FIVE ESTUARIES
OFFSHORE WIND FARM

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ENVIRONMENTAL STATEMENT

VOLUME 5, REPORT 6: MARINE CONSERVATION ZONE ASSESSMENT

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DEFINITION OF ACRONYMS

Term	Definition
CBRA	Cable Burial Risk Assessment
CEA	Cumulative Effects Assessment
CSIP	Cable Specification and Installation Plan
DCO	Development Consent Order
DMLs	Deemed Marine Licences
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EA1N	East Anglia One North
EA2	East Anglia Two
ECC	Export Cable Corridor
EMF	Electro-magnetic Fields
EP	Evidence Plan
EPP	Evidence Plan Process
ES	Environmental Statement
ESNZ	Department for Energy Security and Net Zero
ETG	Expert Topic Group
FOCI	Feature of Conservation Interest
GBS	Gravity-Based System
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
INNS	Invasive Non-Native Species
JUV	jack-up vessels
LSE	Likely Significant Effect
MarESA	Marine Evidence based Sensitivity Assessment
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MCZs	Marine Conservation Zone
MDS	Maximum Design Scenario
MEEB	Measures of equivalent environmental benefit

Term	Definition
MHWS	Mean High Water Springs
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
MPI	Multi-Purpose Interconnector
MW	Megawatts
NSIP	Nationally Significant Infrastructure Project
O&M	Operation and maintenance
OSP	Offshore Substation Platform
OTNR	Offshore transmission network review
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Monitoring Plan
PINS	Planning Inspectorate
SACOs	Supplementary Advice on Conservation Objectives
SEL	Sound Exposure Level
SNCBs	Statutory Nature Conservation Bodies
SoS	UK Secretary of State
SPP	Scour Protection Plan
SSC	Suspended Sediment Concentrations
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Ltd (the Applicant)
WTGs	Wind Turbine Generators
ZoI	Zone of Influence

GLOSSARY OF TERMS

Term	Definition
Array Areas	The areas where the wind turbines will be located.
Array cables	Cables which connect the wind turbines to each other and to the offshore substation(s).
Cumulative effects	The combined effect of Five Estuaries Offshore Wind Farm (VE) in combination with the effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with VE.
Export Cables	Cables that transfer power from the offshore substation(s) or the converter station(s) to shore.
Environmental Statement	The documents that collate the processes and results of the Environmental Impact Assessment.
Offshore Export Cable Corridor	The area(s) where the export cables will be located.
Development Consent Order	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Marine Conservation Zone	A Marine Conservation Zone (MCZ) is a type of marine nature reserve in UK waters. They were established under the Marine and Coastal Access Act (2009) and are areas designated with the aim to protect nationally important, rare or threatened habitats and species.
Marine and Coastal Access Act	The Marine Coastal Access Act 2009 is an act of the Parliament of the United Kingdom. The act introduced a revised system of marine management and licensing, including marine nature conservation.
Mitigation	Mitigation measures, or commitments, are commitments made by the project to reduce and/or eliminate the potential for significant effects to arise as a result of the project.
Order Limits	The extent of development including all works, access routes, TCCs, visibility splays and discharge points.

6 MARINE CONSERVATION ZONE ASSESSMENT

6.1 INTRODUCTION

6.1.1 This report of the Environmental Statement (ES) has been prepared by GoBe Consultants Ltd. and has been produced for the purpose of providing evidence on whether the potential impacts of the Five Estuaries Offshore Wind Farm (hereafter referred to as VE) could give rise to a significant risk of hindering the conservation objectives of Marine Conservation Zones (MCZs) identified in the report. This MCZ assessment has been informed by the following ES chapters and technical reports:

- Volume 6, Part 2, Chapter 1: Offshore Project Description;
- Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes;
- Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology;
- Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology;
- Volume 6, Part 4, Annex 2.1: Physical Processes Baseline Technical Report, and
- Volume 6, Part 4, Annex 2.2: Physical Processes Technical Assessment.

6.1.2 Specific consideration of MCZs is required for any Marine Licence or Development Consent Order (DCO) application containing deemed Marine Licences (DMLs). The Marine Management Organisation (MMO) has specific duties for MCZs and Marine Licence decision making under section 126 of the Marine and Coastal Access Act (MCAA) 2009. Section 126 applies where:

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

6.1.3 This document follows guidance published by the MMO (2013) on how these assessments should be undertaken. The MCZ assessment has been undertaken based on the VE project information provided in Volume 6, Part 2, Chapter 1: Offshore Project Description.

6.1.4 The following three MCZs have been screened in for consideration as a result of their proximity to VE (see section 6.6 and Figure 6.2):

- Blackwater, Crouch, Roach and Colne Estuaries MCZ;
- Kentish Knock East MCZ; and
- Orford Inshore MCZ.

6.1.5 This MCZ assessment will be undertaken by the MMO with this document intended to provide the information required for that assessment, and is structured as follows:

- Section 1: Introduction (this section) – Introduction to the document and the structure of the assessment;
- Section 2: Project overview – A brief overview and description of the Five Estuaries Offshore Wind farm project;

- Section 3: Consultation – Provides a summary of consultation undertaken with respect to the MCZ assessment;
- Section 4: Mitigation measures - Mitigation measures that were identified and adopted as part of the evolution of the project design and that are relevant to the MCZ assessment;
- Section 5: MCZ assessment methodology – Provides an overview of the guidance associated with the assessment and how they should be undertaken;
- Section 6: MCZ screening – This section summarises the screening process and the sights which have been taken forward to the stage 1 assessment;
- Section 7: Background information on MCZs - A description of the MCZs which have been screened in including the protected features and conservation objectives;
- Section 8: Stage 1 assessment – This section provides the stage 1 assessment for the MCZs screened in across all phases of the project, with an assessment of cumulative effects with other plans and projects also provided; and
- Section 9: Conclusions – A conclusion to the MCZ assessment with respect to the conservation objectives of the sites assessed.

6.2 PROJECT OVERVIEW

6.2.1 This section provides a brief overview of the key components of VE. A full description of the project is described in Volume 6, Part 2, Chapter 1: Offshore Project Description. All offshore elements will be installed within the offshore proposed Order Limits. The key offshore elements of VE will be as follows:

- Up to 79 offshore wind turbine generators (WTGs), associated foundations;
- Up to 200 km of Inter- array cables;
- Up to 2 offshore substation platforms (OSPs); and
- Up to 196 km offshore export cables, each in its own trench within the overall cable corridor.

6.2.2 There are several foundation options being considered within the design envelope for VE. These include:

- Monopile;
- Multi-leg pin-piled jacket;
- Mono suction caisson;
- Multi-leg suction caisson jacket;
- Monopile Gravity-Based System (GBS); and
- Multi-leg GBS jacket.

6.2.3 VE will include up to a maximum of two offshore export cable circuits within the offshore export cable corridor (ECC). The cables will be buried below the seabed wherever possible, with a target burial depth defined post-consent. Volume 9, Report 9: Cable Burial Risk Assessment (CBRA) includes detail taking account of the ground conditions and other factors. Possible installation methods for inter-array and export cables include:

- Jet trenching;
- Pre-cut and post-lay ploughing;
- Simultaneous lay and plough (such as a burial sledge) (inter- array cables only);
- Mechanical trenching;
- Dredging (Trailer suction hopper dredger, water injection dredger or backhoe dredger);
- Mass flow excavation;
- Vertical injector; and
- Rock cutting.

6.2.4 In some cases, where burial of the cables cannot be applied, or where minimum cable burial depth cannot be achieved, it is necessary to use cable protection to protect the cable from external damage. Cable protection may consist of one or more of the following methods:

- Rock placement;
- Concrete mattresses;
- Flow dissipation devices;
- Protective aprons, coverings, cladding or pipes; and/ or

- Rock bags.

6.2.5 The offshore export cables will make landfall to a landfall compound located at Sandy Point, to the north west of the golf course, adjacent to Short Lane, between Holland-on-Sea and Frinton-on-Sea on the Essex coast. The works at the landfall, considered within the offshore proposed Order Limits include:

- Horizontal Directional Drilling (HDD) works (or other suitable alternative trenchless techniques such as micro-boring) including temporary construction of sheet piled HDD exit pits in the intertidal or shallow subtidal;
- Intertidal trenching;
- Installation of offshore export cables (cable pulling); and
- Backfilling and re-instatement works.

6.2.6 The final project design will depend on factors including ground and environmental conditions that will be subject to detailed pre-construction surveys, project economics and the approach to procurement of resources. This Chapter is therefore based on the Maximum Design Scenario (MDS) for each impact, defined by the project design envelope (Volume 6, Part 2, Chapter 1: Offshore Project Description). The MDS has been defined within Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes and Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology, as identified within this assessment.

6.3 CONSULTATION

6.3.1 Consultation for ES has been important to the evolution of VE and the parameters for assessment. As part of the EIA process, ongoing consultation has been undertaken with various statutory and non-statutory stakeholders, under the auspices of the Evidence Plan Process (EPP). For this MCZ assessment the Applicant has reviewed the feedback and consultation completed post-publication of the Preliminary Environmental Information Report (PEIR), and feedback has been gathered and subsequently fed back into this assessment, and this Section, along with Section 6.4 of this Chapter regarding mitigation measures, has been updated as appropriate.

6.4 MITIGATION MEASURES

6.4.1 The mitigation measures contained in Table 6.1 are mitigation measures or commitments that have been identified and adopted as part of the evolution of the project design of relevance to the topic, these include project design measures, compliance with elements of good practice and use of standard protocols.

Table 6.1: Relevant mitigation measures.

Project phase	Mitigation measures
General	
Project design	The development boundary selection was made following a series of constraints analyses, with the array area and offshore ECC selected to ensure the impacts on the environment and other marine users are minimised.
Pollution prevention	A Project Environmental Management Plan (PEMP) (Volume 9, Report 18) has been produced to ensure that the potential for contaminant release is strictly controlled. The PEMP will include a Marine Pollution Contingency Plan (MPCP) and will also incorporate plans to cover accidental spills, potential contaminant release and include key emergency contact details (e.g., Environment Agency (EA), Natural England, Maritime Coastguard Agency (MCA) and the project site co-ordinator). The PEMP will be secured as a condition in the deemed Marine Licence(s). Typical measures will include: > Storage of all chemicals in secure designated areas with impermeable bunding (generally to 110% of the volume); and > Double skinning of pipes and tanks containing hazardous materials. The purpose of these measures is to ensure that potential for contaminant release is strictly controlled and provides protection to marine life across all phases of the life of the wind farm.
Pollution prevention	The Applicant commits to the disposal of sewage and other waste in a manner which complies with all regulatory requirements, including but not limited to the IMO MARPOL requirements.[1]
Marine Invasive Non-Native Species (INNS) prevention	The PEMP will also include a marine biosecurity plan detailing how the risk of introduction and spread of INNS will be minimised.
Construction	

[1] https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-%28MARPOL%29.aspx

Project phase	Mitigation measures
Cable Specification and Installation Plan (CSIP)	Development of, and adherence to, a CSIP (Volume 9, Report 12) post consent. The CSIP will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure. The CSIP will also ensure that cable crossings are appropriately designed to mitigate environmental effects, these crossings will be agreed with relevant parties in advance of CSIP submission. The CSIP will include a detailed CBRA to enable informed judgements regarding burial depth to maximise the chance of cables remaining buried whilst limiting the amount of sediment disturbance to that which is necessary. The CSIP will be conditioned in the deemed Marine Licence.
Offshore Cables	Where practicable, cable burial will be the preferred means of cable protection. This will minimise the requirement for surface laid protection.
Project design	A piling Marine Mammal Mitigation Protocol (MMMP) (Volume 9, Report 14.1) has been developed in accordance with the outline MMMP and will be implemented during construction. The piling MMMP will include details of soft starts and ramp up procedures to be used during piling operations.
Landfall	In the nearshore (out to 1,600 m seaward of MHWS), cable remedial protection measures will not include loose rock or gravel. This will greatly limit the blockage of longshore sediment transport and minimise any modification to nearshore waves and tidal currents.
Operation	
Project design	Where burial depth cannot be achieved, cable armouring will be implemented (e.g., mattressing, rock placement etc). The suitability of installing rock or mattresses for cable protection will be investigated, based on (inter alia) the seabed current data at the location of interest and the assessed risk of impact damage.
Decommissioning	
Decommissioning Programme	A Decommissioning Programme will be developed to cover the decommissioning phase as required under Chapter 3 of the Energy Act 2004. As the decommissioning phase will be a similar process to the construction phase but in reverse (i.e., increased project vessels on-site, partially deconstructed structures) the mitigation measure will be similar to those for the construction phase. The Decommissioning Programme will be secured as a condition in the DCO.

6.5 MCZ ASSESSMENT METHODOLOGY

GUIDANCE AND RELEVANT INFORMATION

6.5.1 Guidance published by the MMO (2013) describes how MCZ assessments could be undertaken in the context of marine licensing decisions (Note: there is no published Planning Inspectorate (PINS) guidance or advice on MCZ assessments for DCO applications). These MMO guidelines recommend a staged approach to the assessment, with three sequential stages:

- Screening;
- Stage 1 assessment; and
- Stage 2 assessment.

6.5.2 Full details of each of these stages of the approach are detailed within the MMO (2013) guidance and outlined below in Figure 6.1.

