NORTH FALLS

Offshore Wind Farm

Marine Conservation Zone Assessment Report (Clean)

Document Reference:	7.3
Volume:	7
Date:	July 2025
Revision:	1

Project Reference: EN010119

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Project	North Falls Offshore Wind Farm
Document Title	Marine Conservation Zone Assessment Report (Clean)
Document Reference	7.3
Supplier	Royal HaskoningDHV
Supplier Document ID	PB9244-RHD-ZZ-ZZ-RP-YE-0270

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
0	July 2024	Submission	RHDHV	NFOW	NFOW
1	July 2025	Deadline 7	RHDHV	NFOW	NFOW

Contents

Tables

Plates

Figures

Appendices

Glossary of Acronyms

AfL	Agreement for Lease
AoO	Advice on Operations
BCRC	Blackwater, Crouch, Roach and Colne (Estuaries MCZ)
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
ECR	Export cable route
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
FOCI	Features of conservation interest
GBS	Gravity based structure
GGOW	Greater Gabbard Offshore Windfarm
GWF	Galloper Windfarm
HRA	Habitats Regulations Assessment
INIS	Invasive non-indigenous species
INNS	Invasive non-native species
KKE	Kentish Knock East
MAG	Single magnetometer
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multibeam Echosounder
MCAA	Marine and Coastal Access Act (2009)
MCZ	Marine Conservation Zone
MCZA	Marine Conservation Zone Assessment
MEEB	Measures of Equivalent Environmental Benefit
MFE	Mass flow excavation
MMO	Marine Management Organisation

MPA	Marine Protected Areas
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
O&M	Operation and maintenance
OCP	Offshore Converter Platform
OSP	Offshore Substation Platform
OWF	Offshore Windfarm
PAH	Polyaromatic hydrocarbons
PCB	Polychlorinated biphenyls
PEIR	Preliminary Environmental Information Report
PEMP	Project Environmental Management Plan
PINS	Planning Inspectorate
RWE	RWE Renewables UK Swindon Limited
SAC	Special Area of Conservation
SACO	Supplementary Advice on Conservation Objectives
SBP	Sub-bottom profiler
SNCB	Statutory Nature Conservation Body
SoS	Secretary of State
SPA	Special Protection Area
SSC	Suspended sediment concentration
SSER	SSE Renewables Offshore Windfarm Holdings Limited
SSS	Side scan sonar
SSSI	Sites of Special Scientific Interest
TBT	Tributyltin
TWT	The Wildlife Trusts
UXO	Unexploded ordnance
WTG	Wind turbine generator
ZoI	Zone of Influence

Glossary of Terminology

Array area	The offshore wind farm area, within which the wind turbine generators, array cables, platform interconnector cable, offshore substation platform(s) and/or offshore converter platform will be located.
Array cables	Cables which link the wind turbine generators with each other, the offshore substation platform(s) and/or the offshore converter platform.
Bathymetry	Topography of the seabed.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to the Environmental Impact Assessment (EIA) and information to support the HRA
Hydrodynamic	The process and science associated with the flow and motion in water produced by applied forces.
Intertidal	The shore area between the level of mean high water springs (MHWS) and mean low water springs
Landfall	The location where the offshore export cables come ashore at Kirby Brook.
Landfall search area	The area considered at PEIR, comprising the Essex coast between Clacton-on-Sea and Frinton-on-Sea within which the landfall is located.
Offshore cable corridor	The corridor of seabed from array area to the landfall within which the offshore export cables will be located.
Offshore converter platform	Should an offshore connection to an HVDC interconnector cable be selected, an offshore converter platform would be required. This is a fixed structure located within the array area, containing HVAC and HVDC electrical equipment to aggregate the power from the wind turbine generators, increase the voltage to a more suitable level for export and convert the HVAC power generated by the wind turbine generators into HVDC power for export to shore via a third party HVDC interconnector cable.
Offshore export cables	The cables which bring electricity from the offshore substation platform(s) to the landfall, as well as auxiliary cables.
Offshore project area	The overall area of the array area and the offshore cable corridor.
Offshore substation platform(s)	Fixed structure(s) located within the array area, containing HVAC electrical equipment to aggregate the power from the wind turbine generators and increase the voltage to a more suitable level for export to shore via offshore export cables.
Platform interconnector cable	Cable connecting the offshore substation platforms (OSP); or the OSP and offshore converter platform (OCP)
Sandwave	Bedforms with wavelengths of 10 to 100m, with amplitudes of 1 to 10m
Safety Zones	A marine zone outlined for the purposes of safety around a possibly hazardous installation or works / construction area.
Scour protection	Protective materials to avoid sediment being eroded away from the base of the wind turbine generator foundations and offshore substation platform (OSP) or /

	and offshore converter platform (OCP) foundations as a result of the flow of water.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW)
The Project or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Wind turbine generator	Power generating device that is driven by the kinetic energy of the wind

1 Introduction

1.1 Project background

1. North Falls is an extension to the Greater Gabbard Offshore Wind Farm (GGOW), located off the coast of East Anglia, England. GGOW was commissioned in 2012 and in February 2017, The Crown Estate launched an opportunity for existing wind farms to apply for project extensions.
2. The Applicant, North Falls Offshore Wind Farm Ltd (NFOW) is a joint venture between SSE Renewables Offshore Windfarm Holdings Limited (SSER) and RWE Renewables UK Swindon Limited (RWE) and applied for an Agreement for Lease (AfL) to develop an extension to GGOW, which was granted in 2020.
3. Following consultation feedback on the Preliminary Environmental Information Report (PEIR) and preliminary Marine Conservation Zone Assessment (MCZA), the array area has been reduced from 149.5km^2 down to 95km^2. This has involved the removal of the northern array and interconnector cable corridor, and a reduction in the size of the southern array (now referred to as the 'array area'). The southern array area refinement removed any overlap with the Kentish Knock East (KKE) Marine Conservation Zone (MCZ).

1.2 Purpose of this document

4. The purpose of this MCZA Stage 1 Report is to provide an assessment of whether the proposed North Falls Offshore Wind Farm (hereafter "North Falls" or "the Project") is capable of affecting (other than insignificantly) the features and conservation objectives of the MCZs screened into the MCZA (see Appendix 1). The MCZs screened in are the Blackwater, Crouch, Roach and Colne Estuaries (BCRC) MCZ and the KKE MCZ (Section 3.1).
5. Following refinement of the North Falls array area, neither of the MCZs overlap the array area however they lie within the potential Zone of Influence (ZoI) for indirect effects (Figure 1-1).
6. The MCZA is a requirement of Section 126 of the Marine and Coastal Access Act 2009 (MCAA), which places specific duties on the regulating authority (i.e., the Marine Management Organisation (MMO) for marine licence applications and the Secretary of State (SoS) for Development Consent Order (DCO) applications) which require consideration of MCZs when determining consent applications. As such, the MMO and SoS have incorporated the need to include a MCZA into their decision-making processes where any MCZ has the potential to be affected by a marine licensable activity.
7. This document is informed by guidance published by the MMO (2013) on how such assessments should be undertaken and by advice from the Statutory Nature Conservation Bodies (SNCBs) (in this case Natural England) during consultation in the pre-application phase of North Falls. The MCZA Stage 1 Report has been undertaken based on the description of the Project provided within Section 5 of this report and Chapter 5 Project Description of the Environmental Statement (ES) [**Document Reference: APP-019**] for North Falls.

1.3 Update during Examination

8. This document has been updated to expand on the Applicant's position regarding the effects on the KKE MCZ, as well as incorporating project refinements and further information regarding the effects on the KKE MCZ, including:

   - Clarification that foundations will be at least 50m from the KKE MCZ;
   - Refinement of seabed preparation volumes due to:
     - Removal of gravity base foundations;
     - Further engineering analysis of array cable sandwave levelling requirements; and
     - Additional dredging required as mitigation for shipping in the offshore cable corridor.
   - Commitment to dispose of any dredged sediment at a distance that is greater than 1km from the KKE MCZ (secured in the Outline Sediment Disposal Management Plan [**Document Reference: REP6-049/050**]; and
   - the Hydrodynamic and Dispersion Modelling Report [**Document Reference: 9.54, Rev 2**].

1.4 Structure of this Report

9. The structure of this MCZA Stage 1 Report is as follows:

   - Section 1 (this section): Introduction to the document and the structure of the assessment;
   - Section 2: Legislation, policy and guidance – This section provides the legislative context and details the policy and guidance given by a number of governmental, statutory and industry bodies in relation to the MCZA process;
   - Section 3: Overview of the MCZ assessment process – Provides an overview of the MCZA process and the approach taken by The Applicant;
   - Section 4: Consultation – Provides a summary of the consultation undertaken with respect to the MCZA, including stakeholder comments and The Applicant's responses;
   - Section 5: Project description – An outline of North Falls is given with regard to the location of the project infrastructure and its construction, operation and maintenance (O&M), and decommissioning;
   - Section 6: MCZ baseline – A description of the BCRC Estuaries MCZ and the KKE MCZ, including their protected features and conservation objectives and a description of the location of protected features in relation to the offshore project area, incorporating the site specific survey data that has been collected;

- Section 7: Screening conclusions – This section summarises the screening process and outcomes that have been consulted on through the Evidence Plan Process (EPP). The screening report is provided in Appendix 1;
- Section 8: Stage 1 assessment – This section provides the stage 1 assessment for both MCZs that have been screened into the assessment. An assessment of cumulative impacts with other plans and projects is also provided; and
- Section 9: Conclusion – A conclusion to the MCZA is provided with respect to the conservation objectives of each MCZ.

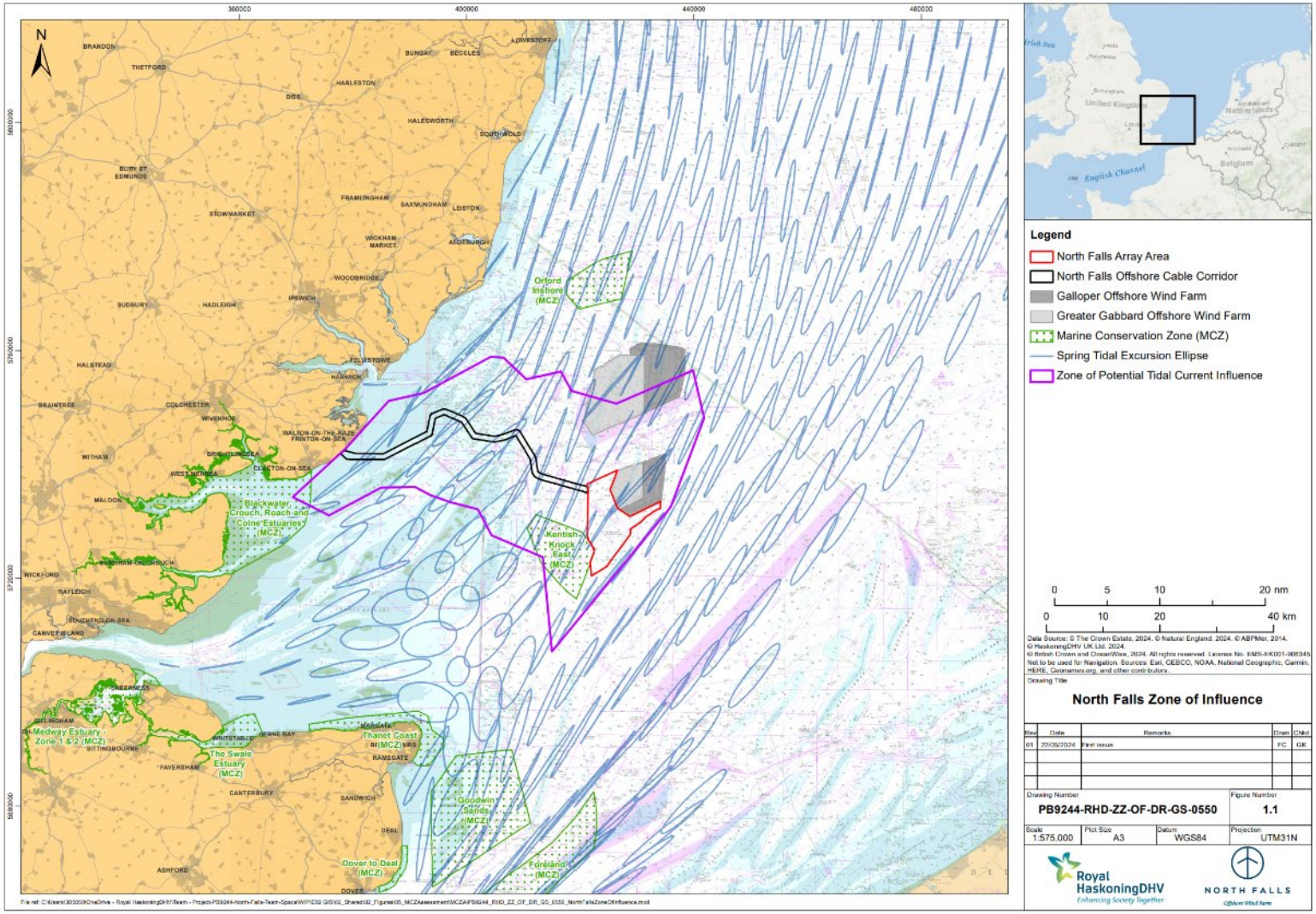

Figure 1-1 North Falls potential Zone of Influence

2 Legislation, policy and guidance

2.1 Marine & Coastal Access Act 2009 (MCAA)

10. The MCAA provides a range of measures to manage the marine environment including establishing MCZs. Section 126 of the MCAA place specific duties on the MMO relating to MCZs and marine licence decision making. Section 126 applies where;

    (a) a public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and

    (b) the act is capable of affecting (other than insignificantly)

        (i) the protected features of an MCZ;

        (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

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

2.2 National Policy Statements

12. The assessment of potential impacts upon MCZs has been made with specific reference to the relevant legislation and guidance, of which the principal policy documents with respect to the Nationally Significant Infrastructure Projects (NSIPs) are the National Policy Statements (NPS). Those relevant to the project are:

    - Overarching NPS for Energy (EN-1) (DESNZ, 2023a), and
    - NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023b).

13. The specific assessment requirements for the MCZs, as detailed in the NPS, are summarised in Table 2.1 together with an indication of the section of this report where each is addressed.

Table 2.1 NPS assessment requirements

NPS Requirements	NPS Reference	Report Reference
Overarching NPS for Energy (EN-1)		
MCZs (Marine Protected Areas in Scotland), introduced under the MCAA 2009, are areas that have been designated for the purpose of conserving marine flora or fauna, marine habitats or types of marine habitat or features of geological or geomorphological interest. The protected feature or features and the conservation objectives for the MCZ are stated in the designation order for the MCZ. If a proposal is likely to have significant impacts on	5.4.9	Consideration to the MCAA has been incorporated throughout this report. There are no Highly Protected Marine Areas in the ZoI and therefore the Project will have no impact on these new designations.

NPS Requirements	NPS Reference	Report Reference
an MCZ, an MCZA should be undertaken as per the requirements under Section 126 of the MCAA. Government has recently designated the first three Highly Protected Marine Areas in England. These are designated as MCZs but with a higher conservation objective and with a single feature of the whole ecosystem within the site boundaries.		
The applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Protected Areas (MPAs). These could include MCZs, habitat sites including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) with marine features, Ramsar Sites, Sites of Community Importance, and Sites of Special Scientific Interest (SSSIs) with marine features. Applicants should also identify any effects on the special character of Heritage Coasts.	5.6.13	Section 8 provides an assessment of the impacts against MCZs, with effects on the site integrity identified. Effects on European sites are assessed in the Report to Inform Appropriate Assessment (Volume 7 of the North Falls DCO application). Effects on SSSIs are assessed in Chapter 23 Onshore Ecology, of the North Falls ES [**Document Reference: APP-037**]. Effects on the special character of Heritage Coasts are assessed in Chapter 29 Offshore Seascape, Landscape and Visual Impact Assessment (SLVIA) of the North Falls ES [**Document Reference: APP-043**].
Where residual impacts relate to Habitat Regulations Assessment (HRA) or MCZ sites then the Applicant must provide a derogation case, if required, in the normal way in compliance with the relevant legislation and guidance.	4.2.13	There is no requirement for a MCAA derogation case following the assessment conclusions provided in Section 8.
NPS for Renewable Energy Infrastructure (EN-3)		
Applicants must undertake a detailed assessment of the offshore ecological, biodiversity and physical impacts of their proposed development, for all phases of the lifespan of that development, in accordance with the appropriate policy for offshore wind farm Environmental Impact Assessment (EIAs), HRAs and MCZ assessments (See Sections 4.3 and 5.4 of EN-1).	2.8.101	The assessment (Section 8) encompasses consideration of impacts across all stages of the lifespan of North Falls.
Applicants must always employ the mitigation hierarchy, in particular to avoid as far as is possible the need to find compensatory measures for coastal, inshore and offshore developments affecting SACs, SPAs, and Ramsar sites and/or MCZs. It is essential that applicants involve SNCBs, other statutory environmental bodies (e.g. Historic England) and Department for Environment, Food and Rural Affairs (Defra), in conjunction with the relevant regulators, as early as possible in the planning process to enable discussions of	2.8.213	The refined array area has been reduced in size, with the order limits no longer overlapping the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ. This has been discussed with the Seabed Expert Topic Group (ETG) and agreed that provided there is no infrastructure in the MCZ, the Project will not require mitigation and/or compensation. See Table 4.1 and Section 9 for further details.

NPS Requirements	NPS Reference	Report Reference
what is and isn't a significant and/or adverse effect, subsequent implications, and if required, mitigation and/or compensation.		
With increasing deployment of offshore wind farms and offshore transmission, environmental impacts upon SACs SPAs, and Ramsar sites and MCZs (individually and as part of a network) may not be addressed by avoidance, reduction, or mitigation alone, therefore compensatory measures (through derogation for SACs SPAs, Ramsar sites, and, MCZs may be required at a plan or project level where adverse effects on site integrity and/or on conservation objectives cannot be ruled out.	2.8.265	
Before submitting an application, applicants should seek the views of the SNCB and Defra, as to the suitability, securability and effectiveness of the compensation plan to ensure that the overall coherence of the National Site Network for the impacted SAC/SPA/MCZ feature is protected. Consultation should also take place throughout the pre-application phase with key stakeholders (e.g. via the evidence plan process and use of expert topic groups).	2.8.274	

2.3 Guidance

14. The MCZA gives consideration to the following guidance:

- MMO (2013). Marine Conservation Zones and Marine Licensing guidance;
- Natural England (2022a, 2022b, 2025). Advice on Operations (AoO);
- Natural England's Offshore Wind Environmental Assessments: Best practice advice for evidence and data standards (Phase III: Expectations for data analysis and presentation at examination for offshore wind applications) (Parker *et al.*, 2025); and
- Planning Inspectorate (PINS) (2025). Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment.

15. Key information from the relevant policies and guidance documents are explained below in Section 3.

16. The approach to the screening assessment has also been informed by advice from Natural England and other stakeholders provided through the EPP (see Section 4).

3 Overview of MCZA process

17. Guidance published by the MMO (2013) describes how MCZAs should be undertaken in the context of marine licensing decisions (note that there is no published PINS guidance or advice specifically covering MCZAs for DCO applications). To undertake its marine licensing function, the MMO has introduced a three stage sequential assessment process for considering impacts on MCZs, in order for it to deliver its duties under Section 126 of the MCAA (see Section 2). Section 126 places specific duties on all public bodies in undertaking their licencing activities where they are capable of hindering the conservation objectives of an MCZ. The MCZA process is similar to, but separate from, the HRA process. The stages of MCZA are presented below.

3.1 Screening (Appendix I)

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

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

19. Where it has been determined through screening that Section 126 applies, the application is assessed further to determine which subsections of Section 126 should apply through Stage 1 assessment and Stage 2 assessment.

20. The potential ZoI from North Falls has been analysed based on an understanding of the tidal regime. The potential ZoI was based on the maximum range of effects from construction, operation and maintenance, and decommissioning of wind turbine generator (WTG), offshore substation platform(s) (OSPs), offshore converter platform (OCPs) foundations, and cables (array cables, offshore export cables and platform interconnector cables). It is expected that changes to the tidal regime would have returned to background levels immediately outside the excursion of one spring tidal ellipse (approximately 15km from the offshore project area), shown in Figure 1-1.

3.2 Stage 1 Assessment (this report)

21. This MCZA Stage 1 Report will consider whether the conditions in Section 126 (6) of the MCAA can be met, to determine whether:

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

22. This report considers the extent of the potential impact of the Project on the MCZs in more detail. The Stage 1 Report looks at whether the plan or project could potentially affect the conservation objectives for the site, that is, impact the site so that the features are no longer in favourable condition, or prevent the features from recovering to a favourable condition. If mitigation to reduce identified impacts cannot be secured, and there are no other alternative locations, then the project will be considered under Stage 2 of the assessment process i.e. considering if there are other means of proceeding, the public benefit from the project and any measures of equivalent environmental benefit. More information on the Stage 2 assessment is provided in Section 3.3.