6.5.3 Where specific activities, impacts or MCZs and their features are screened into the MCZ assessment process, these are then considered within the Stage 1 assessment. Should a significant risk of the activity hindering the conservation objectives be identified within Stage 1, then specific impact receptor pathways need to be considered in Stage 2 assessment (Figure 6.1). Full details of each of these stages of the approach have been provided in the following sections.

6.5.4 The approach presented in this MCZ assessment was informed by guidance published by the MMO (MMO, 2013).

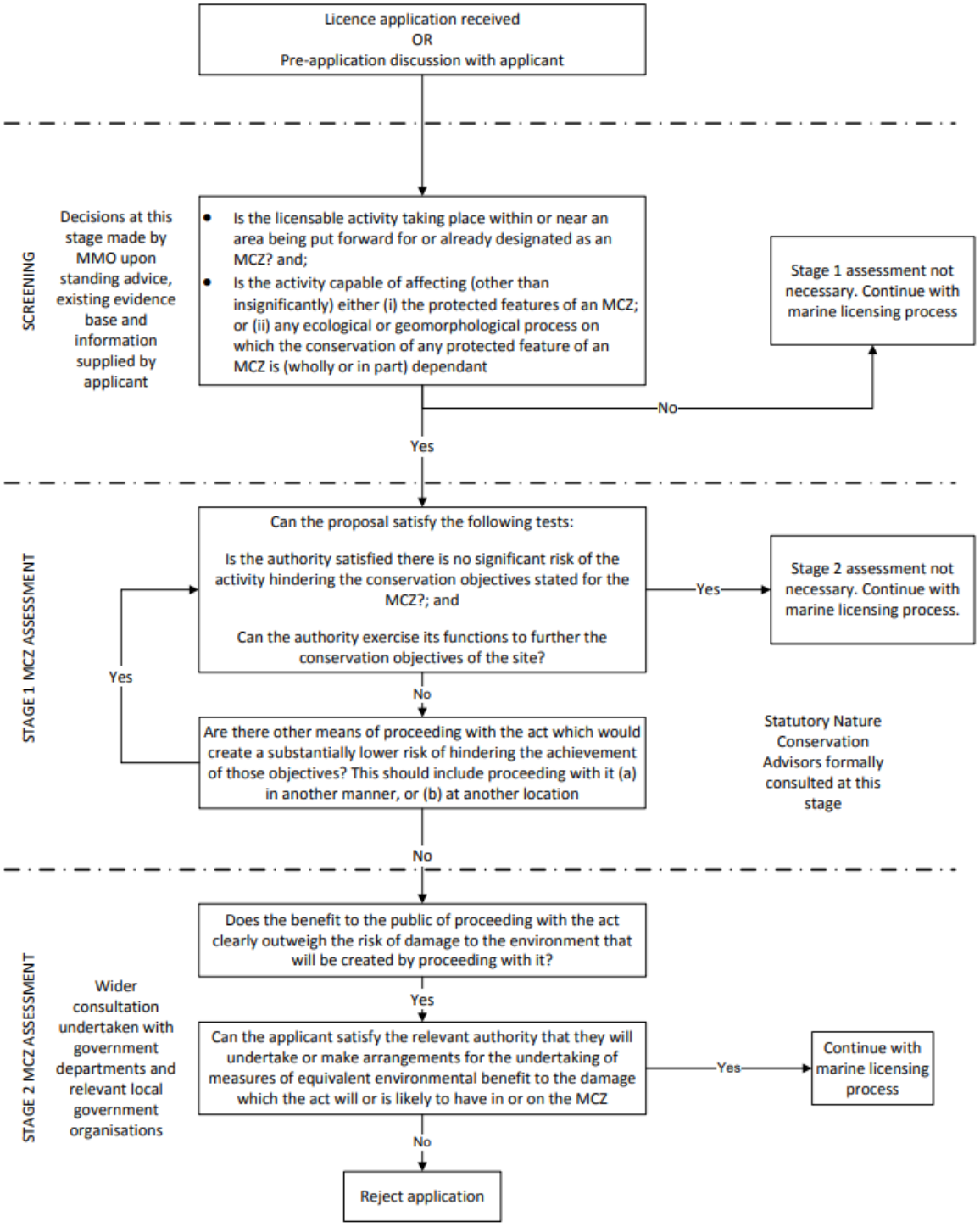


Figure 6.1: Summary of the MCZ assessment process used by the MMO (MMO, 2013).

SCREENING METHODOLOGY

6.5.5 The MMO (2013) guidelines specify, that all marine licence applications need to be screened to determine if Section 126 should apply. It will apply if, through the course of screening, it is determined that:

- the licensable activity is taking place within or near an area being put forward or already designated as an MCZ; and
- the activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

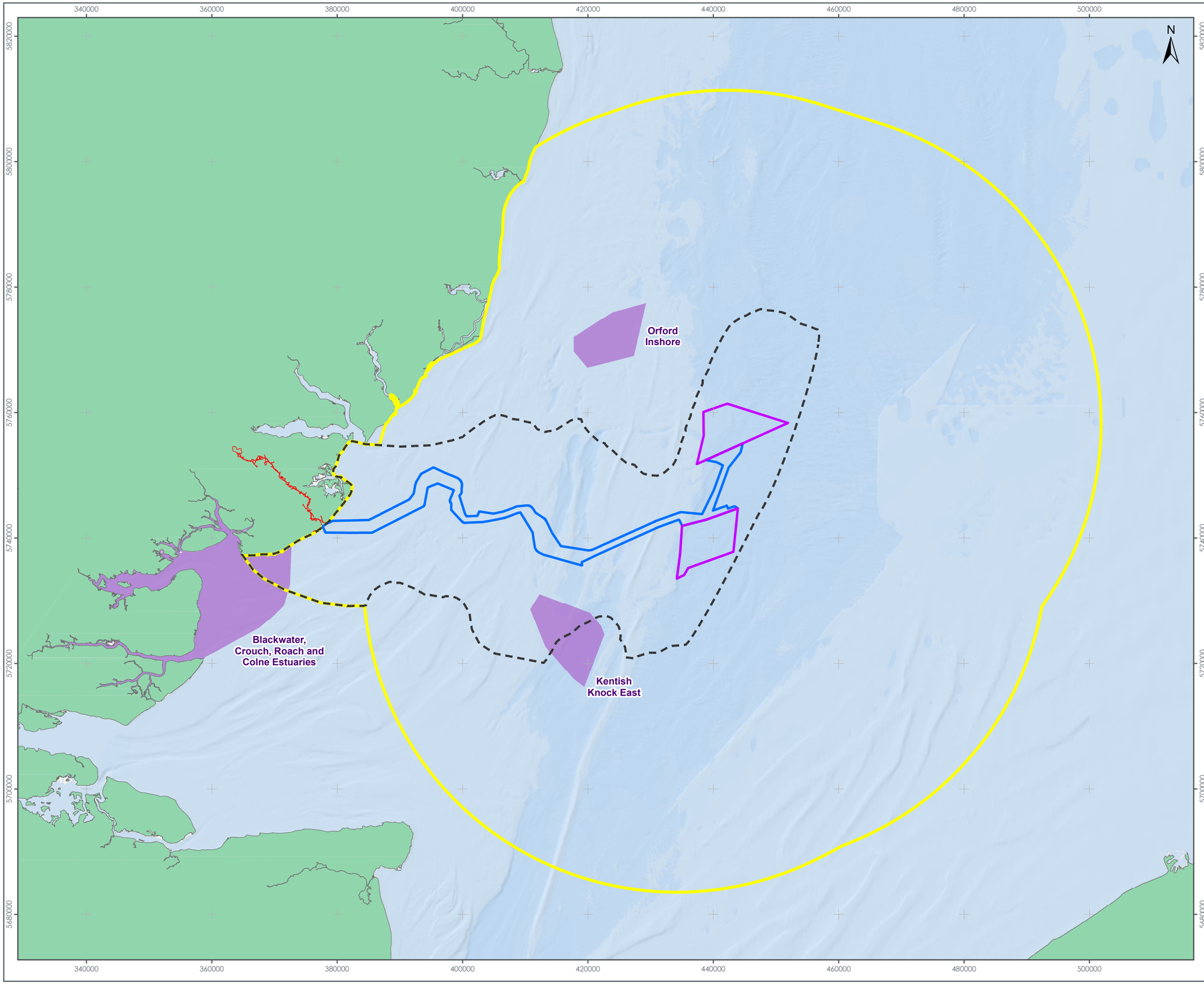
6.5.6 To determine the "nearness" of an activity to individual MCZ and its features, the MMO propose a risk-based approach. This includes applying an appropriate buffer zone to the MCZ features under consideration as well as a consideration of risks which lie in activities further removed from features.

6.5.7 In considering "insignificance", 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 MCZ feature is, wholly or in part, dependent.

6.5.8 For the purposes of the VE MCZ Screening, MCZs considered within the assessment were identified based on proximity to VE as follows:

- Sites with spatial overlap with VE;
- Sites within the study area defined as the proposed Order Limits together with the secondary Zones of Influence (ZoI) relevant to individual indirect impacts:
  - The VE suspended sediment and deposition ZoI, which has been defined based on the expected maximum distance that water from within the VE array areas and offshore ECC might be transported on a single mean spring tide, in the flood and/or ebb direction. The area conservatively indicates the likely spatial extent over which measurable plume effects arising at anytime from anywhere within the proposed Order Limits might be experienced. The maximum distance of the secondary ZoI from the proposed Order Limits is 22.5 km and the minimum distance is 0.85 km (Figure 6.2). This area defines the maximum distance suspended sediments disturbed by development activities might have an impact on benthic habitats, although the majority of suspended sediment is expected to be deposited much closer to the disturbance activity.
  - The exact extents over which noise effect thresholds will be reached has been determined through detailed underwater noise modelling (see Volume 6, Part 5 4, Annex 6.2: Underwater Noise Technical Report), based on the maximum design scenario as relates to the greatest spatial, and greatest temporal effects. The maximum impact range from underwater noise will be up to 39 km from the array areas. However, to ensure a precautionary approach, the ZoI for underwater noise has been informed by impact ranges for the 186 dB re 1

µPa2 s Sound Exposure Level (SEL) for recent UK offshore wind farm applications (Awel y Môr OWF, Sheringham Shoal and Dudgeon OWF Extension Projects, Hornsea Four OWF and Norfolk Boreas OWF), therefore a 50 km ZoI for underwater noise impacts is therefore deemed appropriate for VE.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- SSC and Sediment Deposition ZoI
- Underwater Noise ZoI
- Marine Conservation Zones

0 5 10 20
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

MCZs within the SSC and Deposition and the Underwater Noise ZoIs

VER	DATE	REMARKS	Drawn	Checked
1	12/03/2024	For Information	BPHB	FK

DRAWING NUMBER: 6.2

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:550,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

STAGE 1 ASSESSMENT METHODOLOGY

6.5.9 The Stage 1 assessment, which is presented in Section 6.8, assesses the extent of the potential impact of VE on the MCZs screened into the assessment. The MMO guidance (2013) sets out that Stage 1 assessment needs to consider whether the conditions in Section 126(6) of MCAA can be met. Using information supplied by The Applicant, advice from the Statutory Nature Conservation Bodies (SNCBs) and any other relevant information, the relevant authority would determine whether:

- there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ; and
- the relevant authority can exercise its functions to further the conservation objectives stated for the MCZ .

6.5.10 If the condition in Section 126(6) cannot be met, the Stage 1 assessment also considers whether the condition in Section 127(7)(a) can be met, which requires the relevant authority to determine whether:

- there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ. This should include proceeding with it (a) in another manner, or (b) at another location.

6.5.11 In undertaking a Stage 1 assessment the relevant authority consults with SNCBs for a period of 28 days, unless the SNCB notifies the relevant authority that it need not wait, or the relevant authority determines that there is an urgent need to grant authorisation (in accordance with section 126(4) of the MCAA).

6.5.12 In Stage 1 the conservation objectives for the MCZ features need to be considered. The conservation objectives for MCZ features are high level criteria describing the desired condition of the MCZ features. While conservation objectives for individual MCZs or certain features are often site-specific, the two overarching conservation objectives defined for MCZs are:

- to maintain a feature in favourable condition if it is already in favourable condition; or
- to bring a feature into favourable condition if it is not already in favourable condition.

6.5.13 When considering whether an activity can “further” (for instance, increase the likelihood that the current status of a feature would be maintained or improve) or “hinder” the conservation objectives of a site, the relevant authority considers the direct impact of an activity upon a feature as well as any applicable indirect impacts. An indirect impact may include, for example, changing the effectiveness of a site-specific management measure put in place to further its conservation objectives.

6.5.14 With respect to “other means”, the Applicant should be able to demonstrate that the proposed approach to development reduces the risk such that the activity no longer has a significant risk of hindering the conservation objectives of the site. Where sufficient mitigation to reduce the predicted impacts to an acceptable level cannot be implemented and there are no other means that substantially lower the risk of hindering the achievement of conservation objectives, then a Stage 2 assessment would be required.