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

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

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

25. The assessment to determine no significant risk of each activity facilitating achievement of the conservation objectives is set out below.

3.2.1 Assessment of risk to conservation objectives

3.2.1.1 Likelihood of an activity causing an effect

26. In order to determine likelihood of an activity causing an effect, the sensitivity of the protected features of the MCZs have been determined using Natural England's AoO, which indicates the sensitivity of each receptor to relevant pressures. The sensitivity of receptors provides scientific evidence that can be used to assess the pathway for likelihood of effect between activity-pressure-receptor. Specifically, the sensitivity range of the biotopes associated with each protected feature has been determined in relation to relevant pressures, taking the highest sensitivity as a worst-case scenario.

27. The definition of sensitivity used by Natural England's Conservation Advice Package for the BCRC Estuaries and the Kentish Knock East MCZ's are based on Marine Life Information Network (MarLIN's) Marine Evidence based Sensitivity Assessment (MarESA) (Tyler-Walters *et al.*, 2018). MarESA

determines sensitivity based on resistance (tolerance) and resilience (recoverability) which are defined as:

- Resistance: the likelihood of damage (termed intolerance or resistance) due to a pressure;
- Resilience: the rate of (or time taken for) recovery (termed recoverability, or resilience) once the pressure has abated or been removed.

28. Descriptions of Resistance and Resilience are presented Table 3.1 below.

Table 3.1 Resistance and resilience scale definitions

Level	Description
Resistance (Tolerance)	
None	Key functional, structural, characterising species severely decline and/or physicochemical parameters are also affected e.g. removal of habitats causing a change in habitats type. A severe decline/reduction relates to the loss of 75% of the extent, density or abundance of the selected species or habitat component e.g. loss of 75% substratum (where this can be sensibly applied).
Low	Significant mortality of key and characterising species with some effects on the physicochemical character of habitat. A significant decline/reduction relates to the loss of 25-75% of the extent, density, or abundance of the selected species or habitat component e.g. loss of 25-75% of the substratum.
Medium	Some mortality of species (can be significant where these are not keystone structural/functional and characterising species) without change to habitats relates to the loss <25% of the species or habitat component.
High	No significant effects on the physicochemical character of habitat and no effect on population viability of key/characterising species but may affect feeding, respiration and reproduction rates.
Resilience (Recovery)	
Very Low	Negligible or prolonged recovery possible; at least 25 years to recover structure and function.
Low	Full recovery within 10-25 years.
Medium	Full recovery within 2-10 years.
High	Full recovery within 2 years.

29. The MarESA assessment of sensitivity is guided by the presence of key structural or functional species/assemblages and/or those that characterise the biotope groups. Physical and chemical characteristics are also considered where they structure the community. MarESA uses a matrix approach to determine sensitivity based on both recovery and resilience. The sensitivity matrix used in the impact assessment in the MCZA based on MarESA, is presented in Table 3.2.

Table 3.2 Sensitivity matrix

Resilience (Recovery)	Resistance (Tolerance)			
	None	Low	Medium	High
High	High	High	Medium	Low
Medium	High	High	Medium	Low
Low	Medium	Medium	Medium	Low
Negligible	Medium	Low	Low	Negligible

3.2.1.2 Sensitivity Assessment

30. Table 3.3 sets out the MarESA sensitivity assessment of biotopes and species associated with the protected features of the BCRC Estuaries MCZ. The following biotope and species have been used for the MCZA:

- A5.435 – *Ostrea edulis* beds on shallow sublittoral muddy mixed sediment
- Native oyster *Ostrea edulis*

31. Table 3.4 sets out the MarESA sensitivity assessment of biotopes associated with the protected features of the Kentish Knock East MCZ. The following biotopes have been used for the MCZA:

- Subtidal sand: A5.231 – Infralittoral mobile clean sand with sparse fauna
- Subtidal mixed sediments: A5.422 – *Crepidula fornicata* and *Mediomastus fragilis* in variable salinity infralittoral mixed sediment (A5.451 Polychaete-rich Venus community in offshore mixed sediments has been used to assess the effects of Invasive Non-Native Species (INNS)).
- Subtidal coarse sediment: A5.135 – *Glycera lapidum* in impoverished infralittoral mobile gravel and sand has been used as a proxy for infralittoral coarse sediment.

Table 3.3 Sensitivity ranges for the potential features associated with the BCRC Estuaries MCZ, in relation to the pressures screened into the Stage 1 assessment. NS = Not Sensitive at the benchmark; IE = Insufficient Evidence to assess NR= Not relevant, as determined by Natural England's AoO; and NA = Not Assessed by Natural England (Natural England, 2022)

Potential pressure (screening)	Pressure (AoO)	Native oyster *Ostrea edulis* beds	Native oyster *Ostrea edulis*
Increased suspended sediment concentrations	Changes in suspended solids (water clarity)	NS	High
	Smothering and siltation rate changes (Light)	High	High
Re-mobilisation of contaminated sediments	Hydrocarbon & Polyaromatic Hydrocarbons (PAH) contamination	NA	NA
	Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NA	NA
	Transition elements & organo-metal (e.g. TBT) contamination	NA	NA
Sediment deposition (smothering)	Smothering and siltation rate changes (Light)	High	High
Invasive species	Introduction or spread of invasive non-indigenous species (INIS)	High	High

Table 3.4 Sensitivity ranges for the potential features associated with the Kentish Knock East MCZ, in relation to the pressures screened into the Stage 1 assessment. NS = Not Sensitive at the benchmark; IE = Insufficient Evidence to assess; NR= Not relevant, as determined by Natural England's AoO; and NA = Not Assessed by Natural England (Natural England, 2025)

Potential pressure (screening)	Pressure (AoO)	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal sand
Increased suspended sediment concentrations	Changes in suspended solids (water clarity)[1]	NS	NS	Low
Sediment deposition (smothering)	Smothering and siltation rate changes (Light)	Low	Low	NS
	Smothering and siltation rate changes (Heavy)	Medium	Low	Low
Re-mobilisation of contaminated sediments	Hydrocarbon & Polyaromatic hydrocarbons (PAH) contamination	NA	NA	NA
	Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NA	NA	NA
	Transition elements & organo-metal (e.g. TBT) contamination	NA	NA	NA
	Introduction of other substances (solid, liquid or gas)	NA	NA	NA
Effects on bedload sediment transport	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Low	Low	Low

[1] MarESA defines changes in suspended solids as a change in one rank on the WFD (Water Framework Directive) scale e.g. from clear to intermediate for one year.

Potential pressure (screening)	Pressure (AoO)	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal sand
	Abrasion/disturbance of the substrate on the surface of the seabed	Low	Low	Low
Underwater noise and vibration	Underwater noise changes	NR	NS	NS
Invasive species	Introduction or spread of INIS	High	High	NS
Electromagnetic fields	Electromagnetic changes	IE	IE	IE

3.2.1.3 Magnitude of effect

32. For each effect, a magnitude has been assigned, providing a definition of the spatial extent, duration, frequency and reversibility of the effect considered (where applicable). The definitions of magnitude for the purpose of the MCZA are provided in Table 3.5.

Table 3.5 Definitions of magnitude

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

3.2.1.4 Assessment against conservation objectives

33. Following determination of effect magnitude and receptor sensitivity the Stage 1 assessment considers the risk that the Project could hinder the conservation objectives for each MCZ, with consideration of Natural England's Supplementary Advice on Conservation Objectives (SACOs).

34. SACOs present attributes which are ecological characteristics or requirements of the designated species and habitats within a site. The listed attributes are considered to be those which best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. These attributes have a target which is either quantified or qualified depending on the available evidence (Natural England, 2021 and 2022c). A summary of the consideration or pressures against the relevant attributes are provided in Table 8.1 and Table 8.2.

3.3 Stage 2 Assessment

35. Where it is required, the Stage 2 assessment considers the socio-economic impact of the plan or project together with the risk of environmental damage. There are three parts to the Stage 2 assessment process in respect of which the Applicant would have to satisfy the relevant authority:

- Demonstrate that there is no other means of proceeding which would create a substantially lower risk of hindering the achievement of the conservation objectives;
- Demonstrate that the benefit to the public in proceeding with the project clearly outweighs the risk of damage to the environment that will be created by proceeding with it; and

- Undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit (MEEB) for the damage the project will or is likely to have in or on the MCZ.

3.3.1 Measures of Equivalent Environmental Benefit

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

37. Based on consultation following the refinement of the array area, Stage 1 of the MCZA demonstrates there is no requirement for MEEB.

3.4 Cumulative effects

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

39. Planning Inspectorate (PINS) Advice Note Seventeen (PINS, 2019) provides guidance on plans and projects that should be considered in the Cumulative Effects Assessment (CEA) including:

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

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

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

- Other offshore wind farms;
- Aggregate extraction and dredging;
- Licensed disposal sites;
- Navigation and shipping;
- Subsea cables and pipelines;

- Potential port/harbour development;
- Oil and gas activities; and
- Fisheries management areas.

42. Plans and projects that existed at the time of the relevant MCZ designation or the latest status reports (whichever is most recent) are considered to be part of the baseline environment.

43. The assessment will present relevant cumulative effects of projects based on their stage of development using the tiered approach as devised by Natural England (Natural England and Defra, 2022; shown in Table 3.1 of Appendix 1 [**Document Reference: APP-238**]).

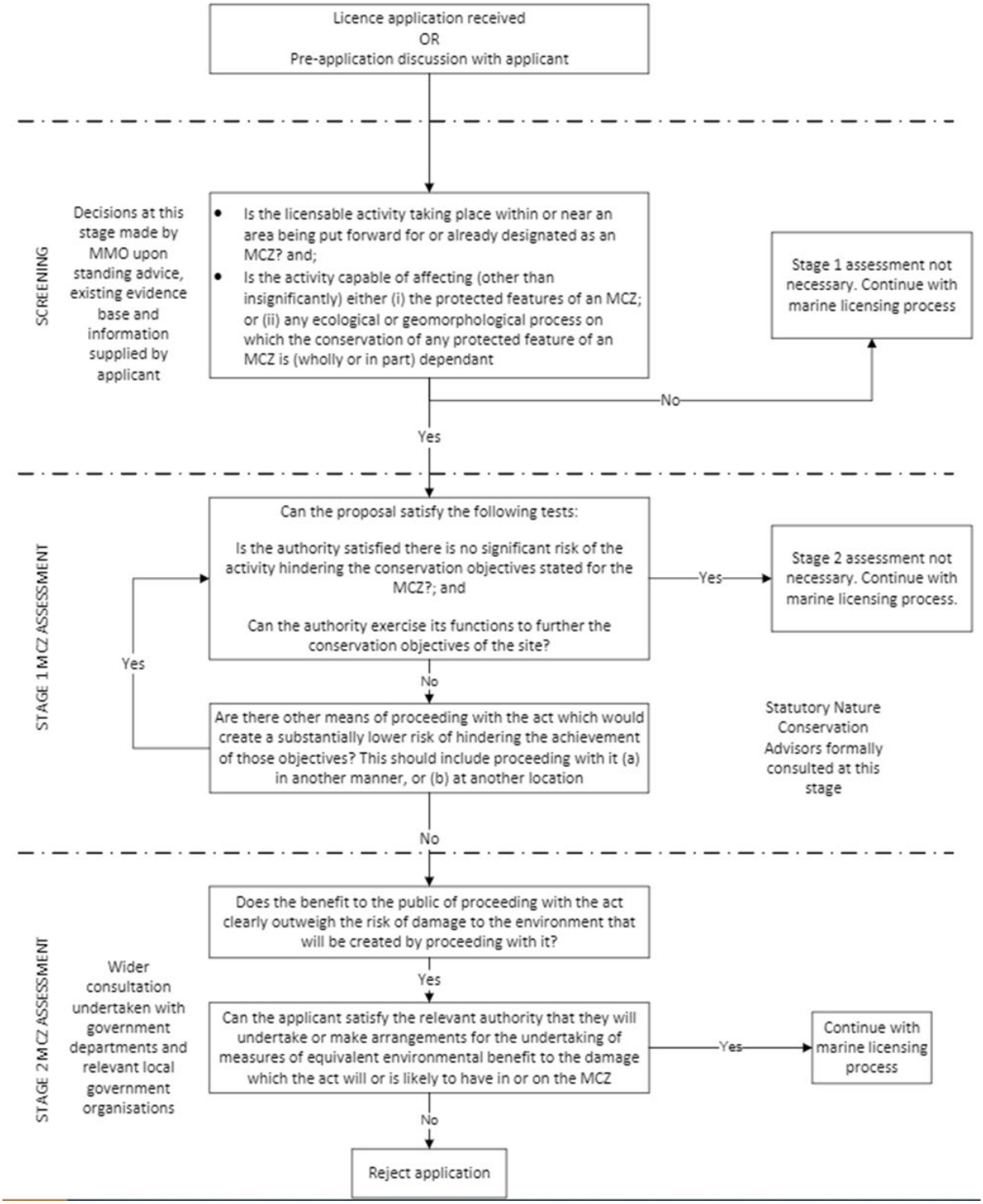

Plate 3-1 Flow chart summary of the MCZ Assessment process used by the MMO during marine licence determination (MMO, 2013).

4 Consultation

44. Consultation undertaken with SNCBs and other stakeholders in relation to the MCZA process is provided in this section.

4.1 Scoping

45. Consultation has been undertaken with the appropriate authorities and stakeholders as part of the scoping stage of the EIA process. The Scoping Report for North Falls (Royal HaskoningDHV, 2021) was submitted to PINS on 19th July 2021 and a Scoping Opinion (PINS, 2021) was received 26th August 2021. Scoping established the potential impacts of North Falls to be assessed by the EIA (and by association the MCZA).

4.2 Evidence Plan Process

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

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

- Natural England; and
- MMO.

48. In addition, The Wildlife Trusts (TWT) were invited but were unable to participate.

49. A draft of the MCZA Screening Report was made available for consultation through the Seabed ETG on 16th November 2021. A preliminary version of this MCZA State 1 Report was also provided for consultation alongside PEIR.

50. This MCZA and the Screening Report have been updated based on the comments received on the draft and revised preliminary versions (see Section 2 of Appendix 1 [**Document Reference: APP-238**] and Table 4.1 below).

4.3 Summary of relevant consultation responses

51. The consultation responses relevant to the MCZA which have been received to date are summarised in Table 4.1.

Table 4.1 Consultation responses

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
Natural England	26/05/2021 Written response regarding benthic survey methodology	It is worth noting that should the geophysical survey reveal more potential habitat changes than expected, then we would expect to see an increase in the number of sample stations to ensure that all potential habitats are sampled and mapped. In turn, this will also inform the impact assessment on the full range of habitats. This is particularly important within MPAs.	Additional sample stations were included in the KKE MCZ in response to feedback from Natural England.
Natural England	26/05/2021 Written response regarding benthic survey methodology	If a development is planned within an MPA, site characterisation also needs to consider potential impacts of the development that extend outside of the MPA, which may require additional survey work to increase confidence and precision on location and extent of the habitats and species present. This might entail more detailed geophysical and/or ground truthing surveys (e.g. video) to assist in locating and defining designated feature boundaries. Therefore, we would recommend that data of a sufficient resolution are gathered in order to clearly understand which features are present and likely to be impacted by the proposals.	
Natural England	26/05/2021 Written response regarding benthic survey methodology	Kentish Knock MCZ, for example, may require an increase in sample site locations, unless the habitat is demonstrated to be homogenous from the geophysical data. Furthermore, it will be necessary to understand development impacts by feature, hence, subtidal coarse sediment, mixed sediment and sand will need to be delineated. It should also be ensured that there are sufficient data captured where the cable route abuts Margate and Long Sands SAC to ensure that impacts on this site can be determined and assessed. These data should be put into context with existing MPA data available on Magic mapper or here: Habitat and species open data: https://data.gov.uk/dataset/bfc23a6d-8879- 4072-95ed-125b091f908a/marine-habitats-and-species-open-data	
Natural England	16/08/2021 Scoping Opinion	Section 2.5.1.3 Point 188 As stated in our advice on a similar situation with regard to the Hornsea Project Three OWF NSIP and Markham's Triangle MCZ, Natural England would expect further mitigation measures to be considered by North Falls, whereby all array infrastructure is removed from within KKE MCZ. If it not	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
		possible to exclude the works from this MCZ then there may be a need to discuss measures of equivalent environmental benefit (MEEB) through the evidence plan process. P8. Further consideration should be given throughout the EIA process and a consideration of MEEB provided, if required.	
Natural England	16/08/2021 Scoping Opinion	Section 2.13.1.4 Para 384 Overlapping sub-sea cables in the southern array area could lead to the placing of cable crossings/protection within the KKE MCZ, which partially overlaps with the southern array. The potential impact of cable crossings/protection in the Kentish Knock MCZ will need to be assessed.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	16/08/2021 Scoping Opinion	Section 2.13.1.4 Para 386 Proposed cables in the study area. The potential impact of cable crossings/protection in the Kentish Knock MCZ will need to be assessed.	
The Planning Inspectorate	26/08/2021 Scoping Opinion	Para 188 KKE Marine Conservation Zone (MCZ). The Inspectorate notes that part of the Proposed Development is situated within the Kent Knock East Marine MCZ. If this area is not to be avoided, the ES will need to precisely quantify the impacts on the protected features of the site to inform an MCZ assessment, including the potential impact of cable crossings / protection.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
MMO	14/07/2023	The MMO defers to the [statutory] advice provided by the relevant Statutory Nature Conservation Body's regarding the potential impacts to	Noted.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
	MCZ Assessment	the protected features of the identified nature conservation areas that may occur because of the North Falls OWF.	
MMO	14/07/2023 MCZ Assessment	The MMO agrees with the pressures screened into the MCZ assessment and notes that three MCZs were identified during the first stage of the screening assessment due to their proximity to the site (i.e., Blackwater, Crouch, Roach, and Colne Estuaries MCZ, KKE MCZ and Orford Inshore MCZ). The protected features of each MCZ are reported clearly and the potential impacts during construction, operation and maintenance, and decommissioning stages have been presented for each.	Noted.
MMO	14/07/2023 MCZ Assessment	The MMO recommends that consideration also be given to the impact of paint flakes (as microplastic pollution), within the Kentish Knock MCZ when developing monitoring plans.	The issue of paint flakes was discussed with the Seabed ETG and the MMO expanded that their assumption is it will have a very low environmental impact but should be considered, perhaps in the monitoring plan. Monitoring of the integrity of the North Falls infrastructure, including flaking paint, is included in the in-principle monitoring plan [**Document Reference: APP-245**].
MMO	14/07/2023 MCZ Assessment	For the Blackwater, Crouch, Roach, and Colne Estuaries MCZ, the protected features are the intertidal mixed sediments, native oyster (*Ostrea edulis*) beds, native oyster (*O. edulis*) and Clacton Cliffs and foreshore. For Kentish Knock MCZ, the protected features are the subtidal sand, subtidal coarse sediments, and subtidal mixed sediments. For Orford Inshore MCZ the protected features are the subtidal mixed sediments. As none of the protected features are fin-fish receptors it is beyond my remit to comment on whether the pressures screened into the assessment are appropriate, and therefore defer to Natural England as the Statutory Nature Conservation Body (SNCB) to comment on the suitability of the assessment approach. The MMO will maintain a watching brief on anything that may fall within the MMO's remint – such as DML conditions.	Noted.
Natural England	28/07/2023	Natural England advises that currently the updated National Policy Statements (NPS) are draft.	The updated NPS have been used in consideration of the Project's potential impacts.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
	MCZ Assessment	We advise that until finalised, the existing NPS should be used in any consideration of the project's potential impacts.	
Natural England	28/07/2023 MCZ Assessment	Natural England advises that currently the updated National Policy Statements (NPS) are draft. We advise that until finalised, the existing NPS should be used in any consideration of the project's potential impacts.	The updated NPS have been used in consideration of the Project's potential impacts.
Natural England	28/07/2023 MCZ Assessment	Natural England highlights the recent SoS decision in relation to Hornsea Project 3, Norfolk Vanguard and Boreas that impact from infrastructure and cable protection even if removed has been considered a lasting impact. We advise the Applicant to update their assessment to reflect this lasting impact.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	28/07/2023 MCZ Assessment	We draw your attention to the list of benthic mitigation measures in the text at the start of this Annex. We advise that all these mitigation measures are fully explored within the KKE MCZ. We advise the developer seeks further collaboration with Natural England on this important aspect of the application.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	28/07/2023 MCZ Assessment	Natural England notes that Unexploded ordnance (UXO) clearance has not been included in site preparation works. Natural England recommends that the assessment is updated to include this.	Temporary physical disturbance is no longer assessed due to the array area having been reduced in size and no longer overlaps the KKE MCZ. Therefore, assessment of UXO clearance is not required.
Natural England	28/07/2023 MCZ Assessment	Natural England strongly advises that should it be demonstrated that avoidance of the KKE MCZ is not possible then the Mitigation Hierarchy is adopted to minimise the benthic impacts. Natural England advises that the developer should clearly demonstrate how they have followed the mitigation hierarchy. This includes removal of Gravity Base Structures (GBS) from the Rochdale Envelope.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ. Furthermore, GBS has been removed.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
Natural England	28/07/2023 MCZ Assessment	Natural England advises that as with the most recent OWF applications, a cable burial risk (CBR) assessment is provided as part of the application. We advise that this should be presented in the ES and that the CBR assessment should be based on relevant geotechnical survey data.	NFOW has undertaken a preliminary cable burial study which has been used to inform the project design envelope presented in ES Chapter 5 Project Description **[Document Reference: APP-019]** and the worst case scenario for the MCZA (Section 5.6).
Natural England	28/07/2023 MCZ Assessment	It is not clear how the pre-construction surveys inform the mitigation measures and marine licence discharge. We advise that clarity is provided.	Pre-construction surveys will be carried out to assess the wider benthic environment and facilitate micrositing. However the array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ and micrositing mitigation is no longer applicable to the MCZA. See Chapter 10 Benthic and Intertidal Ecology of the North Falls ES [**Document Reference: APP-024**].
Natural England	28/07/2023 MCZ Assessment	Natural England notes that the potential area of impact to KKE MCZ is 0.64km^2. We advise the Applicant refers to findings on the impacts to designated sites from Hornsea Project 3, and Norfolk Vanguard and Boreas, and the associated requirements for compensation. We advise that the Project reviews the findings in relation to the projects specified and reconsiders their own findings in light of this. We advise consideration should be given in the first instance to avoiding construction within the MCZ.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	28/07/2023 MCZ Assessment	Natural England notes that drill arisings are referenced in the MCZ Assessment, but the impacts these on KKE MCZ are not included alone and/or cumulatively. Natural England advises the MCZ Assessment is revised to consider drill arisings.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure or drill arisings placed on the seabed within the MCZ. This is therefore no longer applicable.
Natural England	28/07/2023 MCZ Assessment	We draw the Applicant's attention to the list of benthic mitigation measures which should be considered within the MCZ assessment in more detail.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ and no

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
		We advise that the Applicant consults the list provided above.	mitigation would be required. This is therefore no longer applicable.
Natural England	28/07/2023 MCZ Assessment	Section 8 would benefit from inclusion of similar maps to those provided within MCZ screening document. We advise that maps are provided in an updated assessment.	Please see Figure 6-1, Figure 6-2 and Figure 8-1.
Natural England	28/07/2023 MCZ Assessment	Natural England advises that impacts to each of the interest features are considered when undertaking assessments, rather than comparing to the whole site. We advise that the assessment is updated accordingly.	Consideration is given to all individual interest features, see Section 8.1, Section 8.2 and Section 8.3.
Natural England	28/07/2023 MCZ Assessment	Natural England advises that from review of current post construction benthic monitoring reports, that if the required mitigation measures are incorporated into the project design, then recovery is more likely to occur with subtidal sand habitats. We advise consideration is given to how sandwave levelling can be utilised to potentially avoid impacts from cable protection. Natural England advises that this is adequately assessed and presented in the ES.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ. This is therefore no longer applicable.
Natural England	28/07/2023 MCZ Assessment	Natural England advises that the AoO requires some updates to take account of evidence form post construction monitoring. Natural England advises that evidence is demonstrating that within Holderness Inshore MCZ lasting scars have been created by OWF cable installation. Therefore, we are unable to agree with the recovery timeframes as presented. Natural England also advises that within windfarms located within the wider Wash (Norfolk/East Midlands) it has been demonstrated on multiple occasions that mixed sediment poses a risk of sub optimally buried cables and the need for cable protection. Natural England advises that options to avoid this risk should be progressed and presented in the ES.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ and no associated scars. This is therefore no longer applicable.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
Natural England	28/07/2023 MCZ Assessment	It is not clear from the documents where the lasting impact from cable protection will be located and within which sediments. We advise that this is included within the assessment.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	28/07/2023 MCZ Assessment	Natural England advises that the GGOW monitoring reports used to support conclusions drawn are provided as part of this application, with clear information on impact recovery demonstrated across the different sediment types/habitats. In addition, clarity is required on how comparable this is with the activities/impacts for North Falls and the types of sediments impacted. Natural England advises that the discussion on the reports should clearly demonstrate sediment recovery for each sediment type and associated impact. We advise further discussion is required around sandwave levelling, as we understand that sandwave levelling was not used as part of the GGOW installation. We advise a clear assessment is required for KKE MCZ.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ. This is therefore no longer applicable.
Natural England	28/07/2023 MCZ Assessment	Natural England cannot currently agree with the assessment of the effects on sediment transport during construction. We note that North Falls have not collected any project-specific wind/ wave/tide/sediment transport data. The project has instead relied on the results of modelling from previous projects. We note that the North Falls south array has a different seabed morphology/topography to the Greater Gabbard arrays and Galloper northern array. We advise that we need to see up to date and site-specific data in order to support conclusions regarding sediment transport effects at KKE MCZ. Please refer to our comments on Marine Physical Processes for further information.	Updated baseline information on tidal currents, waves and sediments that are bespoke to the Project is provided in Section 8.5 of Chapter 8 Marine Geology, Oceanography and Physical Processes of the North Falls ES [**Document Reference: APP-022**].
Natural England	28/07/2023 MCZ Assessment	In relation to Operational Impacts, Natural England notes that the amount of and location of cable repair, maintenance, anchorage and jack up vessel use within a 2-year period (this is the recovery period identified by	Operational impacts have been refined and listed in Table 5.2.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
		the Applicant), and over the lifetime of the project is not specified within the assessment. We advise that the assessment is updated to include these parameters in the final assessment.	
Natural England	28/07/2023 MCZ Assessment	Natural England advises that all surface laid infrastructure should be removed at the time of decommissioning unless evidence is provided to agree that it remains in situ. We advise that the ES is adjusted accordingly. It should be noted that even with removal, the impacts over the lifetime of a project are still considered lasting.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	28/07/2023 MCZ Assessment	Whilst Natural England agrees with the conclusions, we do not agree with the rationale provided and this will require further consideration. We advise that further information is provided to clearly demonstrate and support the conclusion.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ. This has been discussed with the Seabed ETG and agreed that provided there is no infrastructure in the MCZ, the conservation objectives will not be hindered and MEEB will not require further consideration.
Natural England	28/07/2023 MCZ Assessment	Natural England advises that more evidence is required before it can be concluded that there will be no disruption to sediment transport and if there is, it will not hinder the conservation objectives for the site. We advise that the Applicant refers to our marine physical processes advice to update this assessment.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ. This has been discussed with the Seabed ETG and agreed that provided there is no infrastructure in the MCZ, the conservation objectives will not be hindered and MEEB will not require further consideration. Updated baseline information on tidal currents, waves and sediments that are bespoke to the Project is provided in Section 8.5 of Chapter 8 Marine Geology, Oceanography and Physical Processes of the North Falls ES [**Document Reference: APP-022**].
Natural England	28/07/2023	We are unable to agree with the conclusions of the MCZ Assessment and associated documents as they cannot and should not be considered as a	This MCZA is submitted as a standalone assessment as part of the DCO application. Following a Seabed ETG meeting in

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
	MCZ Assessment Conclusion	standalone assessment as they do not include the required evidence to support the conclusions drawn. Natural England advises that this should be fully addressed in the ES and advises the Applicant to engage further with us in this critical matter.	October 2023, lasting habitat change/loss and colonisation of hard infrastructure have been removed from the KKE MCZ.
Natural England	28/07/2023 MEEB	We acknowledge that KKE MCZ was designated after The Crown Estate plan level HRA for extension projects which included North Falls. However, it should be noted that MCZs are not considered in that assessment. At the time of leasing extension projects there was insufficient information and confidence to consider them as a plan/project to inform designations. In addition, the surveys to inform the designation were undertaken before the leasing of extensions completed. We advise this should be acknowledged in the assessment.	This has been acknowledged in Section 6.3.
Natural England	28/07/2023 MEEB	We note that the [offshore] export cable avoids designated sites and therefore we would expect a similar approach to the array within KKE MCZ. Natural England advises that this should be fully addressed in the Environmental Statement. The necessity to construct with the KKE MCZ needs to be fully justified and presented. We strongly advise that the Applicant considers refining their project design to avoid any construction within KKE MCZ boundary in the first instance. We advise that the Applicant takes note of other projects such as Hornsea Project 3, for which it was agreed that Markham's Triangle MCZ would be an infrastructure exclusion zone. Natural England would advise further engagement on this critical design principle.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there will be no infrastructure placed on the seabed within the MCZ.
Natural England	28/07/2023 MEEB	We draw your attention to Natural England's latest response dated May 2023 to the Secretary of State (SoS) in relation to debris removal as a compensation option for the Norfolk Vanguard and Boreas projects. Natural England's position on debris removal as suitable compensation or MEEB remains unchanged.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there is no longer a requirement for MEEB.

Consultee	Date / Document	Comment	Response / where addressed in the MCZA
Natural England	28/07/2023 MEEB	Please see our comments on the Stage 1 assessment which are also relevant to this document.	Noted.
Natural England	28/07/2023 MEEB	Natural England notes that no one option for MEEB has been progressed. Natural England have advised through the ETG process and in our written responses, that this needs to be addressed prior to submission. It should be noted that recent decisions by the SoS support our position. We advise that the Applicant continues to engage with Natural England on this crucial issue, noting our preference for no construction within KKE MCZ, which in line with mitigation proposed for Hornsea Project 3. Clear justification through the Mitigation Hierarchy must be presented should the Applicant wish to progress to MEEB, contrary to our advice.	The array area has been reduced in size and no longer overlaps the KKE MCZ. Therefore, there is no longer a requirement for MEEB.
Natural England	19/10/2023 MCZ Assessment written response following a seabed ETG in October 2023	Firstly, MCZ assessments (MCZAs) need to be standalone documents with the evidence included in any MCZ assessment in support of statements and conclusions drawn and not within other Application documents. In addition, we had concerns that the conservation objectives of the KKE MCZ would be hindered by the construction and decommissioning phases of the North Falls. However, we agreed with the assessment conclusion that during the operational phase of North Falls, lasting habitat change/loss and colonisation of project may hinder the MCZ conservation objectives. Secondly, we were also concerned that further supporting information was needed to support the assessment conclusions, for example, the lack of project specific wave data and reliance on sediment plume data from the existing projects. However, we note that the project now has site-specific wave data and is considering the VE OWF sediment plume model. Furthermore, since our comments on the PEIR were provided, the Red Line Boundary has been revised so that the southern array is now no longer located within KKE MCZ. Therefore, we will look forward to providing our comments on the updated MCZA with a focus on indirect effects.	This MCZA is to be submitted as a standalone assessment in the DCO application. Following the Seabed ETG meeting in October 2023, lasting habitat change/loss and colonisation of hard infrastructure have been removed from the KKE MCZ assessment.

5 Project description

5.1 Offshore scheme summary

52. The North Falls project area comprises:

- The offshore project area:
  - The offshore wind farm area (the 'array area') - within which the WTGs, OSPs, OCP (if required), platform interconnector cable and array cables will be located;
  - Offshore cable corridor (under options 1 and 2 below) - the corridor of seabed from array area to the landfall within which the offshore export cables will be located; and
- The onshore project area (options 1 and 2 below).

53. The following three grid connection options are included in the Project design envelope.

- Option 1: Onshore electrical connection at a National Grid connection point within the Tendring peninsula of Essex, with a project alone onshore cable route and onshore substation infrastructure.
- Option 2: Onshore electrical connection at a National Grid connection point within the Tendring peninsula of Essex, sharing an onshore cable route and onshore cable duct installation (but with separate onshore export cables) and co-locating separate project onshore substation infrastructure with Five Estuaries; or
- Option 3: Offshore electrical connection, supplied by a third-party.

54. With regards to the MCZA, options 1 and 2 would be the same, and these represent the worst case scenario assessed in Section 8. For option 3 there would be no offshore export cables as the Project's connection to the national grid would be offshore at an OCP within the array area. Within the array area, under options 1 and 2 there would be up to two offshore OSPs; whereas for option 3 there would be one OCP and up to one OSP, i.e. under all scenarios there would be a maximum of two platforms, with no change to the worst case foundation infrastructure.

5.2 Pre-installation works

55. The worst-case scenario takes into account the potential for pre-installation works, such as:

- Boulder clearance;
- Prelay grapnel run; and
- Sandwave levelling.

5.3 Foundations

56. The foundation types currently being considered for the WTGs are:

- Monopile foundations;
- Mono suction bucket foundations;
- Multi-leg pin-piled jacket foundations; and/or
- Multi-leg suction bucket jacket foundations.
-

57. The foundation types considered for the platforms are:
    - Monopile;
    - Multi-leg pin pile jacket; or
    - Multi-leg suction bucket jacket.

58. The decision on the types of foundations used to support the WTGs and platforms will be made post-consent. Foundation types will be selected following detailed design, based on suitability of the ground conditions, water depths and WTG models. There may be only one type used, or a combination of foundation types may be used across the array area.

5.4 Offshore cables

5.4.1 Cable burial

59. Array, platform interconnector and offshore export cables will be buried below the seabed where practicable. The installation method and target burial depth will be defined post consent based on a cable burial risk assessment, considering ground conditions as well as the potential for impacts upon cables such as from trawling and vessel anchors.

60. NFOW has undertaken engineering analysis of the site specific geophysical data which has been used to inform the project design envelope presented in Chapter 5 Project Description in the North Falls ES [**Document Reference: APP-019**] and the worst case scenario for the MCZA (Section 5.6).

61. It is anticipated that the offshore cables will be installed via either mass flow excavation (MFE), ploughing, jetting, trenching, or a combination of these techniques, depending on ground conditions along the specific cable route. MFE represents the worst case scenario for sediment dispersion and smothering and therefore this has been used in the dispersion modelling (Hydrodynamic and Dispersion Modelling Report [9.54, Rev 2]).

5.4.2 External cable protection

62. In some cases, it may be necessary to use alternative methods than burial to provide the adequate degree of protection for the cables. Remedial protection measures could include rock or gravel burial, concrete mattresses, flow energy dissipation devices, dredged sandy material, protective aprons or coverings, and bagged solutions (geotextile sand containers, rock-filled gabion bags or nets, grout bags filled with material sourced from the site or elsewhere).

5.5 Offshore construction programme

63. The final design (e.g. number of WTGs, platform, cables, etc.) and supply chain will affect the construction programme, as well as weather conditions during construction.

64. The overall North Falls construction programme is anticipated to be approximately 5 years, with onshore construction works starting in year 1 and offshore construction works in year 4. UXO clearance would be subject to separate licencing and is likely to occur during year 3.

65. Indicative programmes are provided below in Table 5.1. Offshore working hours during construction are anticipated to be 24/7.

Table 5.1 Indicative offshore construction programme (likely timescale for works shown in dark green, potential construction window in light green)

	Year 1 -3	Year 4			Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Substation installation								
Substation commissioning								
Offshore export cable installation								
Foundation installation								
Array cable installation								
Wind turbine installation								
Commissioning								

5.6 Worst case scenario

Table 5.2 North Falls worst case scenario relating to seabed impacts

Impact	Worst case	Notes
Construction		
Increased suspended sediment concentrations (SSC) – foundation seabed preparation	• Seabed preparation volumes for WTG= 1,040,625m^3 • OSPs/OCP seabed preparation = 38,485m^3 • Worst case scenario volume for foundations = 1,079,110Mm^3	N/A
Increased SSC – array cable installation	• Array cable seabed preparation = 22,204,296m^3 • Array cable burial – 170km length with average 1m trench width x average 1.2m burial depth = 204,000m^3 • Platform interconnector cable sandwave levelling/ seabed preparation = 1,436,480m^3 • Platform interconnector cable burial – 20km length with average 1m trench width x average 1.2m burial depth = 24,000m^3 Worst case scenario volume for array and interconnector platform cables = 23,868,766m^3 Total array area suspended sediments = 24,947,886m^3	Foundation installation would be at least 50m from the KKE MCZ. The disposal of any dredged sediment would be at least 1km away from the KKE MCZ.
Increased SSC – drill arisings in the array area	• Drill arisings at 10% of WTGs = 34,728m^3 (based on 34 of the largest turbines which is the worst case scenario) • Drill arisings at 1 x monopile OSPs/OCP = 11,451m^3 (based on 50% of the platforms needing drilling) • Total = 46,179m^3	Drill arisings would not occur in the event that suction buckets are used and therefore this parameter cannot be added to the maximum seabed levelling described above.

Impact	Worst case	Notes
Increased SSC – offshore export cable installation	• Offshore export cable sandwave levelling/ seabed preparation = 4,297,282m^3 • Offshore export cable burial – 125.4km length with average 1m trench width x average 1.2m burial depth = 150,480m^3 • Worst case scenario volume for offshore export cables = 4,447,761.5m^3	In light of feedback from Port of London Authority, Harwich Haven Authority and London Gateway during the Examination, the Applicant has committed to installing offshore export cable so as not to preclude or impede port dredging to a depth of at least 22m below Chart Datum within the Deep Water Route (DWR) areas Sunk A, and Trinity and Sunk Pilot Diamond Buffer areas as shown on the Deep Water Route Cable Installation Areas (Future Dredging Depths) Plan [9.57]. Cables will be installed so as not to preclude or impede dredging to a depth of at least 19m below CD in the DWR area Sunk B as shown on the Deep Water Route Cable Installation Areas (Future Dredging Depths) Plan. The additional dredging associated with this commitment is included in the export cable volumes.
Remobilisation of contaminated sediments	Maximum suspension of sediments as described above. No significant contaminated sediments were recorded in the offshore project area. See Chapter 9 Marine Water and Sediment Quality [**Document Reference: APP-023**] for more detail.	N/A
Effects on bedload sediment transport	Sediment volumes as described above for 'Increased SSC – offshore export cable installation' and 'Increased SSC – array/ inter-platform cable installation'	The primary pathway for impact relates to the volume of sediment removed and therefore the worst-case scenario is linked to the scenario with the greatest volume of dredged sediment rather than the area over which sandwave levelling occurs. The disposal of any sediment that would be disturbed or removed during sandwave levelling would occur within the offshore project area. In light of feedback from Port of London Authority, Harwich Haven Authority and London Gateway during the Examination, the Applicant has committed to installing offshore export cable so as not to preclude or impede port dredging to a depth of at least 22m below Chart Datum within the DWR areas Sunk A, and Trinity and Sunk Pilot Diamond Buffer areas as shown on the Deep Water Route Cable Installation Areas (Future Dredging Depths) Plan [9.57]. Cables will be installed so as not to preclude or impede dredging to a depth of at least 19m below CD in the DWR area Sunk B as shown on the Deep Water Route Cable Installation Areas (Future Dredging Depths) Plan. The additional dredging associated with this commitment is included in the 'Increased SSC – offshore export cable installation' volumes. London clay is expected to be present. As a worst case scenario, it is estimated that, of

Impact	Worst case	Notes
		the total sediment above, 304,917m^3 of this could be clay which could result in a seabed footprint of 200,000m^2 when deposited. The disposal of dredged sediment and clay would be at least 1km from the KKE MCZ.
Underwater noise and vibration	Maximum hammer energy: • 4,400kJ (pin-piles) • 6,000kJ (monopiles) • Starting hammer energies of 15% would be used for 10 minutes. • Ramp up will then be undertaken for the next 80-120 minutes up to the maximum hammer energy.	N/A
Introduction of Invasive Non-Native Species (INNS)	Indicative port unknown: • Maximum Indicative peak number of construction vessels on site at any one time: up to 35 vessels • Construction vessel two-way trips to port (movements): 2,532 over two year offshore construction period (average of 1,266 movements per year; 3.5 x movements per day)	Construction port and vessel routes to be determined post consent. Embedded mitigation described in Section 5.7.
O&M		
Increased SSC	Unplanned repairs and reburial of cables may be required during O&M, the following estimates are included: • Reburial of c. 2.75% of array/platform-interconnector cable is estimated over the life of the project (24m disturbance width) x average 1.2m depth = 150,480m^3 • Reburial of c. 4% of offshore export cable is estimated over the life of the project (24m disturbance width) x average 1.2m depth = 144,461m^3 • Five array/platform interconnector cable repairs are estimated over the project life. 600m section removed x 24m disturbance width x average 1.2m depth = 86,400m^3	Each O&M activity would be relatively short term and it is likely that the requirements for maintenance would be spread over the project life, with suspended sediments becoming rapidly redeposited.