6.5.15 Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology and Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology present assessments of the impacts of VE on the ecological marine environment with regards to benthic, fish and shellfish receptors. The definitions of the magnitude of impacts, sensitivity of receptors and the significance of effects on those receptors are defined within these chapters, respectively. These definitions have also been adopted for the purposes of this MCZ assessment, with the term 'effect' used to express the consequence of an impact. This is expressed as the 'significance of effect' and is determined by considering the magnitude of the impact alongside the sensitivity of the receptor or resource, in accordance with defined significance criteria as defined in the respective chapters and bringing forward the conclusions of the assessments from the relevant ES chapters.

STAGE 2 ASSESSMENT METHODOLOGY

6.5.16 Stage 2 of the MCZ assessment considers whether the conditions in Sections 126(7)(b) and (c) of the MCAA can be met. From the approach suggested by the MMO (2013), the relevant authority will use information supplied by the Applicant with the licence application, advice from the SNCBs and any other relevant information to determine whether:

- the benefit to the public of proceeding with the proposed activity clearly outweigh the risk of damage to the environment that will be created by said activity; and, if so, then whether;
- the Applicant can satisfy the relevant authority that they will make arrangements for the undertaking of Measures of Equivalent Environmental Benefit (MEEB) to the damage which the activity is likely to have on the MCZ. The above determinations will be addressed in sequence, that is, if the public benefit test is not "passed" then a consideration of MEEB would not be made as the application would be rejected.

6.5.17 In determining "public benefit" benefits at a national, regional or local level will be considered by the relevant authority. Applications for activities that are of solely private benefit do not qualify as delivering a benefit to the public.

6.5.18 Guidance from the MMO on what constitutes MEEB suggests that "*types of compensatory measures that might be considered under the Habitats Directive will also be appropriate2, although consideration will not be confined to those measures alone*."

[2] Although the EU Habitats Directive does no longer apply, compensatory measures that might be considered for European sites under The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, could be referred to in developing MEEB.

6.6 MCZ SCREENING

6.6.1 This section follows the MMO (2013) guidelines and uses a risk-based approach to determine the MCZs that could potentially be affected by VE. A precautionary approach has been taken within this report by considering all of the potential designated features of the relevant MCZs, and the processes upon which they rely, prior to any screening out of MCZ sites or their protected features.

MCZS RELEVANT TO VE

6.6.2 In addressing the following point of the MCZ screening process *"the licensable activity is taking place within or near an area being put forward or already designated as an MCZ",* MCZs in the vicinity of the VE were identified.

6.6.3 A number of MCZs have the potential to be affected by VE and these have been identified. This list has been reviewed in light of their proximity to VE criteria based on sites that fall within the study area, as detailed within paragraph 6.5.8.

6.6.4 MCZs which have the potential to be affected by VE are:

- Blackwater, Crouch, Roach and Colne Estuaries MCZ;
- Kentish Knock East MCZ; and
- Orford Inshore MCZ.

6.6.5 The locations of the MCZs are shown in Figure 6.2. The distance of the MCZs to VE are presented in Table 6.2, as well as the Features of Conservation Interest (FOCI) and conservation objectives for each MCZ.

Table 6.2: MCZ qualifying features and distance to VE

Site	Qualifying features	Distance from VE ECC	Distance from VE Array area
Blackwater, Crouch, Roach and Colne Estuaries MCZ	> Intertidal mixed sediments > Native oyster (*Ostrea edulis*) beds > Native oyster (*O. edulis*) > Clacton Cliffs and Foreshore	5.8 km distance from the offshore ECC	61.7 km distance from the array area
Kentish Knock East MCZ	> Subtidal sand > Subtidal coarse sediment > Subtidal mixed sediment	6.2 km and distance from the offshore ECC	14.3 km distance from the array area
Orford Inshore MCZs	> Subtidal mixed sediment	20.2 km distance from the offshore ECC	14.3 km from the array area

IMPACTS CONSIDERED

6.6.6 To assess, whether *"the activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant",* the conclusions of relevant ES sections were reviewed. Impacts that have the potential to affect designated MCZ features were identified as part of the EIA Screening (Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology and Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology).

DIRECT IMPACTS

6.6.7 The offshore ECC and proposed array areas do not directly overlap with any of the MCZs mentioned above in Section 6.6.4 and as a result no direct impacts on any of the sites will occur. All direct impacts (for example temporary and permanent habitat disturbance and / or loss due to seabed preparation, sandwave clearance, placement of scour protection etc.) will occur within the offshore ECC and array areas and have therefore been **scoped out** of any further assessment in this MCZ assessment.

INDIRECT IMPACTS

6.6.8 Indirect effects from VE are considered further given the proximity of the offshore export cable corridor to the boundary of each MCZ site and the potential for indirect effects.

6.6.9 The MMO guidance states the MCZ assessment process requires impacts to be assessed, unless the impact is deemed insignificant (MMO, 2013). Impacts which can be concluded as having a negligible impact magnitude (in EIA terms) on features of an MCZ are considered to present a sufficiently low risk, to its protected features or the ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent, to allow these impacts to be screened out at this stage.

6.6.10 Indirect impacts that were assigned a 'negligible' magnitude in the ES assessment (Section 10 to 12 of Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology and Chapter 6: Fish and Shellfish Ecology) have therefore been screened out based on "insignificance" and are therefore not taken through to the Stage 1 assessment. These include:

- Construction and decommissioning:
  - Direct and indirect seabed disturbances leading to the release of sediment contaminants;
  - Increased risk of introduction or spread of Marine Invasive Non-Native Species (INNS)
  - Impacts on fishing pressure due to displacement; and
  - Direct damage (e.g. crushing) and disturbance to mobile demersal and pelagic fish and shellfish species arising from construction activities.
- Operation and Maintenance:
  - Colonisation of hard substrates;
  - Increased risk of introduction or spread of Marine Invasive Non-Native Species (INNS);
  - Changes in physical processes;
  - EMF effects generated by inter-array and export cables during operational phase;
  - Underwater noise as a result of operational WTGs and maintenance vessel traffic resulting in potential effects on fish and shellfish receptors;
  - Temporary increase in suspended sediment concentrations (SSC) and deposition arising from operation and maintenance activities;
  - Impacts on fishing pressure due to displacement;
  - Long-term loss of habitat due to the presence of WTGs foundations, scour protection and cable protection; and
  - Increased hard substrate and structural complexity as a result of the introduction of WTGs foundations, scour protection and cable protection.

6.6.11 Impacts that are considered further in the MCZ screening and assessment process include:

- Construction and decommissioning:
  - Temporary increase in SSC and sediment deposition;
  - Seabed disturbances leading to the release of sediment contaminants;
  - Particle motion and underwater noise; and
  - Geomorphological process.
- Operation and maintenance:
  - Temporary increase in SSC and sediment deposition;
  - Seabed disturbances leading to the release of sediment contaminants; and
  - Geomorphological process.

SCREENING ASSESSMENT

TEMPORARY INCREASE IN SSC AND SEDIMENT DEPOSITION

6.6.12 Indirect effects from VE, such as the effects of suspended sediments, are considered further for all MCZs within the secondary ZoI, as described in Section 6.5.8 and shown in Figure 6.2.

6.6.13 The secondary ZoI conservatively indicates the likely spatial extent over which measurable suspended sediment plume impacts arising at anytime from anywhere within the proposed Order Limits might be experienced.

ORFORD INSHORE MCZ

6.6.14 Orford Inshore MCZ is located 14.3 km away at its nearest point to VE and so is beyond the secondary ZoI. As a result, there is no expected impact or change to SSC nor a measurable sediment deposition. As such, there is no identified receptor-impact-pathway to this MCZ associated with construction, operation, or maintenance and decommissioning activities within the array areas and offshore ECC. Therefore, an assessment of SSC and sediment deposition is **screened out** for Orford Inshore MCZ.

BLACKWATER, CROUCH, ROACH AND COLNE ESTUARIES MCZ

6.6.15 The Blackwater, Crouch, Roach and Colne Estuaries MCZ is within the secondary ZoI for increased SSC and deposition. The site boundary is approximately 5.8 km from the offshore ECC at its closest point).

6.6.16 The receptor-impact pathway for SSC and deposition is expected to occur during the construction phase and specifically for the installation of the export cables or other associated works occurring in the nearshore region closest to the MCZ. Impacts during the operation and maintenance phase could arise from cable maintenance activities. The effects from these operational impacts are expected to be similar (or less) in magnitude to those arising during the construction phase, with impacts localised to site of maintenance works, and are predicted to be much more limited in extent (by merit of the more limited nature of the works) and unlikely to significantly impinge on the MCZ. During the decommissioning phase, cables are likely to be removed and impacts are likely to be no greater (and likely less than) those arising from the construction works. It is noted that the decommissioning methodology will be confirmed through the development of a decommissioning plan during the post-consent phase.

6.6.17 Given the theoretical potential for increased suspended sediment concentrations and associated deposition arising from works within the offshore ECC and array areas during the construction, operation and maintenance and decommissioning phases, it is concluded that the works are capable of indirectly affecting the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ. Therefore, the indirect impact from increases in SSC and subsequent sediment deposition from the plume are **screened in** for the Stage 1 Assessment.

KENTISH KNOCK EAST MCZ

6.6.18 The Kentish Knock MCZ is within the ZoI for increased SSC and deposition and smothering are expected from foundation and cable installation works (including HDD installation) and seabed preparation works (including sandwave clearance). The site boundary is approximately 6.2 km from the offshore ECC at its closest point (Figure 6.2).

6.6.19 The potential impacts on the Kentish Knock East MCZ are expected to be similar in nature to those described above for the Blackwater, Crouch, Roach and Colne Estuaries MCZ, with indirect impacts from increased SSC and associated deposition during the construction, operation and maintenance (O&M) and decommissioning phases.

6.6.20 Therefore, given the theoretical potential for sediment plumes arising from works within the offshore ECC and array areas, it is concluded that there is the potential for interaction with the Kentish Knock MCZ. Therefore, the indirect impact from increases in SSC and subsequent sediment deposition from the plume are **screened in** for the Stage 1 assessment.

SEABED DISTURBANCES LEADING TO THE RELEASE OF SEDIMENT CONTAMINANTS

6.6.21 As a result of construction, operation and decommissioning activities and associated sediment deposition, there is the potential for sediment bound contaminants, such as metals, hydrocarbons, and organic pollutants, to be released into the water column and lead to an effect on benthic ecology receptors within the MCZs potentially affected by VE.

ORFORD INSHORE MCZ

6.6.22 Orford Inshore MCZ is located 14.3 km away at its nearest point to VE and so is beyond the secondary ZoI. The majority of resuspended sediments are expected to be deposited within the immediate vicinity of the works. Therefore, if there were to be any release of sediment contaminants, they would likely be rapidly dispersed with the tide and/or currents and would not come into contact with the site.

6.6.23 As such, there is no identified receptor-impact-pathway to this MCZ associated with construction, operation, or maintenance activities within the array areas and offshore ECC. Therefore, an assessment of the potential release of sediment contaminants is **screened out** for the Orford Inshore MCZ.

BLACKWATER, CROUCH, ROACH AND COLNE ESTUARIES MCZ

6.6.24 The Blackwater, Crouch, Roach and Colne Estuaries MCZ is within the benthic study area thus the secondary ZoI for increased SSC and therefore there is the potential for re-suspended sediments to release sediment bound contaminants into the water column and thus could theoretically interact with the features of the MCZ.

6.6.25 In particular, it should be noted that this MCZ has native oyster *Ostrea edulis* and native oyster *O. edulis* beds as a designated feature. Filter-feeding shellfish are considered to be more sensitive to marine pollution due to bioaccumulation.

6.6.26 However, considering the distance to the site from the nearest proposed construction and decommissioning activities which are occurring in the offshore ECC (5.8 km at its nearest point), and the fact the majority of any resuspended sediments are expected to be deposited within the immediate vicinity of the works, the release of contaminants from the small proportion of fine sediments is likely to be rapidly dispersed with the tide and/or currents and therefore increased bioavailability resulting in adverse eco-toxicological effects are not expected. Given this, it is therefore concluded that the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ will not be indirectly affected by the potential release of suspended sediment contaminants from works within the offshore ECC and array areas during the construction, operation and maintenance and decommissioning phases and therefore the indirect impact from the release of sediment contaminants are **screened out** for the Stage 1 assessment.

KENTISH KNOCK EAST MCZ

6.6.27 The Kentish Knock East MCZ is located partially within the secondary ZoI for increased SSC and deposition as shown in Figure 6.2. Therefore, there is the potential for these re-suspended sediments to release sediment bound contaminants into the water column and thus could theoretically interact with the MCZ.

6.6.28 However, as above, considering the distance from the site to the offshore ECC area (6.2 km), the nearest point to where any construction and decommissioning activities would take place, it is considered that the majority of any resuspended sediments are expected to be deposited within the immediate vicinity of the works (Volume 6, Part 5, Annex 2.2: Physical Processes Technical Assessment). The release of contaminants from the small proportion of fine sediments is likely to be rapidly dispersed with the tide and/or currents and therefore increased bioavailability resulting in adverse eco-toxicological effects are not expected. Given this, it is therefore concluded that the features of the Kentish Knock East MCZ will not be indirectly affected by the potential release of suspended sediment contaminants from works within the offshore ECC and array areas during the construction, operation and maintenance and decommissioning phases and therefore the indirect impact from the release of sediment contaminants are **screened out** for the Stage 1 assessment.

UNDERWATER NOISE

6.6.29 As a result of indirect impacts from underwater noise arising from foundation installation during construction, there is the potential for effects upon benthic, fish and shellfish ecology receptors within the MCZs potentially affected by VE. It is expected that any benthic features will be primarily affected by particle motion rather than sound pressure. To inform the assessment of potential impacts associated with underwater noise as a result of the installation of foundations, predictive underwater noise modelling has been undertaken for the relevant piling MDS, full details of which are presented in Volume 6, Part 5, Annex 6.2: Underwater Noise Technical Report, Volume 6 Part 2, Chapter 6: Fish and Shellfish Ecology and Volume 6, Part 2, Chapter 7: Marine Mammal Ecology.

ORFORD INSHORE MCZ

6.6.30 Orford Inshore MCZ is located 14.3 km away at its nearest point to VE and therefore there is unlikely to be any potential impact from particle motion or underwater noise. Additionally, the site is designated for subtidal mixed sediments, rather than a particular species and therefore will not be impacted by particle motion or underwater noise.

6.6.31 It is therefore concluded that the features of the Orford Inshore MCZ are **screened out** for the potential indirect impacts from particle motion and underwater noise during the construction phase of VE.

BLACKWATER, CROUCH, ROACH AND COLNE ESTUARIES MCZ

6.6.32 Native oyster *O. edulis* and native oyster beds *O. edulis,* both features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ, do not possess swim bladders or other gas filled organs, such as fish or marine mammals. It is therefore considered these features would be primarily sensitive to particle motion rather than sound pressure (Popper and Hawkins, 2018).

6.6.33 Pile driving is recognised as a source particle motion, generating high levels of particle motion in the nearfield (Hazelwood and Macey, 2016) which could potentially result in injury or mortality to sensitive shellfish. Impacts from particle motion are also likely to occur local to the source, with studies having demonstrated the rapid attenuation of particle motion with distance (Mueller-Blenkle et al., 2010). Studies on blue mussels *Mytilus edulis* and periwinkles *Littorina spp.* exposed to a single airgun at a distance of 0.5 m have shown no effects after exposure (Kosheleva, 1992).

6.6.34 Taking into consideration the distance of the MCZ to the array area (over 60 km) and the understanding that particle motion attenuates rapidly with distance and therefore impacts will occur close to the source, it is expected there will be no behavioural effects, such as anti-predator responses or increased filtration rates (Roberts, 2015). Additionally, any reactions to particle motion are not likely to interfere with the ecological functioning of the native oysters *O. edulis.*

6.6.35 It is therefore proposed that the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ, including the native oyster *O. edulis* and native oyster *O. edulis* beds designated features are **screened out** for the potential indirect impacts from particle motion and underwater noise during the construction phase of VE.

KENTISH KNOCK EAST MCZ

6.6.36 Whilst Kentish Knock East MCZ is within the benthic study area and secondary ZoI, the MCZ is located 14.2 km away from the array area where underwater noise arising from foundation installation will occur. As described above, for Orford Inshore MCZ, none of the protected features of the site are sensitive to the potential effects from particle motion or underwater noise.

6.6.37 It is therefore concluded that the features of the Kentish Knock East MCZ are **screened out** for the potential indirect impacts from particle motion and underwater noise during the construction phase of VE.

GEOMORPHOLOGICAL PROCESS

BLACKWATER, CROUCH, ROACH AND COLNE ESTUARIES MCZ

6.6.38 It is noted that one of the designated features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ is the “Clacton Cliffs and Foreshore.” This is a geological feature of international importance which extends from the land into the subtidal area. Part of the feature is already protected through other designations (underpinned by Clacton Cliffs and Foreshore Site of Special Scientific Interest (SSSI)).

6.6.39 Whilst the site and this feature sit within the benthic study area and secondary ZoI, the feature will not be sensitive to the impacts associated with all phases of the project. This is primarily because there will be no direct impacts upon the site and therefore there is no pathway for any activities to physically interact with this feature and alter any of the geomorphological processes. Similarly, for indirect impacts as described above, such as SSC and deposition, due to the distance from the offshore ECC (5.8 km) it is unlikely that such indirect effects would have a significant effect upon the geological features.

6.6.40 It is therefore concluded that the geological feature (Clacton Cliffs and Foreshore) of the Blackwater, Crouch, Roach and Colne Estuaries MCZ is **screened out** for the potential impacts from changes in geomorphological processes during all phases of VE. It should be noted that Orford Inshore MCZ and Kentish Knock East MCZ do not have any geological features.

SCREENING CONCLUSIONS

6.6.41 The screened-in indirect effects on the Blackwater, Crouch, Roach and Colne Estuaries MCZ and the Kentish Knock MCZ are those arising from the temporary increase in SSC and subsequent sediment deposition arising from seabed preparation and construction activity in the offshore ECC and array areas, during the operation and maintenance and the decommissioning phases (Table 6.3).

6.6.42 In accordance with the MMO guidelines (MMO 2013), any impacts which can be concluded as having a negligible impact magnitude (in EIA terms) on benthic ecology receptors (including features of an MCZ) within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology and Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology have been screened out. These impacts are considered to present a sufficiently low risk to its protected features or the ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent. From the ES chapter (Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology) these include:

- Direct and indirect seabed disturbances leading to the release of sediment contaminants;
- Increased risk of introduction or spread of INNS;
- Permanent habitat loss / alteration;
- Colonisation of hard substrates;
- Changes in physical processes; and
- Electro-magnetic Fields (EMF).

6.6.43 To reiterate, and as stated above, all impacts that are considered “direct impacts,” have also been screened out due to the lack of impact pathway and these include:

- Temporary habitat disturbance;
- Permanent habitat loss / alteration (also considered to have a negligible magnitude); and
- EMF (also considered to have a negligible magnitude).

6.6.44 The impacts arising from increased SSC as a result of construction, operation and maintenance and decommissioning activities on benthic ecology receptors have been screened into the Stage 1 assessment for Blackwater, Crouch, Roach and Colne Estuaries MCZ and Kentish Knock East MCZ (see Table 6.4Table 6.4: Sites screened into the Five Estuaries MCZ assessment, their designated features and conservation objectives).

6.6.45 Impacts upon the Orford Inshore MCZ (located 14.3 km away at its nearest point to VE) have been screened out, as the site sits outside of the ZoI for the benthic and subtidal study area and there is no receptor-impact-pathway to this site associated with construction, operation, or maintenance activities within the array areas and the offshore ECC.

Table 6.3: Screening assessment

Site	Potential Impacts Screened In		
	Construction	O&M	Decommissioning
Kentish Knock East MCZ	> Temporary increase in SSC and sediment deposition	> Temporary increase in SSC and sediment deposition	> Temporary increase in SSC and sediment deposition
Blackwater, Crouch, Roach and Colne Estuaries MCZ	> Temporary increase in SSC and sediment deposition	> Temporary increase in SSC and sediment deposition	> Temporary increase in SSC and sediment deposition

6.7 BACKGROUND INFORMATION ON MCZS

6.7.1 This section provides a summary of the baseline information for the MCZs which are considered within the Stage 1 assessment.

THE KENTISH KNOCK EAST MCZ

6.7.2 The Kentish Knock East MCZ is an inshore site, located approximately 35 km off the east coast of England in the outer Thames Estuary whereby the eastern boundary extends beyond the 12 nm territorial seas limit (JNCC, 2020). The site covers an approximate area of 96 km^2, has a depth range of 19 to 52 m and is approximately 6.2 km from its nearest point to the VE offshore ECC (Figure 6.2). The site is designated for subtidal sand, subtidal course sediment and subtidal mixed sediment broadscale marine habitats (Figure 6.3). The varied seabed of the site allows the habitat to support a wide range of species, both within and on the sediment. The Kentish Knock East MCZ was designated in 2019 as part of the third Tranche of MCZ designations (JNCC, 2020).

6.7.3 The Kentish Knock East MCZ seabed is predominantly composed of sediment habitats (Figure 6.3). Broadscale marine habitat mapping of the MCZ (Marine Strategy Framework Directive, hereafter; MSFD, 2017) revealed the habitats with the closest proximity to the offshore ECC are circalittoral coarse sediment, circalittoral mixed sediment and offshore circalittoral coarse sediment (Figure 6.3), all of which correlate with the designated features of the MCZ (Table 6.3).

6.7.4 Natural England's Advice on Operations for the Kentish Knock East MCZ (Natural England, 2021), outlines the sensitivities of each protected feature to the pressures which have been screened in. These are summarised in Appendix A.

THE BLACKWATER, CROUCH, ROACH AND COLNE ESTUARIES MCZ

6.7.5 The Blackwater, Crouch, Roach and Colne Estuaries MCZ is located on the Essex coast and extends from the mean high-water mark to where the estuary mouths join the North Sea (Natural England, 2013). The site is approximately 5.8 km from its nearest point to the VE offshore ECC and covers an area of 284 km^2 (Figure 6.2). The site protects one of the largest estuaries in the east of England and includes the Blackwater River, which is the largest tidal river in Essex. The site was designated in the first tranche of MCZ designations in 2013 for intertidal mixed sediments, native oyster *O. edulis*, native oyster *O. edulis* beds and the Clacton Cliffs, a foreshore geological feature (Table 6.3).

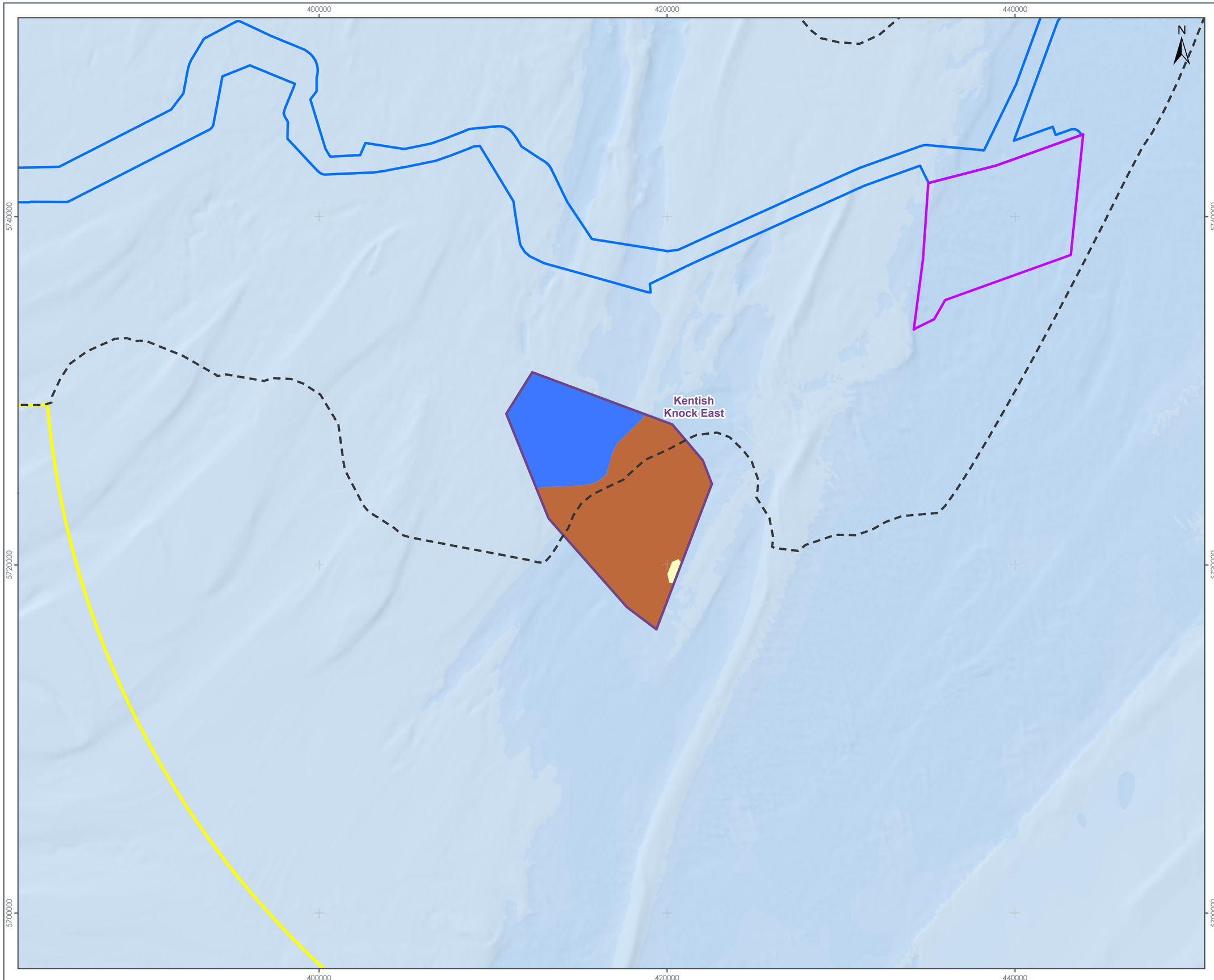
6.7.6 Broadscale marine habitat mapping (MSFD, 2017) of the MCZ revealed the habitats with the closest proximity to the offshore ECC are circalittoral mixed sediment and circalittoral sand (Figure 6.4), both of which correlate with the designated features of the MCZ (Table 6.3). As highlighted above, concentrations of contaminants were considered low within the respective sediment quality guidelines for each contaminant, apart from Arsenic, which were above the Canadian probable effect level, however regional contextualization indicated that the concentrations of arsenic are within the range reported for the Outer Thames Estuary.