Impact	Worst case	Notes
	• Four offshore export cable repairs are estimated over the project life. 600m section removed x 24m disturbance width x average 1.2m depth = 69,120m^3	
Remobilisation of contaminated sediments	Maximum suspension of sediments as described above. No significant contaminated sediments were recorded in the offshore project area. See Chapter 9 Marine Water and Sediment Quality **[Document Reference: APP-023]** for more detail.	N/A
Effects on bedload sediment transport	57 WTG and 2 OSPs/OCP • Volume of array cable protection = 119,000m^3 • Volume of platform interconnector cable protection = 14,000m^3 • Volume of offshore export cable protection = 43,890m^3	N/A
Underwater noise and vibration	WTG operational noise as described in Appendix 12.3 Underwater Noise Modelling Report of the North Falls ES **[Document Reference: APP-098].**	N/A
Introduction of INNS	1,095 round trips of small vessels, and 127 round trips of large vessels (1,222 in total).	N/A
Electromagnetic fields	Array cables: • Maximum cable length: 170km • Maximum voltage: 132kV • Target minimum burial depth: 0.6m (average burial depth: 1.2m) • Up to 20% of total array cable length requiring protection (up to 34km) Platform interconnector cable: • Maximum cable length: 20km • Maximum voltage: 275kV	Embedded mitigation described in Section 5.7.

Impact	Worst case	Notes
	• Target minimum burial depth: 0.6m (average burial depth: 1.2m) • Up to 20% of total array cable length requiring protection (up to 4km) Offshore export cables: • Up to 2 cables • Maximum offshore cable length: 125.4km • Maximum voltage: up to 275kV • Target minimum burial depth: 0.6m (average burial depth: 1.2m) • Up to 10% of total offshore export cable length requiring protection (up to 12.5km)	
Decommissioning		
Increased suspended sediment concentrations	<u>Array area:</u> Cutting of piles below the seabed surface: • 480 pin-piles of 6m diameter • 57 wind turbines x 8 piles • 2 OSPs/OCP x 12 piles Or • 59 monopiles of 17m diameter (57 wind turbines + 2 OSPs/OCP) Or Removal of largest foundations: • 57 WTG x 4 legged suction buckets with 15m diameter each • 2 OSPs/OCP x 6 legged suction buckets with 25m diameter each Or • A mixture of the above foundation types. The foundation types could also include suction caissons, however these do not represent a worst case scenario for decommissioning.	No decision has yet been made regarding the final decommissioning policy for the offshore project infrastructure. It is also recognised that legislation and industry practice change over time. However, the following infrastructure is likely be removed, reused or recycled where practicable: WTGs including monopile, steel jacket and suction bucket foundations; OSPs including topsides and steel jacket foundations; and Offshore cables may be removed or left in situ depending on available information at the time of decommissioning. The following infrastructure is likely to be decommissioned in situ depending on available information at the time of decommissioning: Scour protection; Offshore cables may be removed or left in situ; and Cable protection. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. For the purposes of the worst-case scenario, it is anticipated that the impacts will be no greater than those identified for the construction phase.

Impact	Worst case	Notes
	<u>Offshore export cables:</u> • Up to 125.4km of offshore export cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan) <u>Array cables:</u> • Up to 170km of array cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan) <u>Platform interconnector cables:</u> • Up to 20km of array cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan)	
Re-mobilisation of contaminated sediments	Maximum suspension of sediments as described above. No significant contaminated sediments were recorded in the offshore project area. See Chapter 9 Marine Water and Sediment Quality [**Document Reference: APP-023**] for more detail.	
Effects on bedload sediment transport	<u>Array area:</u> Cutting of piles below the seabed surface: • 480 pin-piles of 6m diameter • 57 wind turbines x 8 piles • 2 OSPs/OCP x 12 piles Or • 59 monopiles of 17m diameter (57 wind turbines + 2 OSPs/OCP) Or Removal of largest foundations (GBS): • 57 WTG x 4 legged suction buckets with 15m diameter each	

Impact	Worst case	Notes
	• 2 OSPs/OCP x 6 legged suction buckets with 25m diameter each Or • A mixture of the above foundation types. The foundation types could also include suction caissons, however these do not represent a worst case scenario for decommissioning. <u>Offshore export cables:</u> • Up to 125.4km of offshore export cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan) <u>Array cables:</u> • Up to 170km of array cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan) <u>Platform interconnector cables:</u> • Up to 20km of array cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan)	
Underwater noise and vibration	WTG operational noise as described in ES Appendix 12.2 Underwater Noise Modelling Report [**Document Reference: APP-098**].	

5.7 Mitigation

66. This section outlines the embedded mitigation relevant to the benthic and intertidal ecology assessment, which has been incorporated into the design of North Falls (Table 5.3).

Table 5.3 Embedded mitigation measures

Parameter	Mitigation measures embedded into North Falls design
Offshore export cable route	The offshore cable corridor was selected in consultation with key stakeholders to select a route which minimised impacts on designated sites, such as avoiding MCZs. See Chapter 4 Site Selection and Assessment of Alternatives of the North Falls ES **[Document Reference: APP-018].**
Array area	Following consultation feedback on the PEIR and preliminary MCZA, the array area has been reduced from 149.5km^2 down to 95km^{2,} including removing any overlap with the KKE MCZ to avoid any direct impacts.

Parameter	Mitigation measures embedded into North Falls design
	Due to the need to ensure there is no over-sail of turbine rotors beyond the order limits, foundations must be set back by a minimum of 50m from the order limits (and therefore a minimum of 50m from the KKE MCZ). Due to the minimum spacing required between turbines (1180m in the downwind direction and 944m in the cross wind direction), the majority of WTG will be over 1km from the KKE MCZ, with only a small number of WTG installed within 1km of the KKE MCZ (approximately 3 WTGs).
	Removal of Gravity Base foundations which provides the following benefits: • Reduced footprint of foundations • Reduced footprint and volume of scour protection • Reduced effects on hydrodynamic regime due to reduced cross sectional area of the foundations
Sediment disposal	The disposal of any dredged sediment would be at least 1km away from the KKE MCZ.
Scour protection	Following industry best-practice the Applicant will seek to minimise the use of scour protection. This will be secured through a Scour Protection Plan that will be submitted for approval post consent.
Electromagnetic fields (EMF)	The Applicant is committed to burying offshore export cables where practicable which reduces the effects of EMFs.
Micrositing	Should seabed obstacles (e.g. *Sabellaria* reef) be identified in the proposed wind turbine locations and/or cable routes during the pre-construction surveys, micrositing would be undertaken where practicable, to minimise potential impacts.
Invasive Non-Native Species (INNS)	The risk of spreading INNS will be reduced by employing biosecurity measures in accordance with the following requirements: International Convention for the Prevention of Pollution from Ships (MARPOL). The MARPOL sets out appropriate vessel maintenance; The International Convention for the Control and Management of Ships' Ballast Water and Sediments, which provide global regulations to control the transfer of potentially invasive species; and The Environmental Damage (Prevention and Remediation) (England) Regulations 2015, which set out a polluter pays principle where the operators who cause a risk of significant damage or cause significant damage to land, water or biodiversity will have the responsibility to prevent damage occurring, or if the damage does occur will have the duty to reinstate the environment to the original condition.

5.8 Monitoring

67. The In Principle Monitoring Plan (IPMP) [**Document Reference: 7.10, Rev 2**] includes a commitment of further monitoring to validate that there will be no significant indirect effects on the KKE MCZ.

68. The IPMP is secured by the DMLs (Schedule 8, Part 2, Conditions 21, 25, 26 and 27; Schedule 9, Part 2, Conditions 22, 26, 27 and 28; and Schedule 10, Part 2, Conditions 21, 25, 26 and 27).

69. In the event that monitoring shows significant changes to the physical processes within the order limits in proximity to the KKE MCZ, monitoring of the benthic community will be undertaken to validate the conclusions of this MCZA.

70. Scope of surveys, including location, programmes and methodologies for the monitoring shall be developed in consultation with the SNCB and submitted to the MMO for written approval at least 6 months prior to the commencement of any survey works.

71. Survey results will be discussed with the MMO and SNCB and in the unlikely event the results show a significant effect, adaptive management will be agreed with the MMO, in consultation with the SNCB and in accordance with the guiding principles discussed in Section 3 of the IPMP [**Document Reference: 7.10, Rev 2**].

6 MCZ Baseline

6.1 North Falls surveys

72. In order to provide site specific and up to date information on which to base the impact assessment and MCZA, surveys have been completed to characterise the seabed in the array area and the offshore cable corridor.

73. Following consultation feedback (Section 4) on the Preliminary Environmental Information Report (PEIR) and preliminary MCZA, the array area has been reduced from 149.5km^2 down to 95km^2. This has involved the removal of the northern array and a reduction in the size of the southern array (now referred to as the 'array area'). The southern array area refinement removed any overlap with the Kentish Knock East (KKE) Marine Conservation Zone (MCZ). An interconnector cable corridor between the former array areas has also been removed. In addition, the landfall location has been selected and the offshore cable corridor refined in the nearshore to align with the landfall area.

74. The geophysical, benthic and intertidal surveys (North Falls ES Appendix 10.1: **Document Reference: APP-094**]) were undertaken based on the PEIR offshore project area, which was larger than, and fully encapsulates, the current offshore project area.

6.1.1 Project geophysical surveys

75. Site specific geophysical surveys were carried out in the PEIR offshore project area. Data were acquired using a multibeam echosounder (MBES), side scan sonar (SSS), sub-bottom profiler (SBP), single magnetometer (MAG), and single-channel sparker. Geophysical data were used to inform the environmental survey design. The surveys undertaken were:

- Geophysical survey of the north array, south array and interconnector cable corridor route, May to August 2021; and
- Geophysical survey of the offshore cable corridor, May to August 2021.

6.1.2 Project benthic characterisation survey

76. A benthic characterisation survey was conducted by Fugro in 2021.

77. The survey was conducted in July 2021 and covered the PEIR offshore project area. The survey included 46 sampling stations (out of a proposed 49), of which five were taken in KKE MCZ. The sampling consisted of drop-down video and

stills photography at each sampling station, along with macrofaunal and physico-chemical grab samples. Sediment chemistry samples were acquired at 26 of the sampling stations. The distribution of this sampling is illustrated in Figure 2.2 of the North Falls ES Appendix 10.1 [**Document Reference: APP-094**].

6.1.3 Benthic habitat mapping

78. The distribution of EUNIS habitats and biotopes were mapped for the survey area of North Falls. A total of one habitat, two biotope complexes and seven biotopes were identified.

79. By combining grab samples with seabed video and photography and evaluating them against multivariate groups (derived from faunal multivariate analysis), EUNIS habitats and biotopes were assigned along sampling stations.

80. A technical report summarising the benthic ecology monitoring method and results is provided in ES Appendix 10.1 Survey Report [**Document Reference: APP-094**].

6.2 Blackwater, Crouch, Roach and Colne Estuaries MCZ

81. The BCRC Estuaries MCZ is located to the north of the Thames estuary on the Essex coast. It covers an area of 284km^2 and extends from the mean high water springs mark to where the estuary mouth joins the North Sea (Figure 6-1).

6.2.1 Protected features

82. The BCRC Estuaries MCZ is designated for four protected features. These are:

- Intertidal mixed sediments
- Native oyster *Ostrea edulis* beds
- Native oyster
- Clacton Cliffs and Foreshore

6.2.1.1 Habitats

6.2.1.1.1 Intertidal mixed sediments

83. Intertidal mixed sediments span across all areas of the MCZ including coastal locations and up-river. However, as stated in the screening report [**Document Reference: APP-238**], this feature will not be affected during construction, operation & maintenance or decommissioning of the Project. This feature is not considered further.

6.2.1.1.2 Native oyster beds

84. The BCRC Estuaries MCZ comprises the most important area for both wild and cultivated native oyster in the south-east region of England (Natural England, 2013).

85. As this MCZ is not located within the North Falls offshore project area, there was no evidence collected of the presence of native oyster beds. Furthermore, there is no reported data with accurate distribution of native oyster beds within the MCZ. Advice from Natural England to Defra (2013) states that due to

sensitivities surrounding the commercial and ecological status of this habitat, their locations have not been reported.

6.2.1.2 Marine Species

6.2.1.2.1 Native oyster

86. As per native oyster beds.

6.2.1.3 Geology

6.2.1.3.1 Clacton Cliffs and Foreshore

87. The Clacton Cliffs and Foreshore are confined to a small area to the north of the MCZ. As stated in the screening report [**Document Reference: APP-238**], this feature will not be affected during construction, operation, maintenance or decommissioning of the Project. This feature is not considered further.

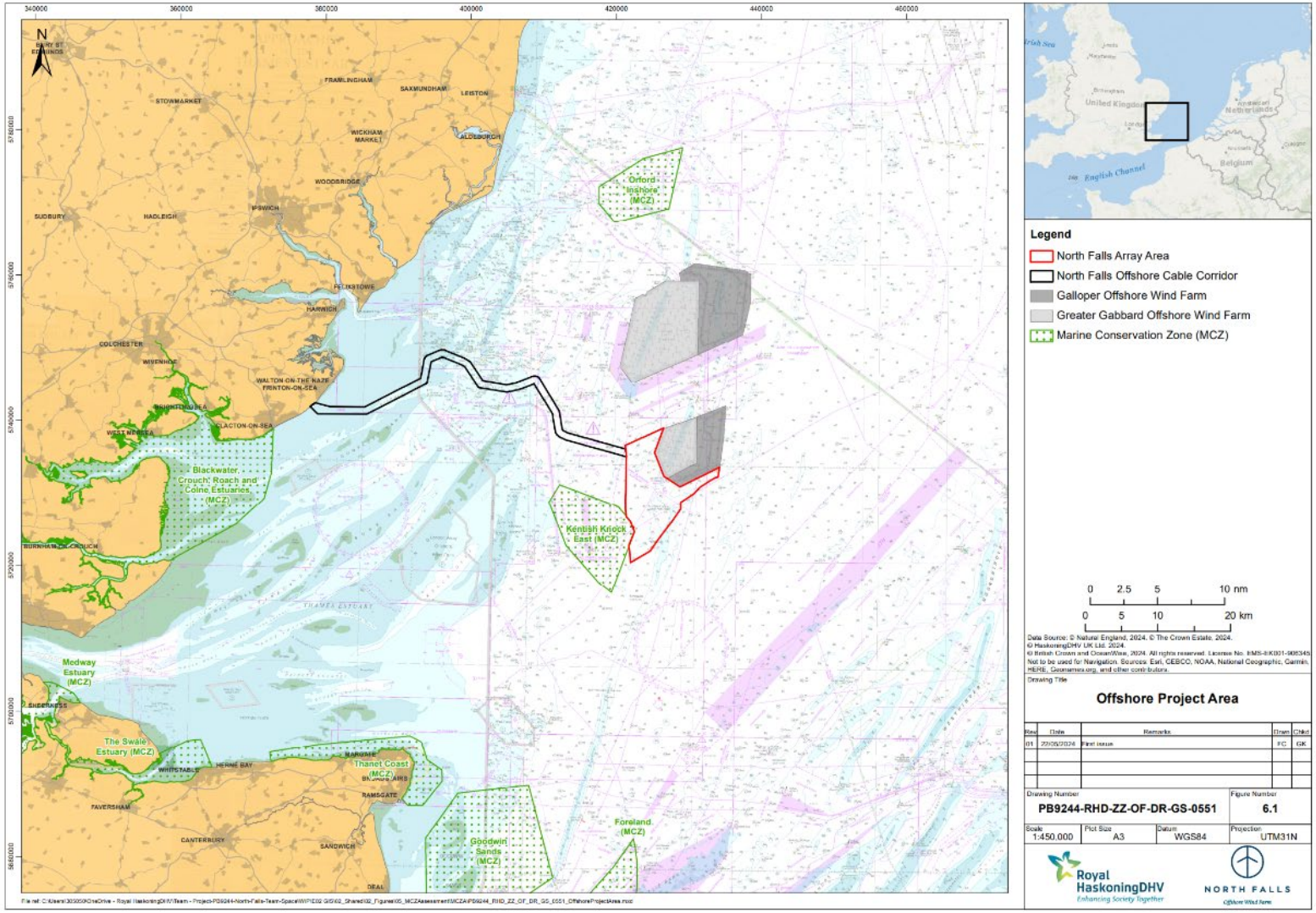

Figure 6-1 Offshore Project Area and MCZs

6.2.2 Conservation objectives

88. The site's conservation objectives apply to the MCZ and the individual species and/or habitat for which the site has been designated.

89. The conservation objective is that each of the protected features:

- Are maintained in favourable condition if they are already in favourable condition.
- Be brought into favourable condition if they are not already in favourable condition.

90. For each protected broad-scale habitat, favourable condition means that, within a zone:

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

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

92. For each species of marine fauna, favourable condition means that the population within a zone is supported in numbers which enable it to thrive, by maintaining:

- The quality and quantity of its habitat.
- The number, age and sex ratio of its population.

93. Any temporary reduction of numbers of a species is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery.

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

95. Table 6.1 shows the features designated by the BCRC Estuaries MCZ.

Table 6.1 Protected features of the Blackwater, Crouch, Roach and Colne Estuaries MCZ (source: Defra, 2013)

Protected feature	Type of feature	Management approach
Intertidal mixed sediments	Broadscale marine habitat	Maintain in favourable condition
Native oyster beds	Feature of Conservation Interest	Recover to favourable condition
Native oyster	Feature of Conservation Interest	Recover to favourable condition

6.3 Kentish Knock East MCZ

96. The KKE MCZ is located 12 nautical miles off the coastline in the outer Thames estuary (Figure 6-1). It covers an area of approximately 96km^2.

97. Based on a Cefas survey on 3rd January to 27th January 2014 (Defra, 2015), the large majority of the KKE MCZ was mapped as being subtidal mixed

sediments (73.61km^2), with subtidal coarse sediment (14.96km^2) and subtidal sand along the easterly side (7.38km^2) with a small (0.3km^2) area of subtidal mud to the north west of the zone, shown in Figure 6-2.

6.3.1 Protected features

98. The MCZ feature map (Figure 6-2, based on Defra (2015)) indicated that all three protected features are expected to occur within the North Falls ZoI. These are:

- Subtidal sand
- Subtidal coarse sediments
- Subtidal mixed sediments

99. It should be noted that these habitats are not features of conservation importance. In accordance with the MCZ project Ecological Network Guidance (JNCC, 2016) these were representative examples of broadscale habitats included in the designation process. Therefore, it is important to note that the habitats protected by the Kentish Knock East MCZ are not threatened, rare or declining habitats which would warrant being features of conservation importance.

6.3.1.1 Subtidal sand

100. Subtidal sand includes clean medium to fine sands or non-cohesive slightly muddy sands on open coasts, offshore or in estuaries and marine inlets. Such habitats are often subject to a degree of wave action or tidal currents which restrict the silt and clay content to less than 15% (JNCC, n.d. (a)).

101. Of the North Falls 2021 survey samples within the KKE MCZ, three locations (ST45ALT, ST46 and ST49) were classed as circalittoral fine sand. This biotope provides habitat for a range of benthos species including echinoderms, polychaetes and bivalves (North Falls ES, Appendix 10.1 [**Document Reference: APP-094**]).

6.3.1.2 Subtidal coarse sediments

102. Subtidal coarse sediments include coarse sand, gravel, pebbles, shingle and cobbles which are often unstable due to tidal currents and/or wave action (JNCC, n.d(b)).

103. Of the sediment samples collected in 2021 in the area of overlap with the MCZ, one location (ST44, shown in Figure 6-3) was found to have coarse sand and was classified as circalittoral coarse sediment.

6.3.1.3 Subtidal mixed sediments

104. Subtidal mixed sediments include:

- Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20 m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon mud, sand or gravel (JNCC, n.d. (c)); and
- Sublittoral mixed (heterogeneous) sediments found from the extreme low water mark to deep offshore circalittoral habitats. These habitats incorporate a range of sediments including heterogeneous muddy gravelly sands and

mosaics of cobbles and pebbles embedded in or lying upon sand, gravel or mud (JNCC, n.d. (d)).

105. During the 2021 survey, one sample location (ST48) in the KKE MCZ was classed as subtidal mixed sediments. The biotope identified in the Fugro (2021) survey was polychaete-rich deep *Venus* community in offshore mixed sediments. A diverse community of polychaetes such as *Glycera lapidum* and *Mediomastus fragilis* are typical of this biotope.