6.7.7 Natural England's Advice on Operations for the Blackwater, Crouch, Roach and Colne Estuaries MCZ (Natural England, 2017), outlines the sensitivities of each protected feature to the pressures which have been screened in. These are summarised in Appendix A.

Table 6.4: Sites screened into the Five Estuaries MCZ assessment, their designated features and conservation objectives.

Site Name	Protected Feature	Type of Feature	Condition and General Management Approach	Conservation objectives
Kentish Knock East MCZ	Subtidal sand	Broadscale marine habitat	Maintain in favourable condition	> The extent (of the broadscale habitat) is stable or increasing; and > The structure and function, the 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 the condition remains healthy and does not deteriorate.
	Subtidal course sediment		Recover to favourable condition	
	Subtidal mixed sediments			
Blackwater, Crouch, Roach and Colne Estuaries MCZ	Intertidal mixed sediments	Broadscale marine habitat	Maintain in favourable condition	> The extent (of the broadscale habitat) is stable or increasing; and > The structure and function, the quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or

Site Name	Protected Feature	Type of Feature	Condition and General Management Approach	Conservation objectives
				inhabiting the habitat) are sufficient to ensure that the condition remains healthy and does not deteriorate.
	Native oyster (*O. edulis)* beds	Marine species	Recover to favourable condition	> The quality and quantity of its habitat is recovered; and > The number, age and sex ratio of its population is recovered.
	Native oyster (*O. edulis)*			
	Clacton Cliffs and Foreshore	Geological feature	Maintain in favourable condition	> The extent, component elements and integrity are maintained; and > The structure and functioning are unimpaired its surface remains sufficiently unobscured to determine the above points 1 and 2 are satisfied.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- SSC and Sediment Deposition ZoI
- Underwater Noise ZoI
- Marine Conservation Zones

MSFD Broad Scale Habitats: (UKSeaMap 2021)

- Offshore circalittoral coarse sediment
- Offshore circalittoral mixed sediment
- Offshore circalittoral sand

0 2 4 8
Kilometers

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Broadscale Habitats of Kentish Knock East MCZ

VER	DATE	REMARKS	Drawn	Checked
1	12/03/2024	For Information	BPHB	FK

DRAWING NUMBER: 6.3

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:200,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

340000
360000
380000
5740000
5720000

N

Blackwater,
Crouch, Roach and
Colne Estuaries

LEGEND

- Offshore Export Cable Corridor
- Onshore Order Limits
- SSC and Sediment Deposition ZoI
- Underwater Noise ZoI
- Marine Conservation Zones

MSFD Broad Scale Habitats: (UKSeaMap 2021)

- Infralittoral coarse sediment
- Infralittoral mixed sediment
- Infralittoral mud
- Infralittoral sand
- Circalittoral coarse sediment
- Circalittoral mixed sediment
- Circalittoral mud
- Circalittoral sand
- Offshore circalittoral mixed sediment
- Offshore circalittoral mud
- Offshore circalittoral sand
- Not Applicable

0 2 4 8
Kilometers

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Broadscale Habitats of Blackwater, Crouch, Roach and Colne Estuaries MCZ

VER	DATE	REMARKS	Drawn	Checked
1	12/03/2024	For Information	BPHB	FK

DRAWING NUMBER: 6.4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:200,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

6.8 STAGE 1 ASSESSMENT

6.8.1 The Stage 1 assessment uses a precautionary approach to assess the extent of the potential impact of VE on the MCZs screened into the assessment. Following the MMO (2013) guidance, the Stage 1 assessment considers the conservation objectives for the MCZ features. This MCZ assessment on the features of the Kentish Knock East MCZ and the Blackwater, Crouch, Roach and Colne Estuaries MCZ, has been undertaken with reference to Natural England's Advice on Operations (summarised in Appendix A).

6.8.2 It should be noted that for the purposes of this MCZ assessment, decommissioning impacts are assessed together with construction impacts, as it is assumed that effects arising during decommissioning will be much less than those resulting from construction.

KENTISH KNOCK EAST MCZ

CONSTRUCTION AND DECOMISSIONING PHASE

TEMPORARY INCREASE IN SUSPENDED SEDIMENT CONCENTRATIONS AND SEDIMENT DEPOSITION

6.8.3 Increases in SSC and associated sediment deposition are predicted to occur during the construction phase as a result of cable route pre-sweeping (sandwave clearance and seabed levelling), cable installation and the installation of the array, including any preparatory work for foundations. Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical processes and Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology provides a full description of the assessment of these potential impacts arising from the construction phase on these processes and indirect impacts on the benthos respectively (with the MDS associated with this impact presented in these ES chapters).

6.8.4 Likewise, increases in SSC and associated sediment deposition are predicted to occur during the decommissioning phase as a result of the decommissioning of the export cables and the WTGs. For the purposes of this assessment, it is assumed that decommissioning will involve full removal of the export cables and WTGs. However, the final extent of decommissioning will be determined through the development of a Decommissioning Plan.

6.8.5 Background surface SSCs are known to vary seasonally, with summer SSC ranging from 1-3 mg/l in the array areas, increasing to 10-20 mg/l during winter months. Higher SSCs are anticipated during spring tides and storm conditions, with greatest concentrations close to the seabed. Within the offshore ECC, SSCs are much higher, reaching a peak close to the coast at the landfall. During winter months, mean surface values exceed 100 mg/l although, as for the array areas, higher values are anticipated during spring tides and storm conditions, with the greatest concentrations encountered close to the seabed.

6.8.6 Site-specific modelling of sediment plumes and deposition from seabed preparation and installation activities has been undertaken to quantify the potential footprint of the plumes, their longevity, and the concentration of SSC as well as the subsequent deposition of plume material on the seabed. The results of modelling can be summarised broadly in terms of four main zones of effect:

- 0 to 50 m – zone of highest SSC increases and greatest likely thickness of deposition. All gravel sized sediment likely deposited in this zone, also a large proportion of sands that are not resuspended high into the water column, and most or all dredge spoil in the active phase. Plume dimensions and SSC, and deposit extent and thickness, are primarily controlled by the volume of sediment released and the manner in which the deposit settles;
    - At the time of active disturbance - very high SSC increase (tens to hundreds of thousands of mg/l) lasting for the duration of active disturbance plus up to 30 minutes following end of disturbance; sands and gravels may deposit in local thicknesses of tens of centimetres to several metres; fine sediment is unlikely to deposit in measurable thickness
    - More than one hour after the end of active disturbance - no change to SSC; no measurable ongoing deposition.
- 50 to 500 m – zone of measurable SSC increases and measurable but lesser thickness of deposition. Mainly sands that are released or resuspended higher in the water column and resettling to the seabed whilst being advected by ambient tidal currents. Plume dimensions and SSC, and deposit extent and thickness, are primarily controlled by the volume of sediment released, the height of resuspension or release above the seabed, and the ambient current speed and direction at the time;
    - at the time of active disturbance - high SSC increase (hundreds to low thousands of mg/l) lasting for the duration of active disturbance plus up to 30 minutes following end of disturbance; sands and gravels may deposit in local thicknesses of up to tens of centimetres; fine sediment is unlikely to deposit in measurable thickness.
    - more than one hour after end of active disturbance - no change to SSC; no measurable ongoing deposition.
- 500 m to the tidal excursion buffer distance – zone of lesser but measurable SSC increase and no measurable thickness of deposition. Mainly fines that are maintained in suspension for more than one tidal cycle and are advected by ambient tidal currents. Plume dimensions and SSC are primarily controlled by the volume of sediment released, the patterns of current speed and direction at the place and time of release and where the plume moves to over the following 24 hours;
    - at the time of active disturbance - low to intermediate SSC increase (tens to low hundreds of mg/l) as a result of any remaining fines in suspension, only within a narrow plume (tens to a few hundreds of metres wide), SSC decreasing rapidly by dispersion to ambient values within one day after the end of active disturbance; fine sediment is unlikely to deposit in measurable thickness.

- one to six hours after end of active disturbance - decreasing to low SSC increase (tens of mg/l); fine sediment is unlikely to deposit in measurable thickness.
- six to 24 hours after end of active disturbance - decreasing gradually through dispersion to background SSC (no measurable local increase); fine sediment is unlikely to deposit in measurable thickness. No measurable change from baseline SSC after 24 to 48 hours following cessation of activities.

- Beyond the tidal excursion buffer distance or anywhere not tidally aligned to the active sediment disturbance activity – there is no expected impact or change to SSC nor a measurable sediment deposition.

6.8.7 This modelling therefore highlights that measurable sediment plumes caused by seabed preparation and construction activities are expected to be restricted to within a single tidal excursion from the point of release, which is encapsulated by the secondary ZoI Figure 6.5, highlights these buffers.

6.8.8 The effects of increases in SSC and associated deposition due to decommissioning activities are expected to be equal or less than those during the construction phase. For the purposes of this assessment, it is assumed that cable removal will lead to increases in SSC and subsequent deposition to levels similar to those experienced during the construction phase (i.e., due to the similarity in some of the methods that might be used to install and remove cables, e.g., jetting).

MAGNITUDE

6.8.9 Taking the above into consideration, it can be concluded that there will be a quick dissipation of the sediment plume and local nature (0-50 m) of deposition impacts where smothering effects on benthic habitats and features might be observed. No significant impacts are expected due to the distance of the MCZ from construction activities (6.2 km at its nearest point) (Figure 6.5).

6.8.10 As a result of the distance from any potential construction activities, plus the short-term, intermittent, and reversible nature of these impacts the magnitude of the impact from SSC and associated potential sediment deposition on the features of the Kentish Knock East MCZ is therefore determined to be **negligible** (as concluded within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology).

SENSITIVITY

6.8.11 Natural England's Advice on Operations (Natural England, 2021) (summarised in Appendix A) provides information on the sensitivities of the MCZ features in relation to a variety of activities and pressures. Of relevance to the activities "Power cable: laying, burial, protection and decommissioning" and "offshore wind: during construction and decommissioning" are the pressures "changes in suspended solids" and "smothering and siltation rate changes (light)" and are both assigned a "medium to high" risk profile, with all features (subtidal coarse sediment, subtidal mixed sediments and subtidal sand) identified as sensitive to these pressures, with the exception of subtidal coarse sediments which was considered not sensitive to the pressure 'changes in suspended solids (water clarity)" i.e. increases in SSC.

6.8.12 As detailed within Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology, all biotopes identified within the array areas, offshore ECC and across the wider benthic ecology study area are acclimated to relatively high levels of SSC that occur naturally within this region and consequently, are subject to and able to tolerate variations in SSC and some degree of sediment deposition.

6.8.13 As this site is not expecting high levels of SSC and smothering due to its distance from the works, it is the sensitivity to light smothering as per the Marlin Marine Evidence based Sensitivity Assessment (MarESA) criteria that should be the focus of this assessment. Representative biotopes of subtidal coarse sediments, subtidal mixed sediments and subtidal sands are deemed to have lower levels of sensitivity to light smothering (<5 cm) and changes in SSC, compared to heavy smothering (5 – 30 cm), as can be expected. The results, as presented within Table 5.16, Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology and within Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology, demonstrate that the majority of sedimentary receptors are either not sensitive or have low sensitivity to changes in SSC and turbidity and light smothering. The only medium sensitivity is related to '*Ophiothrix fragilis* and/ or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment' with regards to light smothering, as brittle star beds are not a feature of the Kentish Knock East MCZ there will be no impact.

6.8.14 Taking the above into account, it is concluded that the features of the Kentish Knock East MCZ have a maximum sensitivity of **low** to light smothering and changes in SSC.