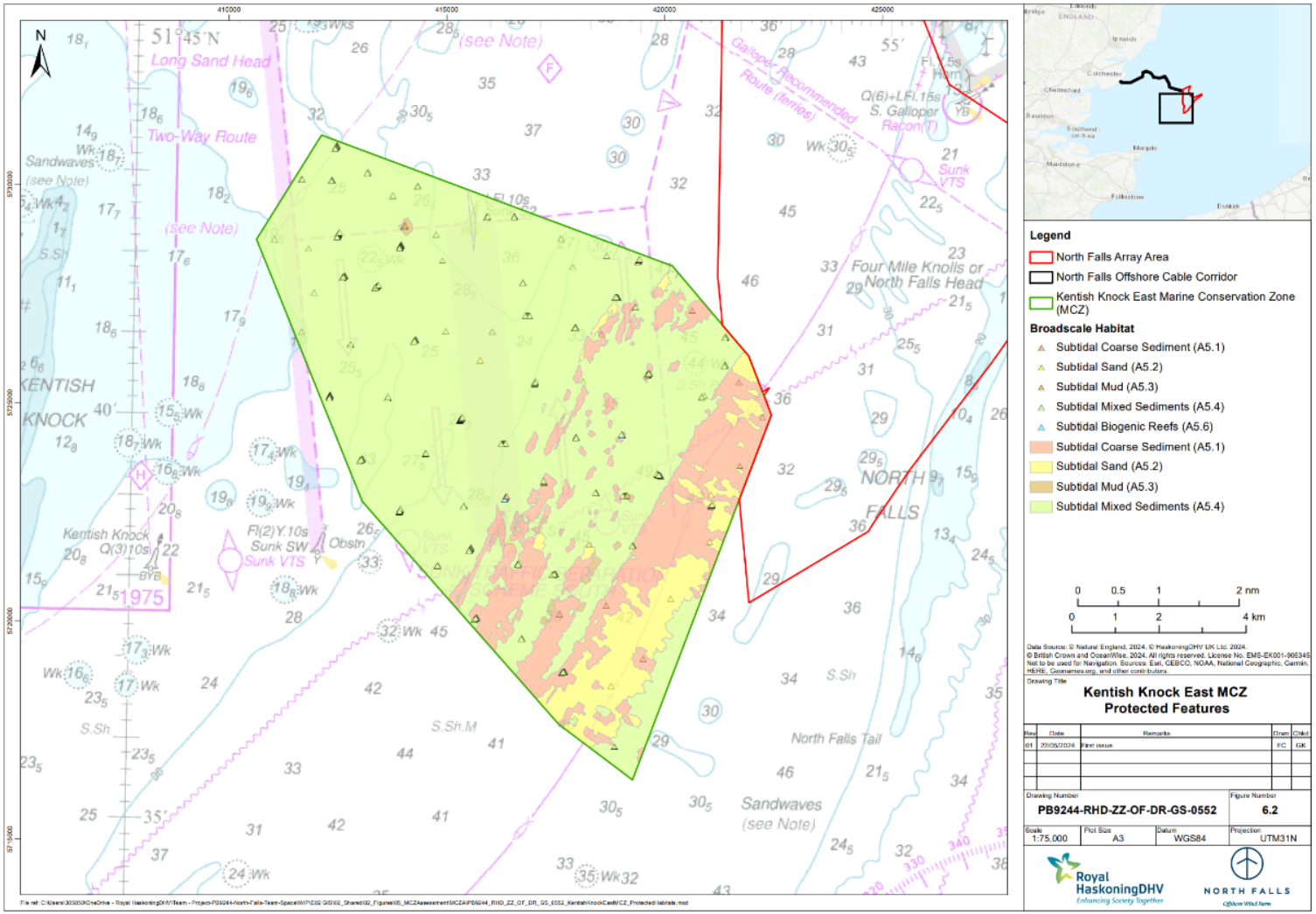

Figure 6-2 KKE MCZ Protected Features (source Defra 2015)

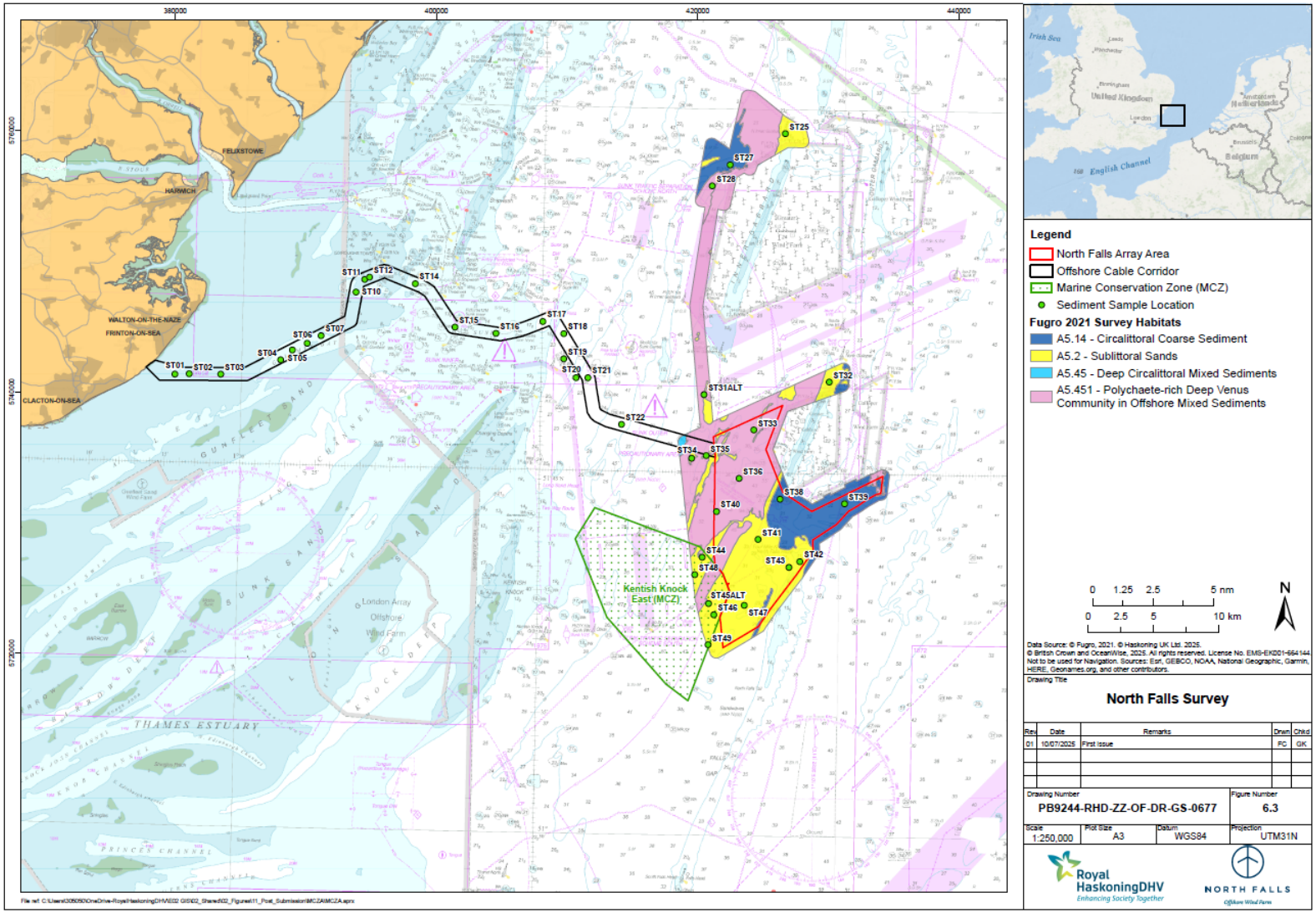

Figure 6-3 North Falls benthic survey results in KKE MCZ (source: ES Appendix 10.1 [APP-094])

6.3.2 Conservation objectives

106. The site's conservation objectives apply to the MCZ and the individual species and/or habitat for which the site has been designated.

107. The conservation objective is that for each of the protected features:

- So far as already in favourable condition, remain in such condition; and
- So far as not already in favourable condition, be brought into such condition, and remain in such condition.

108. "Favourable Condition", with respect to a habitat within this MCZ, means that:

- Its extent is stable or increasing; and
- Its structure and functions, its quality, and the composition of its characteristic biological communities are such to ensure that it remains in a condition which is healthy and not deteriorating.

109. The reference to the composition of the characteristic biological communities of a habitat includes a reference to the diversity and abundance of species forming part of, or inhabiting, that habitat. For the purposes of this MCZ, any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery, and for the purpose of determining whether a protected feature is in favourable condition within the meaning of this designation, any alteration to that feature brought about entirely by natural processes is to be disregarded.

110. Table 6.2 shows the features designated by the KKE MCZ.

Table 6.2 Protected features of the KKE MCZ (source: Defra, 2019a)

Protected feature	Type of feature	Management approach
Subtidal sand	Broadscale marine habitat	Maintain in favourable condition
Subtidal coarse sediment	Broadscale marine habitat	Recover to favourable condition
Subtidal mixed sediments	Broadscale marine habitat	Recover to favourable condition

111. MMO (2025) Stage 3 Site Assessment: Kentish Knock East MPA (Draft) states:

"*There is no feature condition assessment available for this site; in its absence Natural England conducted a vulnerability assessment, which includes sensitivity and exposure information for features and activities in a site. It is used as a proxy for a condition assessment to inform the GMA [general management approach]*.

Biotope data for features within Kentish Knock East MPA is only available at the bioregion level for Southern North Sea. More information on this can be found in Natural England's supplementary advice on conservation objectives –

Kentish Knock MCZ[2]*. The general management approach for both subtidal coarse sediment and subtidal mixed sediments has been established as recover to favourable condition due to their moderate to high vulnerability to bottom towed fishing gear*"

112. The SACO (Natural England, 2023) shows the targets which relate to the recover objectives for subtidal coarse and mixed substrates include:

- Recover the presence and spatial distribution of subtidal mixed/coarse sediment communities
- [Maintain OR Recover OR Restore] the abundance of listed species, to enable each of them to be a viable component of the habitat.
- Recover the species composition of component communities.

7 Screening

113. The following tables summarise the screening exercise which is detailed in Appendix 1 [**Document Reference: APP-238**].

114. The pressure names are as taken from the Natural England's AoO.

7.1 Blackwater, Crouch, Roach and Colne Estuaries MCZ

Table 7.1 Screening of pressures for the BCRC Estuaries MCZ (✓: included in the Stage 1 Assessment, ×: not included in the Stage 1 Assessment)

Potential pressure (scoping)	Pressure name (AoO)	Construction	Operation & Maintenance	Decommissioning
Intertidal mixed sediments				
Scoped out - see Appendix 1 (MCZ Screening Report, **Document Reference: APP-238**).				
Clacton Cliffs and Foreshore				
Scoped out - see Appendix 1 (MCZ Screening Report, **Document Reference: APP-238**).				
Native oyster and oyster beds				
Increased SSC concentrations	Changes in suspended solids (water clarity)	✓	✓	✓

[2] https://designatedsites.naturalengland.org.uk/ConservationAdvice/SupplementaryAdvice.aspx?SiteCode=UKMCZ0080&SiteName=kentish&SiteNameDisplay=Kentish+Knock+East+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0

Potential pressure (scoping)	Pressure name (AoO)	Construction	Operation & Maintenance	Decommissioning
	Smothering and siltation rate changes (Light)			
Re-mobilisation of contaminated sediments	Hydrocarbon & PAH contamination Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) Transition elements & organo-metal (e.g. TBT) contamination	✓	✓	✓
Sediment deposition (smothering)	Smothering and siltation rate changes (Light)	✓	✓	✓
Introduction or spread of INNS	Introduction or spread of invasive non-indigenous species (INIS)	✓	✓	✓
Electromagnetic fields	Scoped out see Appendix 1 [**Document Reference: APP-238**].			

7.2 Kentish Knock East MCZ

Table 7.2 Screening of pressures for the KKE MCZ (✓: included in the Stage 1 Assessment, ×: not included in the Stage 1 Assessment)

Potential pressure (scoping)	Pressure name (AoO)	Construction	Operation & Maintenance	Decommissioning
Subtidal sand, Subtidal coarse sediment and Subtidal mixed sediments				
Increased SSC	Changes in suspended solids (water clarity) Smothering and siltation rate changes (Light) Smothering and siltation rate changes (Heavy)	✓	✓	✓

Potential pressure (scoping)	Pressure name (AoO)	Construction	Operation & Maintenance	Decommissioning
Re-mobilisation of contaminated sediments	Hydrocarbon & PAH contamination Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) Transition elements & organo-metal (e.g. TBT) contamination Introduction of other substances (solid, liquid or gas)	✓	✓	✓
Effects on bedload sediment transport	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion Abrasion/disturbance of the substrate on the surface of the seabed	✓	✓	✓
Underwater noise and vibration	Underwater noise changes Vibration	✓	✓	✓
Introduction or spread of INNS	Introduction or spread of invasive non-indigenous species (AoO)	✓	✓	✓
Electromagnetic fields	Electromagnetic changes	✓	✓	✓

7.3 Screening Summary

Table 7.3 Summary of MCZs screened in and impacts screened in that could potentially hinder conservation objectives of the features of the sites (alone and cumulatively)

Site	Features screened in	Relevant North Falls components	Impacts screened in (alone and cumulatively)
Blackwater, Crouch, Roach and Colne Estuaries MCZ	Native oyster and oyster beds	Indirect effects from North Falls offshore export cables (landfall and nearshore)	Increased SSC
			Re-mobilisation of contaminated sediments
			Sediment deposition (smothering)
			Introduction or spread of INNS
			Increased SSC

Site	Features screened in	Relevant North Falls components	Impacts screened in (alone and cumulatively)
Kentish Knock East MCZ	Subtidal coarse sediment Subtidal sand Subtidal mixed sediments	Indirect effects of the offshore project area	Re-mobilisation of contaminated sediments
			Effects on bedload sediment transport
			Underwater noise and vibration
			Introduction or spread of INNS
			Electromagnetic fields

7.4 Further effects considered during Examination

115. While halo effects were not included in the MCZ Screening report [**APP-238**], nor raised by stakeholders during the pre-application consultation (Section 4), this effect has been considered in response to Natural England's relevant representation [RR-243].

116. Due to the need to ensure there is no over-sail of turbine rotors beyond the order limits, turbine foundations must be set back by a minimum of 50m from the KKE MCZ (explained further in Supporting Information on Offshore Additional Mitigation [**REP4-041**]).

117. In their advice to the Dogger Bank South OWF regarding halo effects, Natural England (2025) stated "*We agree that, based on currently available evidence, 50m is an appropriate buffer to use to assess the potential area of impact*."

118. Therefore, halo effects are screened out of the North Falls assessment due to the 50m buffer between foundations and the KKE MCZ and c.5.9km distance between the North Falls offshore cable corridor and BCRC Estuaries MCZ.

8 Stage 1 assessment

119. This section presents the MCZA Stage 1 assessment of the effects of the construction, operation, maintenance and decommissioning of North Falls on the protected features of both MCZs screened in. Each of the impacts and corresponding pressures (derived from Natural England's AoO) identified in the MCZA Screening Report [**Document Reference: APP-238**] are discussed individually. In April 2025, the Advice on Operations (AoO) (Natural England, 2025) was updated. This version of the AoO has been taken into consideration. The assessment of each impact has considered the effects on the attributes and targets of each protected feature as provided by Natural England's SACOs (Natural England, 2022a and 2022b). The attributes for each protected feature of both MCZs are listed in Table 8.1 and Table 8.2 below, in the order they appear in Natural England's SACOs, along with signposts to the relevant sections of the Stage 1 Assessment where the assessment of that feature and

attribute is provided. Attributes are categorised as either physical or biological to support the assessment, which first addresses impacts on the physical attributes of features, and then the biological attributes of broadscale habitat features (which are largely dictated by physical attributes).

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

121. The indirect impacts screened in are considered during the Stage 1 Assessment.

8.1 Blackwater, Crouch, Roach and Colne Estuaries MCZ

Table 8.1 Pressures assessed in relation to the relevant attributes during the BCRC Estuaries MCZ Stage 1 Assessment. Light blue – no impact pathway, Dark blue – assessment undertaken.

MCZ feature attributes		Impacts											
Attribute type	Attribute	Construction					Operation				Decommissioning		
		Increased suspended sediment concentrations	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Introduction or spread of INNS	Increased suspended sediment concentrations	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Introduction or spread of INNS	Increased suspended sediment concentrations	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Introduction or spread of INNS
Native Oyster *Ostrea edulis*													
Biological	Population: population size	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Population: recruitment and reproductive capability	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Presence and spatial distribution of the species	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Structure: Non-native species and pathogens (species)	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Physical	Supporting habitat: extent and distribution	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: physico-chemical properties (species)	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: sediment movement and hydrodynamic regime (species)	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: water quality – contaminants (species)	N/A	N/A	Section 8.1.1.2	N/A	N/A	N/A	Section 8.1.2.2	N/A	N/A	N/A	Section 8.1.3	N/A
Physical	Supporting processes: water quality – dissolved oxygen (species)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: water quality – nutrients (species)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: water quality – turbidity (species)	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Native oyster *Ostrea edulis* beds													
Physical	Extent and distribution	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3		N/A	N/A
Biological	Structure and function: presence and abundance of key structural and influential species	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Structure: age / size frequency	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Structure: non-native species and pathogens (habitat)	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Structure: population density	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3
Biological	Structure: species composition of the community	Section 8.1.1.1.2	Section 8.1.1.1.2	N/A	Section 8.1.1.3.1	Section 8.1.2.1.2	Section 8.1.2.1.2	N/A	Section 8.1.2.3.1	Section 8.1.3	Section 8.1.3	N/A	Section 8.1.3

MCZ feature attributes		Impacts											
Attribute type	Attribute	Construction					Operation				Decommissioning		
		Increased suspended sediment concentrations	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Introduction or spread of INNS	Increased suspended sediment concentrations	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Introduction or spread of INNS	Increased suspended sediment concentrations	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Introduction or spread of INNS
Physical	Supporting processes: areas with conditions suitable for native oyster bed formation	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: physico-chemical properties (habitat)	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: sedimentation rate	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: water movement and energy	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A
Physical	Supporting processes: water quality – contaminants (habitat)	N/A	N/A	Section 8.1.1.2	N/A	N/A	N/A	Section 8.1.2.2	N/A	N/A	N/A	Section 8.1.3	N/A
Physical	Supporting processes: water quality – dissolved oxygen (habitat)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: water quality – nutrients (habitat)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: water quality – turbidity (habitat)	Section 8.1.1.1.1	Section 8.1.1.1.1	N/A	N/A	Section 8.1.2.1.1	Section 8.1.2.1.1	N/A	N/A	Section 8.1.3	Section 8.1.3	N/A	N/A

8.1.1 Potential Impacts during construction

8.1.1.1 Impact 1: Increased suspended sediment concentrations & Impact 2: Sediment deposition (smothering)

122. During the construction phase of North Falls, there is the potential for foundations and cable seabed preparation and installation activities to disturb sediment, potentially resulting in changes in SSCs and/or seabed level due to deposition of the suspended sediment. This was originally assessed in Chapter 8 Marine Geology, Oceanography and Physical Processes of the North Falls ES [**Document Reference: APP-022**].

123. To test the conclusions of the assessment, hydrodynamic and sediment dispersion modelling was undertaken [REP4-040] and the outputs were interpreted in relation to marine physical processes [REP4-042]. Subsequently, further modelling simulations were run to provide a further evidence base to understand the potential worst case for changes in SSC and sediment deposition **[Document Reference 9.54, Rev 2**]. These documents have been used here to understand potential impacts on the BCRC Estuaries MCZ.

124. Two features of the MCZ have the potential to be affected by increased SSC during construction:

- Native oyster
- Native oyster beds

125. The impact of increased SSC and deposition has been defined using the following pressures identified by Natural England's AoO for the BCRC Estuaries MCZ:

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

126. During the construction phase of the Project, of particular relevance to the BCRC Estuaries MCZ is seabed levelling and trenching during cable installation in the nearshore part of the offshore cable corridor which is located c.5.9km north east of the BCRC Estuaries MCZ.. Numerical modelling shows changes in SSC due to construction activities within the array area do not extend to the BCRC Estuaries MCZ as the array area is located c.48.6km away.

127. Numerical modelling of levelling (sand wave clearance) and cable trenching within the nearshore part of the offshore cable corridor shows the suspended sediment plume in the bottom (near-seabed), middle and surface water column layers extends up to 4km south west the offshore cable corridor and at this distance, changes in SSC are between 5 and 10 mg/l (Plate 8-1). Changes to the north-east of the offshore cable corridor may occur within 10km and near the coast, changes of up to 40mg/l may occur over this distance. Depending on the phase of the tide during levelling, the plume may extend up to 10km south of the offshore cable corridor, potentially within the BCRC MCZ. However, the predicted changes in SSC are extremely small compared to higher background levels of SSC of up to 100 mg/l close to the coast. The changes are also short lived, and SSC return to background levels within two hours of the disturbance.

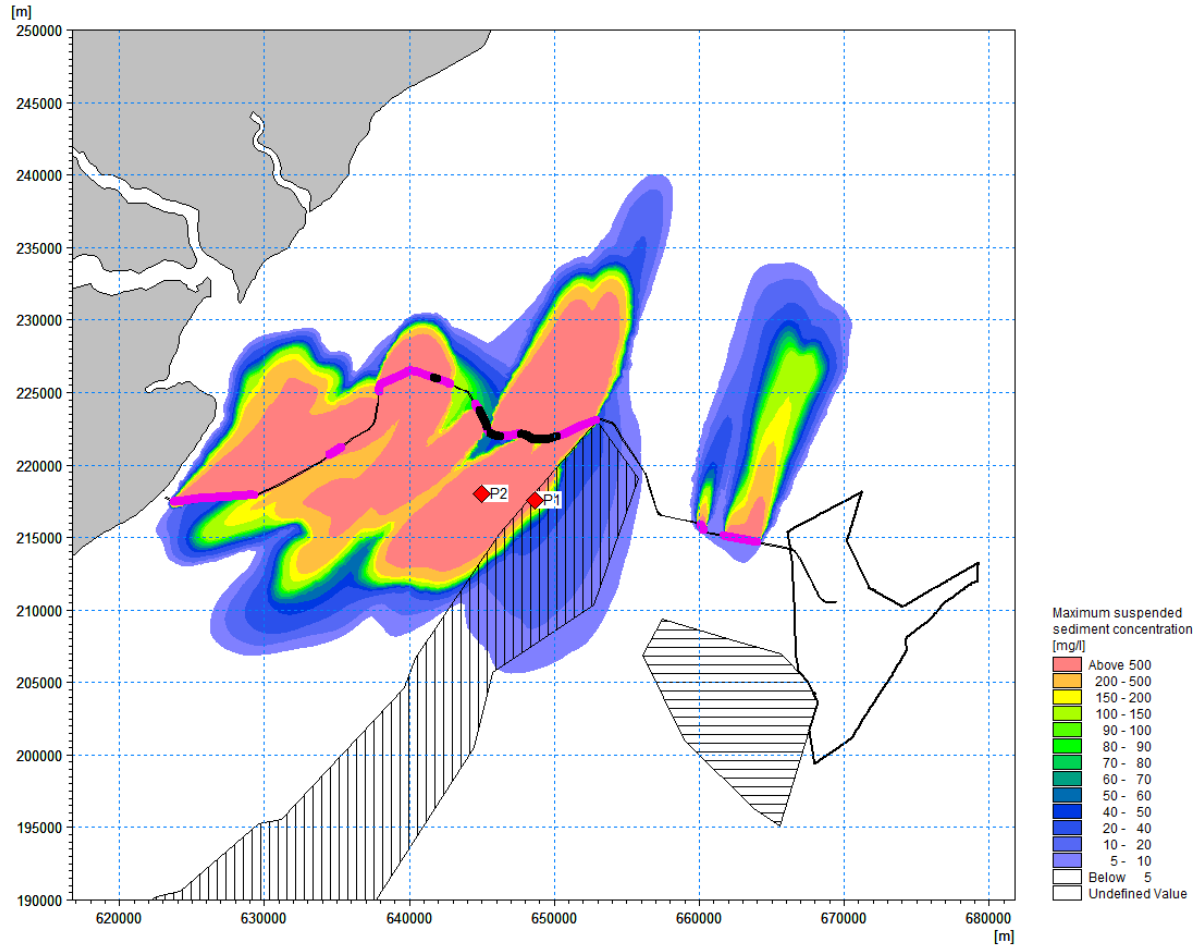

Plate 8-1 Maximum suspended sediment concentration during an indicative offshore export cable levelling near the seabed

128. Changes in seabed level due to deposition of the suspended sediment disturbed during offshore export cable levelling was also modelled and the results show that in the nearshore, deposition of up to 0.8m occurs within 500m of the offshore cable corridor (Plate 8-2). During cable trenching, changes in seabed level are much smaller at <5cm. There will be no changes in seabed level within the BCRC Estuaries MCZ due to cable installation activities in the nearshore.

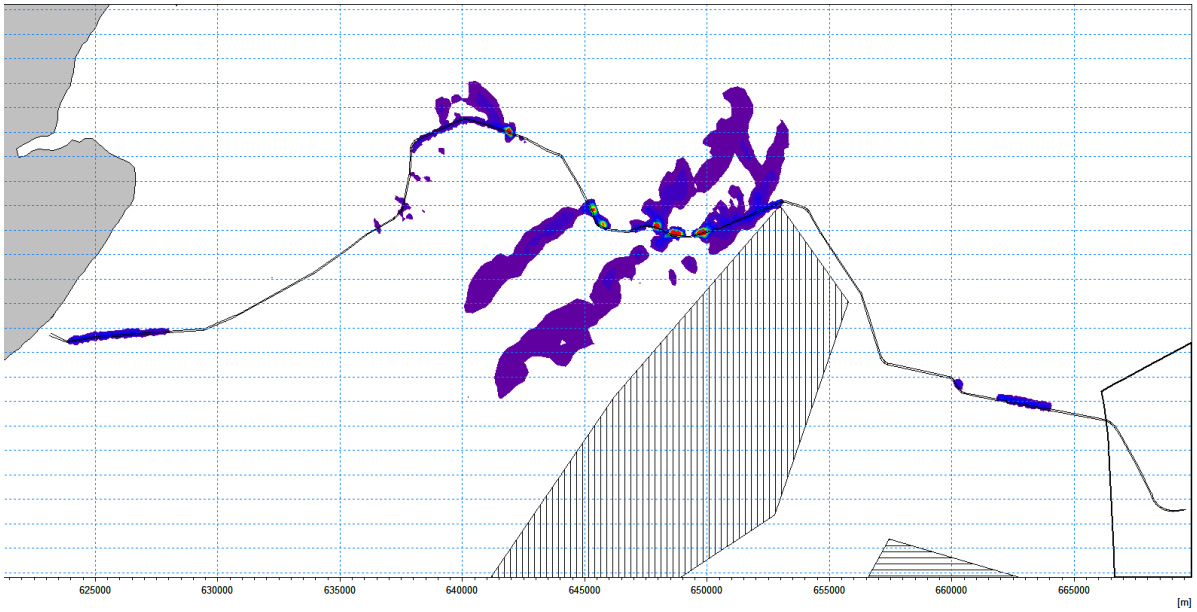

Plate 8-2 Total sediment deposition thickness during export cable levelling operations

129. The pressure 'Smothering and siltation rate changes (light)' has been used for the sensitivity assessment for Native oysters as 'light' deposition is defined as 'up to 5cm of fine material added to the habitat in a single, discrete event' (Marlin, 2022).

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

8.1.1.1.1 Physical attributes

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

- Native oyster:
  - Supporting habitat: extent and distribution
  - Supporting processes: physico-chemical properties (species)
  - Supporting processes: sediment movement and hydrodynamic regime (species)
  - Supporting processes: water quality-turbidity (species)
- Native oyster beds:
  - Supporting habitat: extent and distribution
  - Supporting processes: areas with conditions suitable for native oyster bed formation
  - Supporting processes: physico-chemical properties (habitat)
  - Supporting processes: sedimentation rates
  - Supporting processes: water movement and energy
  - Supporting processes: water quality – turbidity (habitat)

132. As described above, increases in SSC will be short-lived and within the natural range of turbidity. Changes in seabed level due to deposition of increased SSC will also be localised, occurring within 500m of the activity. Therefore, there will be no impact on the physical attributes and targets of the BCRC Estuaries MCZ features.

8.1.1.1.2 Biological attributes

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

- Native oyster
  - Population: population size
  - Population: recruitment and reproductive capability
  - Presence and spatial distribution of the species
  - Structure: non-native species and pathogens (species)
- Native oyster beds:
  - Structure and function: presence and abundance of key structural and influential species
  - Structure: age / size frequency
  - Structure: non-native species and pathogens (habitat)
  - Structure: population density
  - Structure: species composition of the community

134. The status of native oyster individuals directly affects the status of native oyster beds within the MCZ. For continued occurrence of this habitat, recruitment must be successful. Therefore, to maintain a constant availability of habitat for dependent epifauna such as ascidians, polychaetes and sponges, the mortality of *O. edulis* individuals must remain low.

135. As native oyster is a suspension feeder, increased SSCs have the potential to prevent water flow through the oyster. This in turn would inhibit respiration, feeding and removal of waste (Perry & Jackson, 2017). However, the effects of smothering would only become apparent with 5cm or more of sediment deposition (Grant *et al.,* 1990), and the modelling shows depths of this level will not reach the BCRC Estuaries MCZ.

136. As described above, redeposition of suspended sediments will be local to the construction activity and is unlikely to change sediment composition and distribution. Increases in SSC will be localised, short term and within the natural range of turbidity. Therefore, there will be a negligible magnitude of effect on the biological attributes and targets of the BCRC Estuaries MCZ features.

137. Natural England's AoO states that the marine features in the MCZ have medium to high sensitivity (Natural England, 2022a) to pressures associated with increases in SSC and subsequent deposition.

138.

8.1.1.1.3 Summary

139. The BCRC Estuaries MCZ is approximately 5.9km away from the offshore cable corridor and as discussed above, the maximum plume extent could reach 10km. However, changes in SSC at this distance from the source of the disturbance would be short-lived and within the range of natural turbidity and there would be no change to in seabed level within the MCZ.

140. Consequently, both native oyster and native oyster beds will not be affected by increased SSC and subsequent deposition.

141. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected BCRC Estuary MCZ features, it can be concluded that the conservation objective of 'Recover to favourable condition' will not be hindered by temporary increases in SSC and subsequent deposition (smothering) impacts related to the construction of North Falls.

8.1.1.2 Impact 3: Re-mobilisation of contaminated sediments

142. The re-suspension of sediment during seabed preparation and the installation of cables in the offshore cable corridor could lead to the release of contaminated sediment.

143. Two features of the MCZ have the potential to be affected by increased SSC during construction:

- Native oyster
- Native oyster bed

144. Given the low levels of contaminants present in the sediment, contaminant re-mobilisation and subsequent deposition in the MCZ is unlikely.

145. The impact of re-mobilisation of contaminated sediments has been defined using the following pressures identified by Natural England's AoO for the BCRC MCZ:

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

146. To inform the baseline for sediment quality, a benthic survey of the PEIR offshore project area was undertaken between May and August 2021 where grab sampling was undertaken and samples analysed for the following chemical contaminants:

- Trace metals;
- PAHs; and
- Polychlorinated Biphenyls (PCBs).

147. Chemical analysis was undertaken by SOCOTEC, in line with the MMO accreditation scheme regarding sediment sampling for disposal at sea licensing.

148. The context of contaminants found within sediments is established through the use of recognised guidelines and action levels, in this case Centre for Environment, Fisheries and Aquaculture (Cefas) Action Levels have been applied because they provide good coverage of contaminants, across a broad

range of contaminant types (MMO, 2018). These levels are used to indicate general contaminant levels in the sediments. If, overall, levels do not generally exceed the lower threshold values of these guideline standards, then contamination levels are not considered to be of significant concern and are low risk in terms of potential impacts on the marine environment.

149. A comparison of the sediment quality data against Cefas Action Levels has been undertaken in Chapter 9 Marine Water and Sediment Quality of the North Falls ES [**Document Reference: APP-023**]. Chapter 9 concludes that sediment contamination levels are not of significant concern and are low risk in terms of potential impacts on the marine environment. Even though there are some elevated levels of contaminants within the sediments, they align with the typical levels for the region and do not pose a high risk.

150. The following attributes of protected features are relevant to the effects of the re-mobilisation of contaminated sediments:

- Supporting processes: water quality – contaminants (habitat); and
- Supporting processes: water quality – contaminants (species).

151. However, given that there is no risk in relation to re-mobilisation of contaminated sediments due to there being no concentrations of contaminants at levels of concern, further assessment against these attributes is not required.

8.1.1.2.1 Summary

152. Based on the absence of contaminants at levels of concern recorded within the North Falls offshore cable corridor, it can be concluded that the conservation objectives of 'Recover to favourable condition' will not be hindered by re-mobilisation of contaminated sediments related to the construction of North Falls.

8.1.1.3 Impact 4: Introduction or spread of INNS

153. The introduction of INNS poses a threat to benthic communities as they may become invasive and displace native organisms by preying on them or out competing them for resources such as food, space, or both.

154. There are multiple potential pathways for the introduction of INNS, including ship ballast water, hull fouling and solid ballast. Also, the placement of human-made structures could act as vectors for INNS to colonise on new habitats (Glasby *et al.,* 2007). Potential colonisation of North Falls infrastructure by INNS is discussed in Section 8.1.2.3. The primary pathway for the introduction of INNS during construction is therefore through vessels and infrastructure sourced from a different region of ocean or sea. Table 5.2 presents the indicative number of vessel movements that will be used for construction of North Falls. However, it is to be noted that the port location will be determined post-consent and therefore it is unknown whether vessels will transit through or close to the MCZ.

155. North Falls is in a region of high vessel activity and therefore the number of vessels frequenting the offshore project area will not represent a significantly increased risk of INNS. Furthermore, as the MCZ is approximately 5.9km away from the offshore cable corridor and approximately 48.6km from the array area, the likelihood of high volumes of vessel activity within the MCZ are low.

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

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

157. These commitments will be secured through an outline Project Environmental Management Plan (PEMP) [**Document Reference: REP3-011**].

158. The impact of INNS has been defined using the following 'low risk' pressure identified by Natural England's AoO for the BCRC Estuaries MCZ:

- Introduction or spread of invasive non-indigenous species (INIS; hereafter referred to as INNS).

8.1.1.3.1 Biological attributes

159. The following biological attributes of protected features are relevant to the introduction or spread of INNS:

- Native oyster:
  - Population: population size;
  - Population: recruitment and reproductive capability;
  - Presence and spatial distribution of the species; and
  - Structure: non-native species and pathogens (species).
- Native oyster beds:
  - Structure and function: presence and abundance of key structural and influential species;
  - Structure: age / size frequency;
  - Structure: non-native species and pathogens (habitat);
  - Structure: population density; and
  - Structure: species composition of the community.

160. Natural England's AoO states that the marine features in the MCZ have medium to high sensitivity to pressures associated with INNS (Natural England, 2022a).

161. As discussed above, INNS may be introduced through the use of vessels and the installation of infrastructure, however the risk of introduction and spread of INNS will be mitigated through adherence to the relevant regulations and guidance and secured through an outline PEMP **[Document Reference: REP3-011].** Therefore, there will be a negligible magnitude of effect for the associated attributes of the BCRC Estuaries MCZ.

8.1.1.3.2 Summary

162. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected BCRC Estuaries MCZ features, it can be concluded that the conservation objective of 'Recover to favourable condition' will not be hindered by introduction of INNS from the construction of North Falls.

8.1.2 Potential Impacts during operation

8.1.2.1 Impact 1: Increased suspended sediment concentrations & Impact 2: Sediment deposition (smothering)

163. During operation, there is potential for increases in SSC in the water column and subsequent deposition onto the seabed due to cable repair and replacement or reburial of infrastructure.

8.1.2.1.1 Physical attributes

164. The physical attributes associated with SSC and subsequent deposition during the operational phase are the same as described in **Section 8.1.1.1.1**.

165. Table 5.2 gives a summary of the worst-case volume of sediment displaced during operation. The volumes are lower than during the construction phase and any disturbance will be highly localised. The frequency of activities will also be lower than during construction. Therefore, any changes in SSC and seabed levels will not be greater than predicted during construction as outlined in Section 8.1.1.1.

8.1.2.1.2 Biological attributes

166. The biological attributes associated with SSC and subsequent deposition during the operational phase are the same as described in Section 8.1.1.1.2.

167. Natural England's AoO states that the marine features in the MCZ have medium to high sensitivity to pressures associated with increases in SSC and subsequent deposition (Natural England, 2022a; see Table 3.3).

168. A negligible magnitude of effect for the associated attributes of the BCRC Estuaries MCZ has been determined due to the localised, short-term nature of each maintenance activity.

8.1.2.1.3 Summary

169. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of BCRC Estuaries MCZ features, it can be concluded that the conservation objective of 'Recover to favourable condition' will not be hindered by SSC and subsequent deposition during maintenance activities.

8.1.2.2 Impact 3: Re-mobilisation of contaminated sediments

170. Re-mobilisation of contaminated sediments may occur as a result of maintenance activities where there is seabed disturbance. Sediment-bound contaminants could potentially be released in the water column.

171. As described in Section 8.2.1.2, sediment analysis was carried out and found sediment contamination levels to not be of significant concern and are low risk in terms of potential impacts on the marine environment (discussed further in Chapter 9 Marine Water and Sediment Quality of the North Falls ES [**Document Reference: APP-023**]).

172. Two features of the MCZ have the potential to be affected by increased SSC during construction:

- Native oyster; and
- Native oyster bed.

173. The physical attributes associated with re-mobilisation of contaminated sediments are the same as those described in Section 8.1.1.2.

8.1.2.2.1 Summary

174. Due to the sediment analysis results, it can be concluded that the conservation objectives of 'Recover to favourable condition' will not be hindered by re-mobilisation of contaminated sediments related to the construction of North Falls.

8.1.2.3 Impact 4: Introduction or spread of INNS

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

176. Table 5.2 presents the maximum number of vessels to be used during operational phase. However, these numbers are representative of the entire offshore project area and therefore are an overestimate of activity in proximity to the BCRC Estuaries MCZ. It should also be noted that there is an existing baseline of vessel activity in the region and therefore the small increase in vessel traffic in proximity to the MCZ associated with North Falls will not represent a significantly increased risk of introduction of INNS.

177. Although ship ballast water appears to be the largest single vector for INNS, bio-fouling communities on ships and the introduction of hard infrastructure to provide new habitat are also identified as contributors and act as potential 'steppingstones' for the colonisation of INNS (Kerckhof *et al.,* 2011). Any cable protection for surface laid offshore export cables for North Falls would be at least 5.9km from the BCRC Estuaries MCZ.

178. The risk of spreading INNS will be mitigated by the relevant regulations and guidance listed in Section 8.1.1.2. These commitments will be secured in the outline PEMP [**Document Reference: REP3-011**].

179. This assessment considers the effects of increased vessel activity with the introduction of INNS and the subsequent colonisation by faunal communities on the ecological attributes and targets for the two broadscale marine habitat features:

- Native oyster; and
- Native oyster beds.

180. The impact of INNS has been defined using the following 'low risk' pressure identified by Natural England's AoO for the BCRC Estuaries MCZ:

- Introduction or spread of INNS.

8.1.2.3.1 Biological attributes

181. The following biological attributes of protected features are relevant to the introduction or spread of INNS:

- Native oyster;
  - Population: population size;
  - Population: recruitment and reproductive capability;
  - Presence and spatial distribution of the species; and
  - Structure: non-native species and pathogens (species).
- Native oyster beds;
  - Structure and function: presence and abundance of key structural and influential species;
  - Structure: age / size frequency;
  - Structure: non-native species and pathogens (habitat);
  - Structure: population density; and
  - Structure: species composition of the community.

182. As discussed above, INNS may be introduced through the use of vessels, however the risk of introduction and spread of INNS will be mitigated through adherence to the relevant regulations and guidance and secured through an outline PEMP [**Document Reference: REP3-011**]].

183. Natural England's AoO states that the marine features in the MCZ have high sensitivity to INNS (Natural England, 2022a; see Table 3.3) however a negligible magnitude of effect for the associated attributes of the BCRC Estuaries MCZ has been determined as there will be no introduction of hard substrate into the MCZ itself, and the movement of vessels associated with North Falls is relatively low in the context of the existing vessel density and subsequently the additional risk of introduction and spread of INNS is negligible.

8.1.2.3.2 Summary

184. Based on the relevant pressure, receptor sensitivity, and assessment of impacts against the attributes of affected BCRC Estuaries MCZ features it can be concluded that the conservation objective of recovering native oysters and native oyster beds to favourable condition will not be hindered by the risks of introduction and spread of INNS related to the development of North Falls.

8.1.3 Potential Impacts during decommissioning

185. A decision regarding the final decommissioning policy is yet to be made as it is recognised that rules and legislation change over time in line with best industry practice. The decommissioning methodology and programme would need to be finalised nearer to the end of the lifetime of the proposed North Falls to ensure it is in line with the most recent guidance, policy and legislation.

186. The scope of the decommissioning works would most likely involve removal of the accessible installed components. This is outlined in Chapter 5 Project Description of the North Falls ES [**Document Reference: APP-019**] and the detail would be agreed with the relevant authorities at the time of decommissioning. Offshore, this is likely to include removal of all of the wind

turbine components and part of the foundations (those above seabed level), removal of some or all of the array and offshore export cables. Scour and cable protection would likely be left in situ.

187. The following effects have been considered for decommissioning:

- Increased suspended sediment concentrations;
- Sediment deposition (smothering); and
- Introduction or spread of INNS.