SIGNIFICANCE OF EFFECT

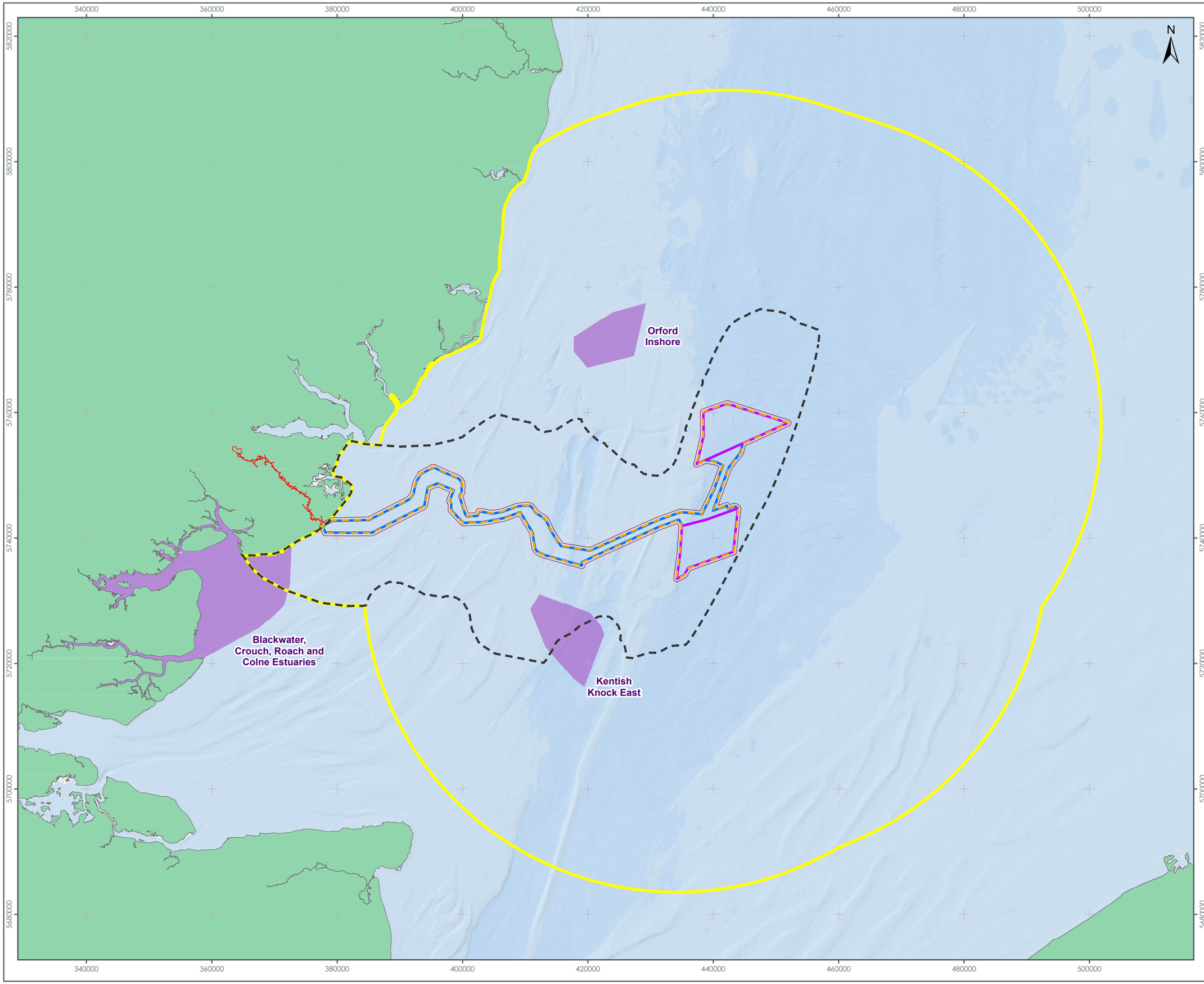
6.8.15 The Kentish Knock East MCZ Supplementary Advice on Conservation Objectives (SACOs)[3] present attributes which are ecological characteristics or requirements of the designated species and habitats within the site and are relevant to subtidal coarse sediments, subtidal mixed sediments and subtidal sands:

- Distribution: presence and spatial distribution of biological communities;
- Extent and distribution;
- Structure and function: presence and abundance of key structural and influential species;
- Structure: sediment composition and distribution;
- Structure: species composition of component communities;
- Supporting processes: sedimentation rate;
- Supporting processes: water quality – dissolved oxygen; and
- Supporting processes: water quality – turbidity.

[3] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UKMCZ0080&SiteName=Kentish%20Knock%20East&SiteNameDisplay=Kentish+Knock+East+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=

6.8.16 With respect to the above attributes the magnitude is deemed **negligible** and the sensitivity of features is deemed **low**. As such, the **low** sensitivity and **negligible** magnitude of impacts arising from increases in SSC and any associated sediment deposition during the operation and maintenance phase on the features of the Kentish Knock East MCZ could result in a minor (not significant) effect. Overall, taking into account the short term and localised nature of this impact and the tolerance and recoverability of the benthic features of the Kentish Knock East MCZ, to increased SSC and deposition, the significance of effect is deemed **minor adverse,** which is not significant in EIA terms.

6.8.17 VE **will not hinder** the conservation targets of the above attributes or the overall conservation objectives of the features of the sedimentary features of the Kentish Knock East MCZ.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- SSC and Sediment Deposition ZoI
- Underwater Noise ZoI
- Marine Conservation Zones
- 50m Buffer
- 500m Buffer

0 5 10 20
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Sediment Buffers and MCZs

VER	DATE	REMARKS	Drawn	Checked
1	12/03/2024	For Information	BPHB	FK

DRAWING NUMBER: 6.5

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:550,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

OPERATION AND MAINTENANCE PHASE

TEMPORARY INCREASE IN SSC AND SEDIMENT DEPOSITION

6.8.18 Increases in SSC and associated sediment deposition are predicted to occur during the operation and maintenance phase as a result of, for example, cable remedial burial, replacement and repairs and the use of any jack-up vessels (JUV). If a section of cable is damaged, the replacement/ repair will utilise similar methodologies to those proposed to install the cables during construction. Therefore, the effects are considered comparable or lesser than those of cable installation in the construction and decommissioning phases but are moderated by the limits on the maximum amount of cable per event.

6.8.19 O&M works that cause increases in SSC and associated deposition will be from cable works in the offshore ECC and inter-array cable replacement within the array areas. in Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical processes and Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology provide a full description of the assessment of these potential indirect impacts on the benthos (with the MDS associated with this impact presented in Table 2.8 of Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical and Table 5.12 of Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology).

6.8.20 As described for the construction and decommissioning phase above, cable remedial burial and cable replacement/ repairs are both predicted to cause sediment plumes. Plume modelling highlights that sediment plumes caused by seabed preparation and construction activities are expected to be restricted to within a single tidal excursion from the point of release, which is encapsulated in the ZoI (Figure 6.5). Therefore, O&M works are likely to have a similar or (more likely) less than extent.

6.8.21 As a result, any sediment plumes are expected to quickly dissipate after cessation of the activities, due to settling and wider dispersion with the concentrations reducing quickly over time to background levels. Sediment deposition will consist primarily of coarser sediments deposited close to the source, with a small proportion of silt deposition (reducing exponentially from source).

MAGNITUDE

6.8.22 The magnitude of the maximum potential increase in SSC resulting from O&M activities is expected to be broadly the same, or less than that during construction.

6.8.23 The magnitude of the impact from SSC and associated potential sediment deposition on the features of the Kentish Knock East MCZ is determined to be **negligble** (as described in Volume 6, Part 2, Chapter 5: Benthic and Intertidal ecology). This is taking account the distance from any potential operation and maintenance activities (6.2 km at its nearest point), plus the short-term, intermittent and reversible nature of these impacts.

SENSITIVITY

6.8.24 The sensitivities of the MCZs features (and their associated attributes) to this pressure are expected to be the same as those described in section 6.8.14 which assessed the features to have a maximum sensitivity of **low,** to an impact of this nature**.**

SIGNIFICANCE OF EFFECT

6.8.25 As detailed above (Section 6.8.15), the significance of effect for O&M is concluded to be equal to or less than the significance of effects during the construction and decommissioning phases. As such, the **low** sensitivity and **negligble** magnitude of impacts arising from increases in SSC and any associated sediment deposition during the operation and maintenance phase on the features of the Kentish Knock East MCZ could result in a minor (not significant) effect. Overall, taking into account the short term and localised nature of this impact and the tolerance and recoverability of the benthic features of the Kentish Knock East MCZ, to increased SSC and deposition, the significance of effect is deemed **minor adverse,** which is not significant in EIA terms.

6.8.26 VE **will not hinder** the conservation targets of the above attributes (paragraph 6.8.15 et *seq.*) or the overall conservation objectives of the features of the sedimentary features of the Kentish Knock East MCZ.

CUMULATIVE EFFECTS

6.8.27 The MCAA does not provide any explicit legislative requirement for cumulative effects on features of MCZs to be considered during the assessment process. 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.

6.8.28 As outlined in Section 5.12 of Volume 6, part 2, Chapter 5: Benthic and Intertidal Ecology, for the purposes of the potential cumulative effects on benthic and intertidal ecology, planned projects were screened into the assessment based on a screening range that encapsulates the VE benthic subtidal study area as defined by the secondary ZoI, which has been defined based on the expected maximum distance that water from within the proposed Order Limits might be transported on a single mean spring tide, in the flood and/or ebb direction. This screening area therefore encompasses the extent of impacts to benthic and intertidal ecology associated with VE. This is then further broken down into Tier 1, 2 and 3 projects that could have the potential for cumulative increases in SSC and associated sediment deposition. A full description of the tiers can be found in Volume 6, Part 1, Annex 3.1: Cumulative Effects Assessment Methodology.

Table 6.5: Description of Tiers of other developments considered for cumulative effect assessment.

Tiers	Development Stage
Tier 1	Projects under construction.
	Permitted applications, whether under the Planning Act 2008 or other regimes, but not yet implemented.
	Submitted applications, whether under the Planning Act 2008 or other regimes, but not yet determined.
Tier 2	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted.
	Projects under the Planning Act 2008 where a PEIR has been submitted for consultation.

Tier 3	Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted.
	Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/ approvals, where such development is reasonably likely to come forward.

6.8.29 The operational projects included within the table are included due to their completion/ commissioning subsequent to the data collection process for VE and as such not included within the baseline characterisation. Operational aggregate licence areas identified in Table 6.6 are considered within this Cumulative Effects Assessment (CEA) as they are located within a distance of one spring tidal excursion ellipse from VE. Accordingly, it is necessary to consider the potential for cumulative changes in SSC and bed levels.

6.8.30 With respect to Kentish Knock East MCZ, projects which are encompassed by this screening area and thus the extent of the impacts are detailed in Table 6.6 and Figure 6.5.

Table 6.6: Cumulative impacts, tiers and justifications of project included in cumulative effects assessment.

Impact	Scenario	Justification
Cumulative temporary increase in SSC and sediment deposition	Tier 1: > Operation of aggregate production areas including Tarmac Marine Ltd (509/1, 509/2, 509/3), CEMEX UK Marine Ltd (510/2, 507/1), Britannia Aggregates Ltd (498) and DEME Building Materials Ltd (524) > Operation of sea disposal sites Inner Gabbard (TH052), Inner Gabbard East (TH056) and Harwich Haven (TH027) > Construction and O&M of NeuConnect Interconnector Tier 2: > Construction of OWF North Falls > Construction of Sea Link Interconnector	If these intermittent activities overlap temporally with either the construction or maintenance of VE, there is potential for cumulative SSC and sediment deposition to occur within the modelled plume footprints

Impact	Scenario	Justification
	Tier 3: > Construction of Lionlink Multi-Purpose Interconnector (MPI) > Construction of Nautilus MPI	

6.8.31 The SSC plumes generated during the construction (and operation) of VE are not predicted to reach the majority of the aggregate and disposal sites in any significant concentrations. The zone of measurable SSC increases, and measurable deposition is within 500 m of the construction impact. Therefore, the only aggregate license area that will overlap in terms of potential significant impact is Tarmac Marine Ltd License Area 509/1. This site lies 100 m for the VE offshore ECC, however is still located outside the 0-50 m zone of highest SSC increase and greatest likely thickness of deposition. Therefore, on account of the distance of the majority of these impacts from the zones of highest impact and the fact that they are intermittent in nature, the magnitude is expected to be **low adverse**.

6.8.32 The consented NeuConnect Interconnector is proposed to cross the northern array area and offshore ECC therefore will interact with the benthic ecology study area. Minor onshore works access works have already begun and it is expected that construction to lay subsea cables and build converter stations will start in 2027, with NeuConnect due to be operational by 2028 (NeuConnect, 2023). There will be one year of construction overlap with VE construction. Operation and maintenance of NeuConnect Interconnector will also overlap with VE construction. The installation of the NeuConnect Interconnector and any subsequent increases in SSC and sediment deposition that would have the potential to pose a significant smothering impact to benthic ecology receptors is expected to short-term and localised to the development area. Additionally given the relatively limited overlap with the study area compared to the interconnector's overall extent (28%), significant cumulative effects are not anticipated.

6.8.33 The magnitude of impacts from the Tier 1 projects identified is therefore considered to be worst-case **low adverse.**

6.8.34 The Tier 2 project Sea Link is a proposed offshore High Voltage Direct Current (HVDC) link between Suffolk and Kent, the purpose of which is to take the power brought in by East Anglia One North (EA1N), East Anglia Two (EA2), Nautilus MPI, Lionlink and Sizewell from Suffolk down to Kent to distribute within the Thames Valley where it is needed. There is currently limited detail on the project and therefore it is not possible to make a detailed assessment of the significance of effect, however it is predicted that any increases in SSC and sediment deposition from the construction, operation and maintenance will be short term and localised to the site. It is not anticipated that any effects, once qualified, would result in a significant impact in EIA terms.

6.8.35 The Tier 3 project Nautilus MPI is a proposed interconnector at the pre-scoping stage of consenting. The interconnector would be a subsea electricity cable that connects Great Britain to neighbouring energy markets in Belgium. This project forms part of the Offshore transmission network review (OTNR), which investigates the way that the offshore transmission network is designed and delivered, consistent with the ambition to deliver net zero emissions by 2050.

6.8.36 The Tier 3 project LionLink is another proposed MPI project also at the pre-scoping stage of consenting. The project would deliver a new electricity link between Great Britain to the Netherlands. Whilst limited information is available at this time, it is expected that *if* consented LionLink and Nautilus MPI construction activities will overlap with VE construction.

6.8.37 Tier 2 project North Falls OWF and (as discussed) the Tier 3 Nautilus MPI and LionLink MPI's are likely to overlap their construction impacts, with VE construction, which is predicted to increase SSC and deposition within the wider benthic ecology study area. It is not known what volumes of sediment are likely to be displaced as the project has not submitted its environmental assessment. However, we do know that the projects will cause intermittent disturbances over the construction period and that spatial overlap resulting in a heavy level (5 to 30 cm) of deposition is unlikely (as this is only predicted to occur within 0 to 50 m of impact, based on the physical processes assessment (Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes and Volume 6, Part 5, Annex 2.2: Physical Processes Technical Assessment)).

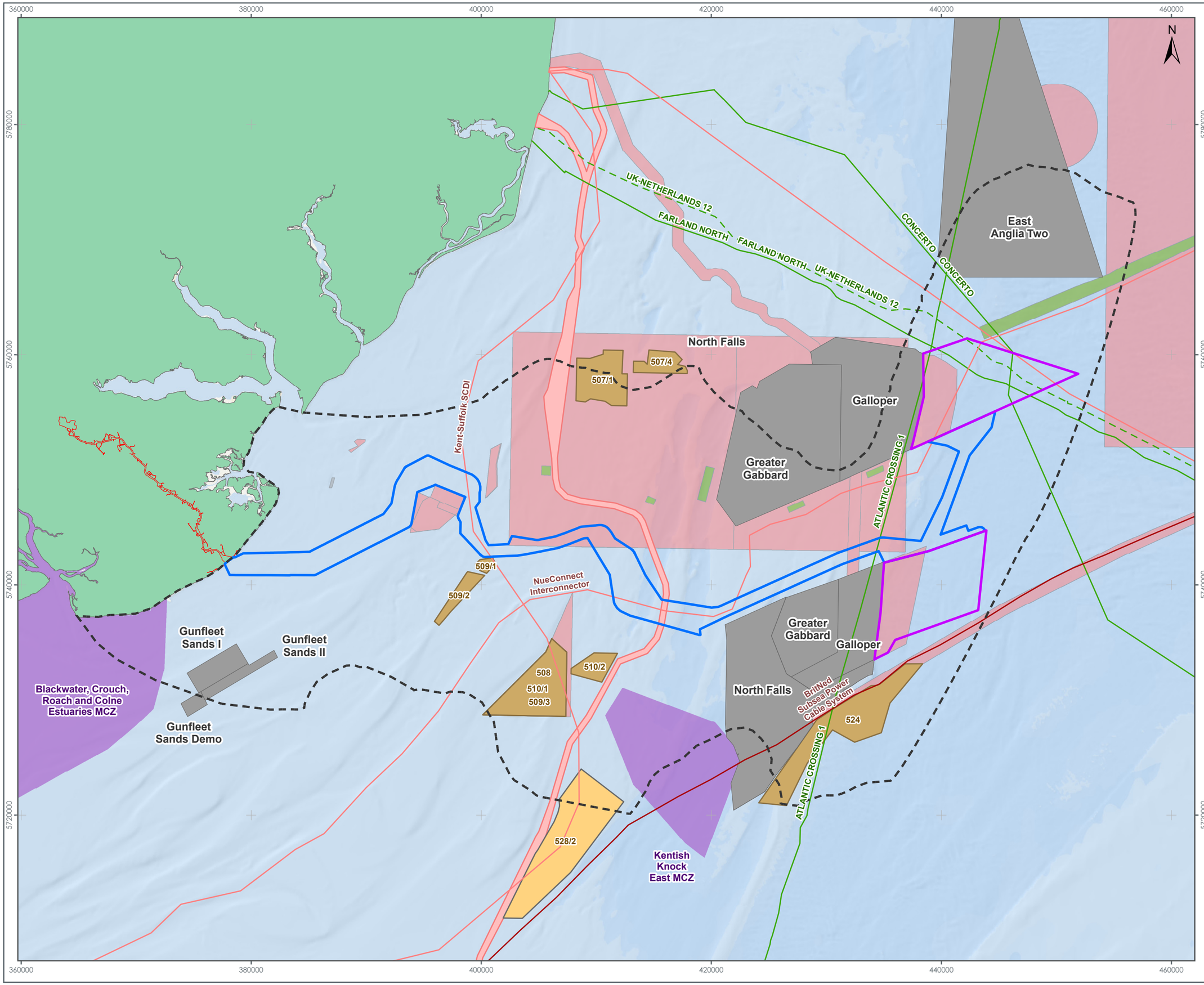
6.8.38 The cumulative impacts of increased SSC and sediment deposition is deemed to be **low adverse** magnitude, indicating that the potential is for localised disturbance that does not threaten the permanent viability of the resource.

6.8.39 Full discussion of the sensitivity of the features of the Kentish Knock East MCZ to increased SSC and sediment deposition is discussed above in Section 6.8.14 which concluded that the features that have the potential to be indirectly affected by increased SSC and deposition within the benthic ecology study area have a worst-case **low** sensitivity to the expected levels of SSC and deposition.

6.8.40 Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology concluded that the sensitivity of the receptors is worst-case **low**, and the magnitude is **low** adverse. The short-term and/or localised nature of the potential impact and the tolerance and recoverability of the majority of the benthic receptors, the significance of the residual effect is deemed **minor adverse**, which is not significant in EIA terms.

6.8.41 It is expected that the greatest levels of SSC and the majority of the deposition will occur in close proximity to the source with only low concentrations and levels of deposition extending further in the form of sediment plumes and having the potential to interact with the Kentish Knock East MCZ; therefore it is concluded that there will be no significant cumulative impacts from these sites or projects on the Kentish Knock East MCZ, and therefore **no hinderance** to the conservation objectives, as:

- The extent of the designated features will be maintained, despite increased SSC or associated deposition, and will remain stable during the construction phase; and
- The structure and function, quality and composition of characteristic biological communities will remain in a stable and healthy condition which will not deteriorate from impacts of the pressure.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- SSC and Sediment Deposition ZoI
- Marine Conservation Zones
- Offshore Wind Farm

Aggregates Areas:

- Exploration and Option Area
- Production Agreement Area

Disposal Sites:

- Closed
- Disused
- Open

Subsea Cable (Type - Status)

- Power - Active
- Power - Proposed
- Telecom - Active
- Telecom - Disused
- SeaLink Interconnector

0 2.5 5 10
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
Projects and plans screened into the VE cumulative effects MCZ assessment

VER	DATE	REMARKS	Drawn	Checked
1	12/03/2024	For Information	BPHB	FK

DRAWING NUMBER: 6.6

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:300,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

BLACKWATER, CROUCH, ROACH AND COLNE ESTUARIES MCZ

6.8.42 This MCZ assessment on the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ has been undertaken with reference to Natural England's Advice on Operations (Natural England, 2017) (summarised in Appendix A).

CONSTRUCTION AND DECOMISSIONING PHASE

TEMPORARY INCREASE IN SUSPENDED SEDIMENT CONCENTRATIONS AND SEDIMENT DEPOSITION

6.8.43 The activities expected to result in increases in SSC and associated sediment deposition during construction and decommissioning are described above in Section 6.8.3. Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical processes and Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology provides a full description of the assessment of these potential impacts arising from the construction phase on marine processes and indirect impacts on the benthos respectively (with the MDSs associated with this impact presented in these ES chapters).

6.8.44 The Blackwater, Crouch, Roach and Colne Estuaries MCZ is located 5.8 km away from the offshore ECC, at its nearest point. As a result, and as described in bullet point 3 of Section 6.8.6, the site sits within the '500 m to the tidal excursion buffer distance,' which is described as the zone of 'lesser but measurable SSC increase and no measurable thickness of deposition'. This is illustrated further in Figure 6.5.

MAGNITUDE

6.8.45 The magnitude of the impact from SSC and associated potential sediment deposition from the VE construction and decommissioning phase on the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ will be similar in nature to that detailed in Section 6.8.22. This concluded that the impacts of increased SSC and associated deposition arising from construction activities associated with the ECC and array areas on features of the MCZ are predicted to be short term, intermittent, reversible and of localised extent. It is predicted that this impact would be of **negligible** magnitude (as described in Volume 2, Chapter 5: Benthic and Intertidal ecology). This is also taking account the distance from any potential construction activities (5.8 km at its nearest point to the offshore ECC). Figure 6.5 highlights the buffer distances in relation to this MCZ and the potential interaction with any features.

SENSITIVITY

6.8.46 The available Natural England Advice on Operations (Natural England, 2017) (summarised in Appendix A) for the features intertidal mixed sediments, native oyster *O. edulis*, native oyster *O. edulis* beds indicates that the pressures 'changes in suspended solids (water clarity)', and 'smothering and siltation changes (light)' for activities associated with cable installation and decommissioning have been assigned a "medium-high" risk profile.

6.8.47 The features native oyster *O. edulis* beds and native oyster *O. edulis* have been assessed as both sensitive to the pressure "smothering and siltation rate changes," whereas native oyster *O. edulis* beds are assessed as not sensitive to the pressure "changes in suspended solids (water clarity).

6.8.48 Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology details that native oyster *O. edulis* are suspension feeders, feeding on phytoplankton, bacteria, particulate detritus and dissolved organic matter (DOM) (Korringa, 1952; Yonge, 1960), therefore the addition of fine sediment, would potentially increase food availability for native oysters *O. edulis*. However, small increases in sediment deposition have been found to reduce growth rates in native oyster *O. edulis* (Grant *et al*., 1990), with smothering potentially preventing the flow of water through the oyster that permits respiration, feeding and removal of waste. In addition, native oyster are permanently fixed to the substratum and therefore would not be able to burrow up through the deposited material (Perry and Jackson, 2017). Due to their commercial and conservation value to the region, native oyster *O. edulis* are considered to be of **medium** sensitivity to impacts from increased SSC and deposition.

6.8.49 Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology details that intertidal sediments are naturally subject and acclimated to relatively high levels of SSC that occur naturally within this region and consequently, are subject to and able to tolerate variations in SSC and some degree of sediment deposition. Mixed intertidal sediments are expected to be at worst-case **low** sensitivity to the expected levels of SSC and deposition, based on representative biotopes using the Marlin MarESA assessment.

6.8.50 It should be noted that although the Blackwater, Crouch, Roach and Colne Estuaries MCZ is within the ZoI, it is 5.8 km away from the offshore ECC, and within the 500 m to the tidal excursion buffer distance, where there is considered to be a lesser but measurable SSC increase and no measurable thickness of deposition.

6.8.51 Taking the above into account, it is concluded that the features of Blackwater, Crouch, Roach and Colne Estuaries MCZ have a maximum sensitivity of **medium**.

SIGNIFICANCE OF EFFECTS

6.8.52 The following SACOs present attributes which are ecological characteristics or requirements of the designated intertidal mixed sediment habitat within the site and are relevant to subtidal coarse sediments, subtidal mixed sediments and subtidal sands:

- Distribution: presence and spatial distribution of biological communities;
- Extent and distribution;
- Structure and function: presence and abundance of key structural and influential species;
- Structure: sediment composition and distribution;
- Structure: species composition of component communities;
- Supporting processes: sedimentation rate;
- Supporting processes: water quality – dissolved oxygen; and
- Supporting processes: water quality – turbidity.

6.8.53 The following SACOs present attributes which are ecological characteristics or requirements of the designated oyster and oyster beds within the site:

- Extent and distribution
- Structure: species composition of the community

- Structure: population density
- Structure: non-native species and pathogens (habitat)
- Structure: age / size frequency
- Structure and function: presence and abundance of key structural and influential species
- Supporting processes: areas with conditions suitable for native oyster bed formation
- Supporting processes: physico-chemical properties (habitat)
- Supporting processes: sedimentation rate
- Supporting processes: water movement and energy
- Supporting processes: water quality - contaminants (habitat)
- Supporting processes: water quality - dissolved oxygen (habitat)
- Supporting processes: water quality - nutrients (habitat)
- Supporting processes: water quality - turbidity (habitat)
- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Supporting habitat: extent and distribution
- Supporting processes: physico-chemical properties (species)
- Supporting processes: sediment movement and hydrodynamic regime (species)
- Supporting processes: water quality - contaminants (species)
- Supporting processes: water quality - dissolved oxygen (species)
- Supporting processes: water quality - nutrients (species)
- Supporting processes: water quality - turbidity (species)

6.8.54 With respect the above attributes the magnitude is deemed **negligible** and the sensitivity of features is deemed **medium**. Increases in SSC and any associated sediment deposition during the construction and decommissioning phase on the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ could result in a minor (not significant) effect. Overall, taking into account the short term and localised nature of this impact and the tolerance and recoverability of the benthic features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ, to increased SSC and deposition, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.

6.8.55 VE **will not hinder** the conservation targets of the above attributes or the overall conservation objectives of the features of the sedimentary features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ.

OPERATION AND MAINTENANCE

TEMPORARY INCREASE IN SSC AND SEDIMENT DEPOSITION

6.8.56 The activities expected to result in increases in SSC and associated sediment deposition during O&M is described above in Section 6.8.18. Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical processes and Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology provides a full description of the assessment of these potential impacts arising from the O&M phase on marine processes and indirect impacts on the benthos respectively (with the MDS associated with this impact presented in these ES chapters).

6.8.57 As highlighted in section 6.8.19, it is expected that most operation and maintenance works that cause increases in SSC and associated deposition will be from cable works in the offshore ECC and inter-array cable replacement within the array areas However, it can be assumed that any works undertaken upon the array during operation and maintenance will have a less than or equal than effect than assessed during construction.

MAGNITUDE

6.8.58 The magnitude of the maximum potential increase in SSC resulting from operation and maintenance activities is expected to be broadly the same (or less than) that during construction and as detailed in Section 6.8.45.