188. Effects on the features of the MCZ would be no greater than, and are expected to be less than, those of the construction phase for all effects (Section 8.1.1).

189. Based on the relevant pressures, receptor sensitivity, and the assessment of impacts against the attributes of affected BCRC Estuaries MCZ features, it can be concluded that conservation objective of recovering to favourable condition of native oyster and native oyster beds, will not be hindered by INNS impacts related to the decommissioning of North Falls.

8.2 Kentish Knock East MCZ

190. Table 8.2 lists the attributes for each protected feature of the KKE MCZ as shown in Natural England's SACOs. Table 8.2 also signposts to the relevant sections of this MCZA Stage 1 Report where the assessment of that feature and attribute is provided.

Table 8.2 Pressures assessed in relation to the relevant attributes during the KKE MCZ Stage 1 Assessment. Light blue – no impact pathway, Dark blue – assessment undertaken.

MCZ feature attributes		Impacts																			
ATTRIBUTE TYPE	Attribute	Construction						Operation												Decommissioning	
		Increased SSC	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Effects on bedload sediment transport	Underwater noise and vibration	Introduction or spread of INNS	Increased SSC	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Effects on bedload sediment transport	Underwater noise and vibration	Introduction or spread of INNS	Electromagnetic fields	Increased SSC	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Effects on bedload sediment transport	Underwater noise and vibration	Introduction or spread of INNS
Subtidal coarse sediment, Subtidal mixed sediments and Subtidal sand.																					
Biological	Distribution: presence and spatial distribution of biological communities	Section 8.2.1.1	Section 8.2.1.2	N/A	Section 8.2.1.4.2	N/A	N/A	Section 8.2.2.1	Section 8.2.2.1	N/A	Section 8.2.2.4	N/A	N/A	Section 8.2.2.7.1	Section 8.2.3	Section 8.2.3	N/A	Section 8.2.3	N/A	N/A
Physical	Extent and distribution	N/A	N/A	N/A	Section 8.2.1.4.1	N/A	N/A	N/A	N/A	N/A	Section 8.2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	Section 8.2.3	N/A	N/A
Biological	Structure and function: presence and abundance of key structural and influential species	Section 8.2.1.1	Section 8.2.1.2	N/A	Section 8.2.1.4.2	N/A	N/A	Section 8.2.2.1	Section 8.2.2.1	N/A	Section 8.2.2.4	N/A	N/A	N/A	Section 8.2.3	Section 8.2.3	N/A	Section 8.2.3	N/A	N/A
Biological	Structure: non-native species and pathogens (habitat)	N/A	N/A	N/A	N/A	N/A	Section 8.2.1.6.1	N/A	N/A	N/A	N/A	N/A	Section 8.2.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 8.2.3
Physical	Structure: sediment composition and distribution	Section 8.2.1.1	Section 8.2.1.2	N/A	N/A	N/A	N/A	Section 8.2.2.1	Section 8.2.2.1	N/A	N/A	N/A	N/A	N/A	Section 8.2.3	Section 8.2.3	N/A	N/A	N/A	N/A
Biological	Structure: species composition of component communities	Section 8.2.1.1	Section 8.2.1.2	N/A	Section 8.2.1.4.2	Section 8.2.1.5.1	N/A	Section 8.2.2.1	Section 8.2.2.1	N/A	Section 8.2.2.4	Section 8.2.2.5	N/A	N/A	Section 8.2.3	Section 8.2.3	N/A	Section 8.2.3	Section 8.2.3	N/A
Physical	Supporting processes: energy / exposure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: physico-chemical properties (habitat)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: sediment contaminants	N/A	N/A	Section 8.2.1.2	N/A	N/A	N/A	N/A	N/A	Section 8.2.2.2	N/A	N/A	N/A	N/A	N/A	N/A	Section 8.2.3	N/A	N/A	N/A
Physical	Supporting processes: sediment movement and hydrodynamic regime (habitat)	N/A	N/A	N/A	Section 8.2.1.4.1	N/A	N/A	N/A	N/A	N/A	Section 8.2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	Section 8.2.3	N/A	N/A
Physical	Supporting processes: water quality – contaminants (habitat)	N/A	N/A	Section 8.2.1.2	N/A	N/A	N/A	N/A	N/A	Section 8.2.2.2	N/A	N/A	N/A	N/A	N/A	N/A	Section 8.2.3	N/A	N/A	N/A
Physical	Supporting processes: water quality – dissolved oxygen (habitat)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MCZ feature attributes		Impacts																			
ATTRIBUTE TYPE	Attribute	Construction						Operation												Decommissioning	
		Increased SSC	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Effects on bedload sediment transport	Underwater noise and vibration	Introduction or spread of INNS	Increased SSC	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Effects on bedload sediment transport	Underwater noise and vibration	Introduction or spread of INNS	Electromagnetic fields	Increased SSC	Sediment deposition (smothering)	Re-mobilisation of contaminated sediments	Effects on bedload sediment transport	Underwater noise and vibration	Introduction or spread of INNS
Physical	Supporting processes: water quality – nutrients (habitat)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: water quality – turbidity (habitat)	Section 8.2.1.1	Section 8.2.1.2	N/A	N/A	N/A	N/A	Section 8.2.2.1	Section 8.2.2.1	N/A	N/A	N/A	N/A	N/A	Section 8.2.3	Section 8.2.3	N/A	N/A	N/A	N/A	N/A

8.2.1 Potential Impacts during construction

8.2.1.1 Impact 1: Increased suspended sediment concentrations

191. Temporary increases in SSC within the water column will occur as a result of seabed preparation, foundation installation and cable installation.

192. The dominant sediment type recorded in the array area during the site specific benthic survey was medium to coarse sand (16-83% in all samples). The mud content was zero in five of the eight samples and less than 15% in all samples.

193. Sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2**) shows the full sediment plumes for each activity. For example, the worst case plume for seabed preparation of foundations is based on preparation for all foundation locations. It therefore shows the maximum SSC for all locations together. However, in reality, a plume of the size shown in Plate 8-3 to Plate 8-4 will not occur because preparation will not take place at all foundations at the same time. This therefore provides a conservative basis for the assessment.

194. During seabed preparation for both the large and small foundations, the sediment plume would interact with part of the Kentish Knock East MCZ, with the greatest change (concentrations and extent) occurring if the largest foundations are installed, as shown in Plate 8-3. A worst case location on the eastern side of the MCZ, closest to the array area (shown as P1 on Plate 8-3) has been used to measure the maximum SSC within this MCZ associated with levelling the largest foundations. A maximum near seabed SSC of around 800mg/l is expected, returning to ambient concentrations within around 1.5 hours.

195. There is potential for overlapping effects if multiple construction activities are undertaken concurrently. To assess this, changes in SSC due to seabed preparation for foundations (based on the maximum number of smaller turbines), array cables and offshore export cables were modelled concurrently (Plate 8-4). The results show there are no overlapping effects between activities in the array area and the offshore cable corridor.

196. During seabed preparation for the offshore export cables the sediment plume would interact with the KKE MCZ. A worst case location in the centre of the plume where it overlaps the MCZ (shown as P2 on Plate 8-4), has been used to measure the maximum SSC within this MCZ. A maximum near seabed SSC of around 290 mg/l is expected near the seabed, while plumes exceeding 15 mg/l would return to ambient conditions in approximately 1.5 hours.

197. During seabed preparation for the foundations and array cables, the sediment plume would interact with part of the Kentish Knock East MCZ, as shown in Plate 8-4**.** A worst case location on the eastern side of the MCZ, closest to the array area (shown as P3 on Plate 8-4**)** has been used to measure the maximum SSC within this MCZ. A maximum near seabed SSC would peak at around 16,000mg/l and the plume would only exceed 15mg/l for around 1.5 hours before returning to ambient concentrations.

198. The seabed preparation modelling above is based on MFE (blasting the sediment with seawater), which provides the worst case scenario for sediment plumes, however an alternative methodology could involve dredging which

would require sediment disposal. Modelling of an indicative disposal location as close as possible to the KKE MCZ (taking into account the 1km buffer) is shown in Plate 8-5. The SSC levels for P1 exceed 15 mg/l near the seabed for approximately one hour with a peak of 3,700 mg/l.

199. Drilling for both the larger and smaller WTGs will generate low levels of SSC, with predicted maximum concentrations of 5mg/l restricted to the immediate vicinity of each structure that requires drilling. These changes in SSC will not interact with the Kentish Knock East MCZ.

200. Seabed trenching for the array cable installation is predicted to have a less significant effect on SSC when compared to sand wave and megaripple levelling. The maximum near seabed concentrations of SSC at the closest point in the KKE MCZ are predicted to be 25mg/l, but only for 1 hour before returning to ambient conditions.

201. The array area is adjacent to the following broadscale marine habitat features of the KKE MCZ:

- Subtidal coarse sediment;
- Subtidal mixed sediments; and
- Subtidal sand.

202. The impact of temporary increases in SSC has been defined using the following pressures identified by Natural England's AoO (Natural England, 2025) for the Kentish Knock MCZ (Table 8.2):

- Changes in suspended solids (water clarity).

203. Sections 8.2.1.1.1 to 8.2.1.1.3 assess the impact of temporary increases in SSC during construction against the attributes and targets of each protected feature as provided by Natural England's AoO.

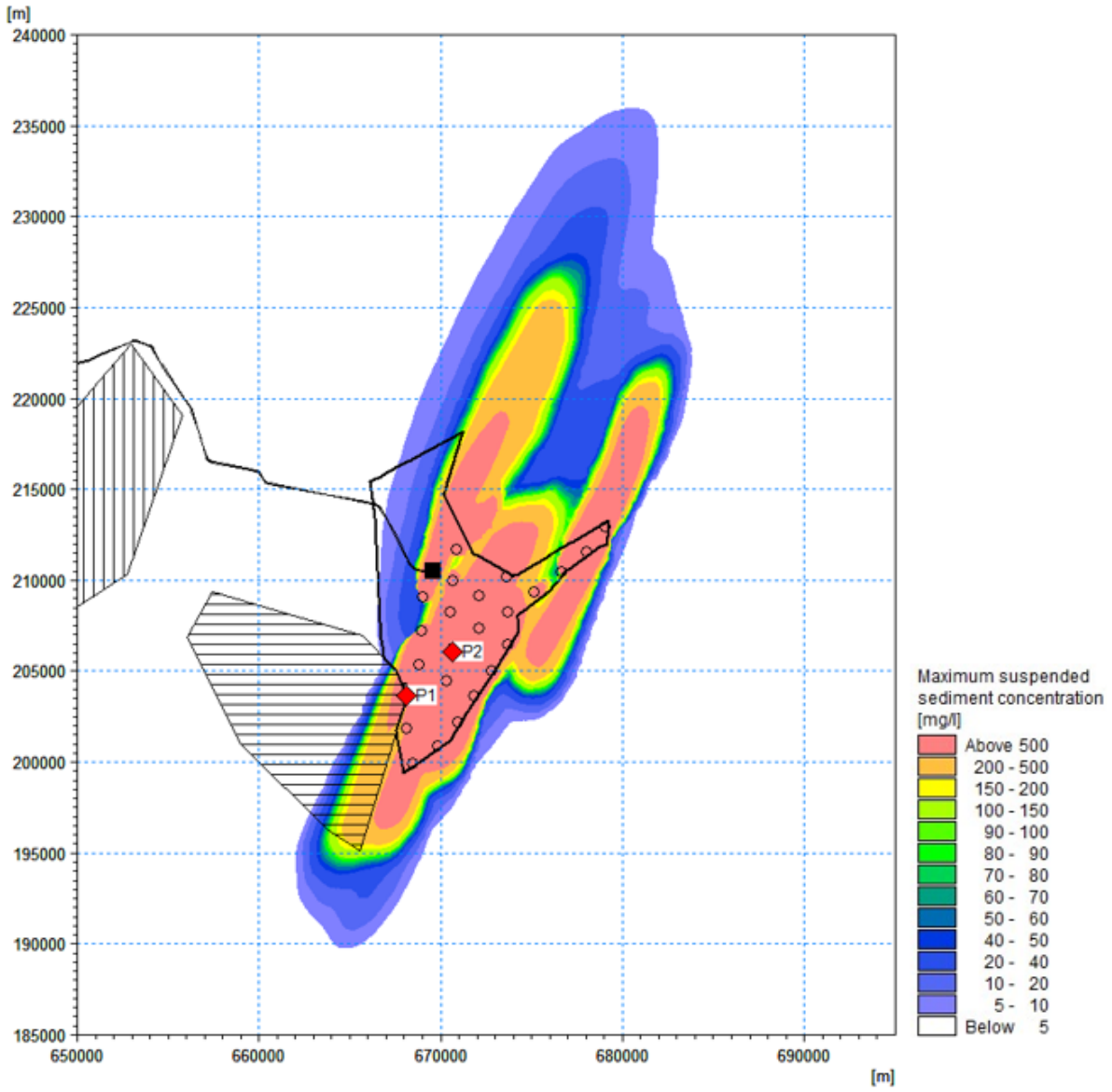

Plate 8-3 Maximum suspended sediment concentration during seabed preparation operations for larger WTGs layout structures occurring near the seabed (red points = time series extraction points, vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54, Rev 2]**

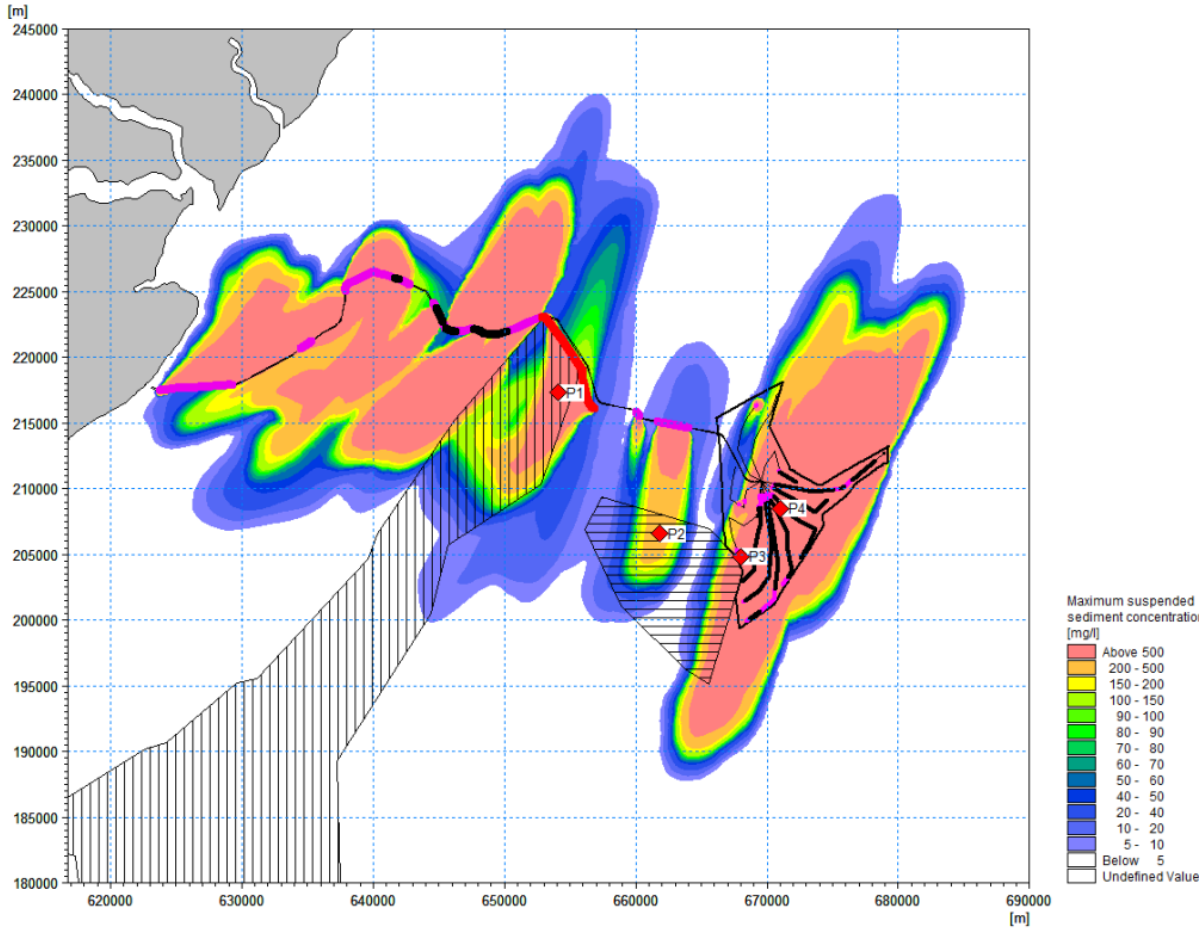

Plate 8-4 Maximum suspended sediment concentration during a concurrent scenario that includes array cable levelling, offshore export cable levelling, seabed preparation for foundation installation and disposal of dredged sediment occurring near the seabed (thick purple line = MR, thick black line = SW, red points = time series extraction points, vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54, Rev 2]**

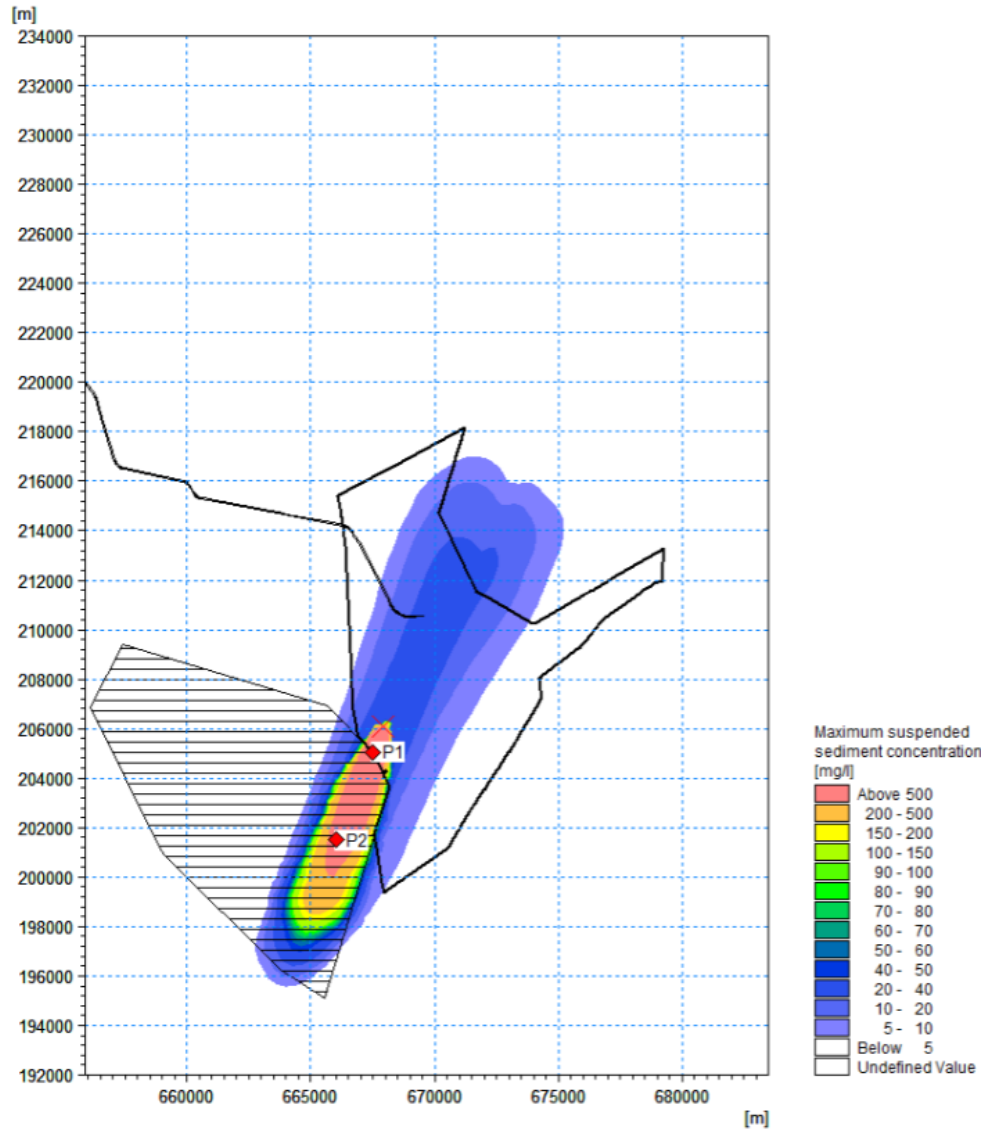

Plate 8-5 Maximum suspended sediment concentration at the seabed during disposal of dredged sediment at a worst case location for the KKE MCZ (1km north east of the MCZ) (red points = time series extraction points, vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54, Rev 2]**

8.2.1.1.1 Physical attributes

204. The following physical attribute of protected features is relevant to temporary increases in SSC:

- Supporting processes: water quality – turbidity (habitat).