6.8.59 The magnitude of the impact from SSC and associated potential sediment deposition on the features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ is determined to be **negligble** (as described in Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology). This is taking account the distance from any potential operation and maintenance activities (6.2 km at its nearest point), plus the short-term, intermittent, and reversible nature of these impacts.

SENSITIVITY

6.8.60 The sensitivities of the MCZs features to this pressure are expected to be the same as those described in Section 6.8.46, which assessed the features to have a maximum sensitivity of **medium.**

SIGNIFICANCE OF EFFECT

6.8.61 As detailed above (Section 6.8.55), the significance of effect for operation and maintenance is concluded to be equal to or less than the significance of effect during the construction and decommissioning phases. As such, the **medium** sensitivity and **negligible** magnitude of impacts arising from increases in SSC and any associated sediment deposition during the operation and maintenance phase on the features of the MCZ could result in a minor (not significant) effect. Overall, taking into account the short term and localised nature of this impact and the tolerance and recoverability of the benthic features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ, to increased SSC and deposition, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.

6.8.62 VE **will not hinder** the conservation targets of the above attributes or the overall conservation objectives of the features of the sedimentary features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ.

CUMULATIVE EFFECTS

6.8.63 The approach to the cumulative effects assessment for the Blackwater, Crouch, Roach and Colne Estuaries MCZ is as previously described for the Kentish Knock East MCZ under Section 6.8.27.

6.8.64 With respect to Blackwater, Crouch, Roach and Colne Estuaries MCZ, projects which are encompassed by the screening area (described in Section 6.8.27) and thus the extent of the impacts are detailed in Table 6.6 and Figure 6.6 highlights, that of the projects that have been screened in, they are all quite a significant distance from the MCZ itself. Nevertheless, there is still the potential for cumulative effects.

6.8.65 As described in 6.8.41, the only aggregate license area that will overlap in terms of potential significant impact is Tarmac Marine Ltd License Area 509/1. This site lies 100 m from the VE offshore ECC, however is still located outside the 0-50 m zone of highest SSC increase and greatest likely thickness of deposition. Therefore, on account of the distance of the majority of these impacts from the zones of highest impact and the fact that they are intermittent in nature, the magnitude is expected to be **low.**

6.8.66 The consented NeuConnect Interconnector is proposed to cross the northern array are and offshore ECC therefore will interact with the ZoI. Construction is expected to occur in 2027, so there will be one year of construction overlap with VE construction. Operation and maintenance of NeuConnect Interconnector will also overlap with VE construction. The installation of the NeuConnect Interconnector and any subsequent increases in SSC and sediment deposition is expected to be short-term and localised to the development area. Additionally given the relatively limited overlap with the study area compared to the interconnector's overall extent (28%), significant cumulative effects are not anticipated.

6.8.67 The magnitude of impacts from the Tier 1 projects identified is therefore considered to be worst-case **low adverse.**

6.8.68 The Tier 2 project Sea Link has limited detail on the project and therefore it is not possible to make a detailed assessment of the significance of effect, however it is predicted that any increases in SSC and sediment deposition from the construction, operation and maintenance will be short term and localised to the site. It is not anticipated that any effects, once qualified, would result in a significant impact in EIA terms.

6.8.69 Tier 2 project 'North Falls OWF' and the Tier 3 'Nautilus MPI' are predicted to overlap their construction impacts, with VE construction. It is not known what volumes of sediment are likely to be displaced as the project hasn't submitted its environmental assessment. However, we do know that the projects will cause intermittent disturbances over the construction period and that spatial overlap resulting in a heavy level (5 to 30 cm) of deposition is unlikely (as this is only predicted to occur within 0 to 50 m of impact, based on physical processes assessment (Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes and Volume 6, Part 5, Annex 2.2: Physical Processes Technical Assessment).

6.8.70 The cumulative impacts of increased SSC and sediment deposition is deemed to be **low adverse** magnitude, indicating that the potential is for localised disturbance that does not threaten the permanent viability of the resource.

6.8.71 The activities, generation and persistence of SSC and subsequent deposition are predicted to be similar to those previously described for the CEA for the Kentish Knock East MCZ (see section 6.8.27 onwards). It is expected that the highest levels of SSC and the majority of the deposition will occur in close proximity to the source, with finer sediments persisting in a plume over a greater distance but at low concentrations and with reducing levels of sediment deposition. Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology concluded that cumulative effects of increased SSC and deposition on benthic communities would be of local spatial extent, short-term, intermittent and reversible, being of **minor adverse** significance (not significant in EIA terms). It is, therefore, concluded that there will be no cumulative impacts from these sites on the Blackwater, Crouch, Roach and Colne Estuaries MCZ and therefore there will be no significant cumulative impacts from these plans and projects.

6.8.72 VE alone and cumulatively with other projects will **not hinder** the overall conservation objectives of the features of the sedimentary features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ.

6.9 CONCLUSION

6.9.1 This MCZ assessment has been produced to provide the necessary information to allow the MMO to meet their specific duty for MCZs as outline in section 126 of the MCAA. It is intended (with reference to the detailed information set out in the relevant parts of the ES) to provide the necessary information on the impacts of the VE to inform the MCZ assessment process.

6.9.2 The first stage in the assessment process was Screening to identify those MCZs that had the potential to be affected by the proposed VE development. The screening stage identified Kentish Knock East MCZ and Blackwater, Crouch, Roach and Colne Estuaries MCZ as being relevant. These sites were carried through to the Stage 1 assessment for full assessment against the relevant conservation objectives in relation to the potential indirect impact 'temporary increase in SSC and sediment deposition' arising from the construction, operation and maintenance and decommissioning activity in the offshore ECC and array areas. Note that direct impacts were scoped out from further assessment given that the offshore ECC and array areas do not spatially overlap with either of the MCZ sites.

6.9.3 The Stage 1 assessment considered the effects of VE construction, operation, and maintenance, and decommissioning on the protected features of the Kentish Knock East MCZ and the Blackwater, Crouch, Roach and Colne Estuaries MCZ, with the impact 'temporary increase in SSC and sediment deposition' identified in the screening stage discussed individually. This included consideration of effects on attributes and targets of the relevant protected features, and subsequently on the conservation objectives, using the best available scientific evidence to support the assessment process and with due regard to the relevant Advice on Operations.

6.9.4 It was concluded that the construction, operation and maintenance and decommissioning activities would result in short term, intermittent and localised increases in SSC and localised sediment deposition, resulting in a **negligible** magnitude of impact. The sensitivity of the features at each site were assessed as, as a maximum, **low** (Kentish Knock East MCZ) and **medium** (Blackwater, Crouch, Roach and Colne Estuaries MCZ), with a maximum significance of **minor adverse** attributed in each case.

6.9.5 Cumulative effects on features of the Kentish Knock East MCZ and Blackwater, Crouch, Roach and Colne Estuaries MCZ were also considered in the Stage 1 assessment. Several other projects were also considered in relation to SSC and sediment deposition effects; no significant cumulative effects were predicted.

6.9.6 As a result, it is concluded that the VE construction, operation and maintenance and decommissioning activities within the offshore ECC and array areas will not hinder the achievement of the conservation objectives of either MCZ, either alone or cumulatively and therefore a stage 2 assessment is not required.

6.10 REFERENCES

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6.11 APPENDIX A – NATURAL ENGLAND ADVICE ON OPERATIONS PRESSURE SCREENING AND SUMMARY OF ASSESSMENT

The Tables below summarises the Advice on Operations by Natural England for the Kentish Knock East MCZ (Natural England, 2021) (Table 6.7) and Blackwater, Crouch, Roach and Colne Estuaries MCZ (Natural England, 2017) (Table 6.8). NS = Not sensitive at the benchmark. S= Sensitive, the feature is sensitive to the pressure at the benchmark. NA = Not assessed, a sensitivity assessment has not been made for this feature to this pressure. NR = The evidence base suggests that there is no interaction of concern between the pressure and the feature, or the activity and the feature could not interact.

Table 6.7: Pressure screening for Natural England Advice on Operations and summary of assessment for the Kentish Knock East MCZ.

Pressure	Habitat/feature of the Kentish Knocks East MCZ			Summary of Assessment
	Subtidal coarse sediment	Subtidal mixed sediment	Subtidal sand	
Power cable: laying, burial and protection, and decommissioning				
Changes in suspended solids (water clarity)	NS	S	S	Whilst all features are sensitive to these pressures (with the exception of subtidal coarse sediments), the magnitude of the impact from construction and decommissioning is considered **low adverse** with an overall maximum sensitivity of **low**. Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms. Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.
Smothering and siltation rate changes (light)	S	S	S	

Pressure	Habitat/feature of the Kentish Knocks East MCZ			Summary of Assessment
	Subtidal coarse sediment	Subtidal mixed sediment	Subtidal sand	
Power cable: operation and maintenance				
Changes in suspended solids (water clarity)	NS	S	S	As above, all features are sensitive to these pressures (with the exception of subtidal coarse sediments). The magnitude of the impact from operation and maintenance is considered **low adverse** with an overall maximum sensitivity of **low**. Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms. Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.
Smothering and siltation rate changes (light)	S	S	S	
Offshore wind: during construction and decommissioning				
Changes in suspended solids (water clarity)	NS	S	S	Similarly for activities during construction and decommissioning within the array areas, all features are considered sensitive to these pressures (with the exception of subtidal coarse sediments), the magnitude of the impact from construction and decommissioning is considered **low adverse** with an overall maximum sensitivity of **low**. Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.
Smothering and siltation rate changes (light)	S	S	S	

Pressure	Habitat/feature of the Kentish Knocks East MCZ			Summary of Assessment
	Subtidal coarse sediment	Subtidal mixed sediment	Subtidal sand	
				Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.
Offshore wind: operation and maintenance				
Changes in suspended solids (water clarity)	NS	S	S	As above, all features are sensitive to these pressures (with the exception of subtidal coarse sediments). The magnitude of the impact from operation and maintenance is considered **negligible** with an overall maximum sensitivity of **low**. Therefore, the significance of effect is deemed **low adverse**, which is not significant in EIA terms. Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.
Smothering and siltation rate changes (light)	S	S	S	

Table 6.8: Pressure screening for Natural England Advice on Operations and summary of assessment for the Blackwater, Crouch, Roach and Colne Estuaries MCZ.

Pressure	Habitat/feature of the Blackwater, Crouch, Roach and Colne Estuaries MCZ				Summary of Assessment
	Clacton Cliffs and Foreshore	Intertidal mixed sediments	Native oyster *O. edulis* beds	Native oyster *O. edulis*	
Power cable: laying, burial and protection, and decommissioning					
Changes in suspended solids (water clarity)	NA	S	NS	S	The overall sensitivity of the features of this MCZ are considered **medium** to the pressures listed, and a magnitude of the impact considered **low adverse.** Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.
Smothering and siltation rate changes (light)	NA	S	S	S	Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.
Power cable: operation and maintenance					
Changes in suspended solids (water clarity)	NA	S	NS	S	The overall sensitivity of the features of this MCZ are considered **medium** to the pressures listed, and a magnitude of the impact considered **low adverse.** Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.
Smothering and siltation rate changes (light)	NA	S	S	S	Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.
Offshore Wind: during construction and decommissioning					

Pressure	Habitat/feature of the Blackwater, Crouch, Roach and Colne Estuaries MCZ				Summary of Assessment
	Clacton Cliffs and Foreshore	Intertidal mixed sediments	Native oyster *O. edulis* beds	Native oyster *O. edulis*	
Smothering and siltation rate changes (light)	NR	NR	S	S	Clacton cliffs and foreshore and intertidal mixed sediment features have not been assessed for both pressures (indicated by the blank cells). This indicates that the evidence base suggests that there is no interaction of concern between the pressure and the feature, or the activity and the feature could not interact. The features native oyster beds and native oyster have been assessed as both sensitive to the pressure “smothering and siltation rate changes,” whereas native oyster beds are assessed as not sensitive to the pressure “changes in suspended solids (water clarity).
					The overall sensitivity of the features of this MCZ are considered **medium** to the pressures listed, and a magnitude of the impact considered low adverse**.** Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.
Changes in suspended solids (water clarity)	NR	NR	NS	S	Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.

Pressure	Habitat/feature of the Blackwater, Crouch, Roach and Colne Estuaries MCZ				Summary of Assessment
	Clacton Cliffs and Foreshore	Intertidal mixed sediments	Native oyster *O. edulis* beds	Native oyster *O. edulis*	
Offshore wind: operation and maintenance					
Smothering and siltation rate changes (light)	NR	NR	S	S	As above, Clacton cliffs and foreshore and intertidal mixed sediment features have not been assessed for both pressures (indicated by the blank cells). This indicates that the evidence base suggests that there is no interaction of concern between the pressure and the feature, or the activity and the feature could not interact. The features native oyster beds and native oyster have been assessed as both sensitive to the pressure "smothering and siltation rate changes," whereas native oyster beds are assessed as not sensitive to the pressure "changes in suspended solids (water clarity).
					The overall sensitivity of the features of this MCZ are considered **medium** to the pressures listed, and a magnitude of the impact considered low adverse**.** Therefore, the significance of effect is deemed **minor adverse**, which is not significant in EIA terms.
					Overall, there is considered no hinderance to the conservation objectives of the site, either alone or cumulatively.

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