205. As described above, the impact of suspended sediment on the KKE MCZ will be short term temporary and over a small area of the KKE MCZ. The benchmark provided by MarESA defines changes in suspended solids as "*a change in one rank on the WFD (Water Framework Directive) scale e.g. from clear to intermediate for one year*" (Natural England, 2025). As the SSCs resulting from construction of North Falls would not meet this benchmark due to lasting a matter of hours, rather than one year, there will be a negligible impact magnitude on the physical attributes and targets of the KKE MCZ features as shown in the

Hydrodynamic and Sediment Dispersion Modelling Report **[Document Reference 9.54, Rev 2]**.

8.2.1.1.2 Biological attributes

206. Areas of subtidal sand in the array area were defined to EUNIS level 3 as A5.2 sublittoral sand. For A5.2, biotope A5.231 infralittoral mobile clean sand with sparse fauna has been used as a proxy to represent A5.2 stations. A5.231 has been used as a proxy as the characteristic species of this biotope including *Pagarus berhardus*, *Carcinus maenus* and *Asterias rubens*, are similar to those found in the site investigations. Furthermore, the sediment descriptions are interchangeable and show similarities. The sensitivity of this biotope to relevant pressures is not sensitive - low to changes in suspended solids (water clarity). This biotope also has a high resilience to this pressure which equates to full recovery within 2 years.

207. Natural England's AoO states that the relevant biotopes for subtidal coarse sediment are not sensitive to changes in suspended solids. Furthermore, out of the seven relevant biotopes used to characterise subtidal mixed sediment, only one has low sensitivity to changes in suspended solids and the remaining six are not sensitive.

208. Therefore, the biotopes found within KKE MCZ have low sensitivity or are not sensitive to the pressures associated with temporary increases in SSC.

209. A negligible magnitude of effect for the associated attributes of the KKE MCZ has been determined due to the short-term nature of the suspended sediment plumes, as discussed in the Hydrodynamic and Sediment Dispersion Modelling Report **[Document Reference 9.56, Rev 2]** and summarised above.

8.2.1.1.3 Summary

210. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of the KKE MCZ features it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by SSC related to the construction of North Falls.

8.2.1.2 Impact 2: Sediment deposition (smothering)

211. Sediment deposition onto the seabed will occur as a result of the SSCs described above.

212. Sediment deposition within the MCZ as a result of seabed preparation for foundations; drilling; and disposal of dredge material will not exceed 5cm and will therefore be indiscernible.

213. As discussed in Section 8.1.1.1, the potential for overlapping effects if multiple construction activities are undertaken concurrently have been modelled based on changes in seabed level due to concurrent seabed preparation for foundations, array cables and offshore export cable (Plate 8-6)**.** The changes within the KKE MCZ were the same concurrently as predicted for array cable levelling. This is because there are no predicted changes in the MCZ due to seabed preparation for foundation installation, as discussed above. The initial deposition of sediment following array cable installation would occur over a small area of the MCZ (Plate 8-6) and would be between 5cm to 60cm. This

sediment will be mobile, driven by the existing physical processes, therefore will be re-distributed by the prevailing waves and tidal currents.

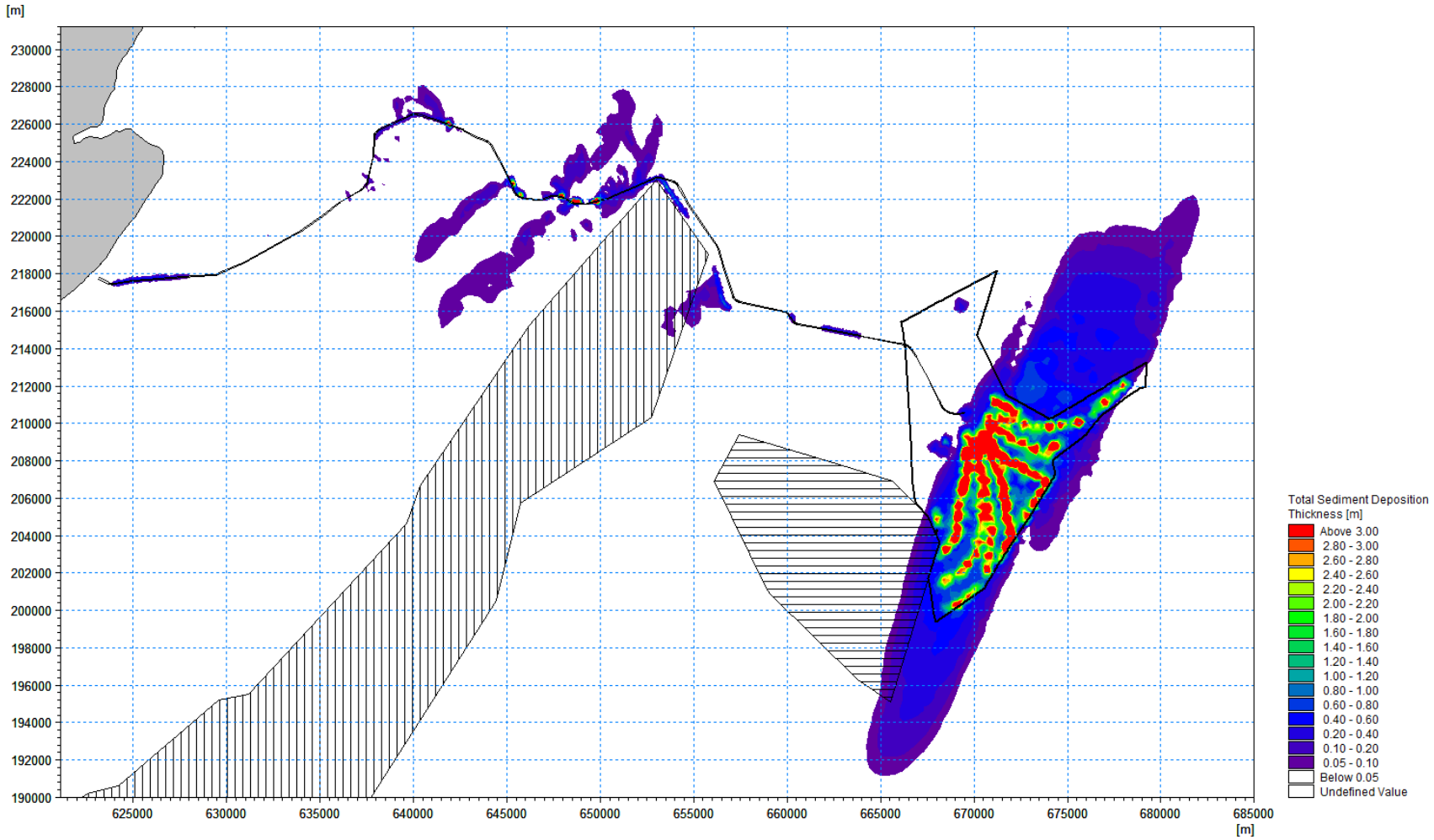

Plate 8-6 Total sediment deposition thickness during an indicative offshore export cable levelling (including additional length), array cable levelling and seabed preparation operations for smaller WTGs layout structures (vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54, Rev 2]**

214. As discussed in Section 8.2.1.1.1, the dominant sediment type recorded in the array area during the site specific benthic survey was medium to coarse sand (16-83% in all samples). The mud content was zero in five of the eight samples and less than 15% in 100% of the samples. Therefore, the SSC and subsequent deposited sediment will be comparable to the broadscale marine habitat features of the KKE MCZ:

- Subtidal coarse sediment;
- Subtidal mixed sediments; and
- Subtidal sand.

215. The impact of subsequent deposition has been defined using the following pressure identified by Natural England's AoO (Natural England, 2025) for the Kentish Knock MCZ (Table 8.2):

- Smothering and siltation rate changes (light); and
- Smothering and siltation rate changes (heavy)

The following sections assess the impact of deposition during construction against the attributes and targets of each protected feature as provided by Natural England's AoO.

8.2.1.2.1 Physical attributes

216. The following physical attribute of protected features is relevant to deposition impacts:

- Structure: sediment composition and distribution.

217. As described above, the deposition on the KKE MCZ will be of comparable sediment types to those of the MCZ and over a relatively small proportion of the MCZ. The effect will also be temporary as the sediment will naturally be re-distributed by the prevailing waves and tidal currents. Therefore, there will be a negligible impact magnitude on the physical attributes and targets of the KKE MCZ features.

8.2.1.2.2 Biological attributes

218. As shown in Table 3.4, the subtidal coarse feature represents the worst case scenario for sensitivity to sediment deposition (smothering) and as discussed above, sediment deposition of up to 60cm could occur over a small area of the MCZ and therefore the AoO 'Smothering and siltation rate changes (Heavy)' pressure is considered, although noting that over much of the deposition area, the effect will be light smothering.

219. The biotopes shown by the AoO to have the highest (medium) sensitivity to heavy smothering are:

- *Hesionura elongata* and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand
- *Glycera lapidum* in impoverished infralittoral mobile gravel and sand

220. The sensitivity assessment for *Hesionura elongata* and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand (Marshall *et al.,* 2023) states that limited evidence was found regarding

responses of characterising species to heavy smothering. Marshall *et al.,* (2023) states evidence is assessed for deposits of fine material from sources such as dredge waste spoil and recovery from aggregate dredging. This effect is not directly comparable to North Falls which would have limited fines, with sediment in the array area being comparable to that of the Kentish Knock East MCZ with predominantly medium to coarse sand. Marshall *et al.,* (2023) states that deposition of fine sediment, is expected to lead to a change in the species community, however the species community will return to that characterising mobile medium-coarse sand if physical processes such as sediment transport provide a return to that habitat. As discussed in Section 8.2.1.2, sediment deposited will be mobile, driven by the existing physical processes and therefore will be re-distributed by the prevailing waves and tidal currents. As a result, the effect will be temporary and the community can be expected to recover.

221. The sensitivity assessment for *Glycera lapidum* in impoverished infralittoral mobile gravel and sand (Tillin & Watson, 2023) provides a literature review showing that small bivalves, *Donax* spp. and *Tellina* sp. could migrate through approximately 20cm and 50cm of sand layer, respectively. Similarly, *Nephtys* could migrate c. 90cm through sand. Tillin & Watson, (2023) note that the character of the smothering is an important factor determining the degree of vertical migration of buried bivalves and polychaetes, with their sensitivity information being based on the potential for muds to be more cohesive and compacted than sand. The sensitivity has therefore been defined as 'Medium', however as previously discussed, North Falls would have limited fines, with sediment in the array area being comparable to that of the Kentish Knock East MCZ. As a result, the effect will be temporary and the community can be expected to recover.

222. Monitoring at Greater Gabbard (CMACS, 2014) shows the amount and distribution of more coarse material has remained similar pre- and post-construction. In addition, there is no material change to the number of individuals or taxa, beyond natural variation Table 3.4. Furthermore, many of the species were either the same or very similar across the years.

Table 8.3 Percentage contributions of the four predominant infaunal groups to the overall number of individuals and taxa

Group	2005 (EIA Characterisation)		2009 (Pre-construction)		2013 (Post construction)	
	Individuals	**Taxa**	Individuals	Taxa	Individuals	Taxa
Annelids	53	40	52	45	49	38
Crustacea	15	17	26	29	24	25
Echinoderms	9	4	15	6	10	3
Molluscs	5	14	4	15	3	13
Other	18	25	3	5	14	21

223. The habitats and communities at Greater Gabbard were comparable to KKE MCZ, with the main community being of polychaetes, including *Glycera lapidum*, along with echinoderms and amphipods and bivalves, classified as the biotope *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel which has medium sensitivity to both medium and light smothering and is therefore to similar to those described for the KKE MCZ biotopes above. A number of monitoring stations were also classified as *Glycera lapidum* in impoverished infralittoral mobile gravel and sand, and is therefore directly comparable to the KKE MCZ.

224. Noting the recovery targets for the KKE MCZ relate to the abundance, distribution and composition of communities (Section 6.3.2) the evidence shows these will not be hindered by North Falls. With regards to the overall conservation objectives North Falls will not hinder the objective to maintain or recover the extent of the projected features, noting the sediment arising from the array area will be comparable to that in the KKE MCZ, and will not hinder the structure and function of the MCZ, its quality, and the composition of its characteristic biological communities.

8.2.1.2.3 Summary

225. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected KKE MCZ features it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by sediment deposition (smothering) related to the construction of North Falls.

8.2.1.3 Impact 3: Re-mobilisation of contaminated sediments

226. The re-suspension of sediment during seabed preparation and the installation of foundations and array cables in the array area could lead to the release of contaminated sediment which may have an effect on benthic biological communities associated with the protected features of KKE MCZ.

227. Three broadscale marine habitat features would be affected by re-mobilisation of contaminated sediments during construction, due to their proximity to construction activities:

- Subtidal coarse sediment;
- Subtidal sand; and
- Subtidal mixed sediments.

228. Given the low levels of contaminants present in the sediment, contaminant re-mobilisation and subsequent deposition in the MCZ is unlikely.

229. The impact of re-mobilisation of contaminated sediments has been defined using the following pressures identified by Natural England's AoO for the KKE MCZ:

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

230. To inform the baseline for sediment quality, a benthic survey of the former PEIR offshore project area was undertaken between May and August 2021 where grab sampling was undertaken and samples analysed for the following chemical contaminants:

- Trace metals;
- PAHs; and
- PCBs.

231. Chemical analysis was undertaken by SOCOTEC, in line with the MMO accreditation scheme regarding sediment sampling for disposal at sea licensing.

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

233. A comparison of the sediment quality data against Cefas Action Levels has been undertaken in Chapter 9 Marine Water and Sediment Quality of the North Falls ES [**Document Reference: APP-023**]. Chapter 9 concludes that sediment contamination levels are not of significant concern and are low risk in terms of potential impacts on the marine environment. Even though there are some elevated levels of contaminants within the sediments, they align with the typical levels for the region and do not pose a high risk.

234. The following attributes of protected features are relevant to the effects of the re-mobilisation of contaminated sediments:

- Supporting processes: sediment contaminants; and
- Supporting processes: water quality – contaminants (habitat).

235. However, given that there is no risk in relation to re-mobilisation of contaminated sediments due to there being no concentrations of contaminants at levels of concern, further assessment against these attributes is not required.

8.2.1.3.1 Summary

236. Based on the absence of contaminants at levels of concern recorded within the array area, it can be concluded that the conservation objectives of recover to favourable condition and maintain in favourable condition the features of KKE MCZ will not be hindered by re-mobilisation of contaminated sediments related to the construction of North Falls.

8.2.1.4 Impact 4: Effects on bedload sediment transport

237. Changes to bedload sediment transport may occur as a result of seabed preparation and installation of cable protection measures within the array area. The effect of cable protection on bedload sediment transport is assessed in Section 8.2.2.4.

238. The presence of sandwaves across the array area indicates that there is some bedload sediment transport with a net direction south-west to north-east (North Falls ES Chapter 8 [**Document Reference: APP-022**]. The array area is located adjacent to the KKE MCZ, to the north-east. Therefore, changes to bedload sediment may occur within the MCZ.

239. Three broadscale marine habitat features, and the benthic organisms associated with them, have the potential to be affected by changes to bedload sediment transport during construction:

- Subtidal coarse sediment;
- Subtidal sand; and
- Subtidal mixed sediments.

240. The impact effects on bedload sediment transport have been defined using the following pressure identified by Natural England's AoO for the KKE MCZ:

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

241. Where practicable, sediment dredged during seabed preparation will be deposited as close as possible to the location of origin. Keeping the dredged sand within the sand bank system enables the sand to become re-established within the local sediment transport system by natural processes and encourages the re-establishment of the bedforms. Given the local favourable conditions that enable sandwave development, the sediment would be naturally transported back into the levelled area within a short period of time.

8.2.1.4.1 Physical attributes

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

- Extent and distribution; and
- Supporting processes: sediment movement and hydrodynamic regime (habitat).

243. Seabed morphology and bedload sediment transport would not be affected far outside of the direct footprint of construction works and can be expected to recover in a short period of time. Gross patterns of bedload sediment transport would therefore not be affected significantly. Further detail can be found in Section 8.6.2.9 in Chapter 8 Marine Geology, Oceanography and Physical Processes of the North Falls ES [**Document Reference: APP-022**].

244. Therefore, during construction, effects on bedload sediment transport during North Falls construction works will not have a significant influence over the extent and distribution of the three features of interest nor change the hydrodynamic regime of the MCZ.

8.2.1.4.2 Biological attributes

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

- Distribution: presence and spatial distribution of biological communities;

- Structure and function: presence and abundance of key structural and influential species; and
- Structure: species composition of component communities.

246. Natural England's AoO states that subtidal coarse sediment and subtidal mixed sediments are not sensitive to effects on bedload sediment transport. It does state that subtidal sand is sensitive. However, out of the ten named biotopes, only one is considered to have medium sensitivity (Natural England, 2022b).

247. As stated in Section 8.2.1.1.2, the biotope A5.231 has been used as a proxy for A5.2 stations in site investigations. In Natural England's AoO, A5.231 is not sensitive to effects on bedload sediment transport and has high resistance and resilience to the pressure too.

248. A low magnitude of effect for the associated attributes of the KKE MCZ has been determined due to the localised, short-term nature of the works and subsequently the discernible change to the benthic environment within the MCZ.

8.2.1.4.3 Summary

249. The extent, distribution and structure of habitat features and presence and spatial distribution of associated biological communities will be maintained despite the potential for short term temporary interruption to a small portion of the three broadscale marine habitat features.

250. Based on the relevant pressures, receptor sensitivity and the assessment of impacts against the attributes of affected KKE MCZ it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by effects to bedload sediment transport during construction.

8.2.1.5 Impact 5: Underwater noise and vibration

251. Underwater noise and vibration may occur, primarily as a result of foundation installation and UXO clearance in proximity to (but outside) the KKE MCZ.

252. Three broadscale marine habitat features, and the benthic organisms associated with them, have the potential to be affected by underwater noise and vibration during construction:

- Subtidal coarse sediment;
- Subtidal sand; and
- Subtidal mixed sediments.

253. The impact of temporary underwater noise and vibration has been defined using the following pressure identified by Natural England's AoO for the KKE MCZ:

- Underwater noise changes.

254. There is evidence to suggest benthic species respond to increased levels of underwater noise and vibration. The effects have been assessed further in Chapter 10 Benthic and Intertidal Ecology of the North Falls ES [**Document Reference: APP-024**]. Continued research into the effects of underwater noise

and vibration is being conducted on a range of benthic species, however further understanding into the effects is required.

255. The effects of underwater noise and vibration will not directly affect physical attributes as set out by Natural England therefore they have not been assessed here.

8.2.1.5.1 Biological attributes

256. The following biological attribute of the protected features is relevant to underwater noise and vibration:

- Structure: species composition of component communities.

257. Underwater noise and vibration have the potential to affect benthic communities through disturbance to the habitat. Disturbance can cause the sediment community to change in response to increased pressure.

258. Research into the effects of underwater noise and vibration have been carried out on a number of species of crustacea. It has been found that various, common benthic species exhibit a response to changes in underwater noise and adapt their behaviours accordingly (see Chapter 10 Benthic and Intertidal Ecology of the North Falls ES [**Document Reference: APP-024**].

259. Biological communities recorded in the KKE MCZ, adjacent to the array area, are either not sensitive or there is no relevant interaction of concern between the pressure and feature (Natural England, 2022b). Therefore, based on Natural England's AoO, the biological communities will not be affected.

8.2.1.5.2 Summary

260. Construction works carried out would increase levels of underwater noise and vibration, potentially affecting biological communities within the three broadscale marine habitat features of KKE MCZ. Research suggests benthic species will exhibit a response and changes to behaviour when there are higher levels of underwater noise and vibration.

261. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected KKE MCZ features, it can be concluded that the conservation objectives of recovering and maintaining the features in a favourable condition will not be hindered by underwater noise and vibration.

8.2.1.6 Impact 6: Introduction or spread of INNS

262. Non-native species may become invasive and displace native organisms by preying on them or out-competing them for resources such as food, space or both. The only pathway for the potential introduction during construction of INNS is from the use of vessels.

263. It should be noted that there is an existing baseline of vessel activity within the KKE MCZ including fishing, cargo, recreational and wind farm support vessels and therefore the small increase in vessel traffic in proximity to the MCZ associated with construction of North Falls will not represent a significantly increased risk of introduction of INNS.

264. The risk of spreading INNS will be mitigated by the relevant regulations and guidance listed in Section 8.1.1.2.

265. This assessment considers the effects of vessel activity and the introduction of INNS and the effect this will have on the ecological attributes and targets of three broadscale marine habitat features:

- Subtidal coarse sediment;
- Subtidal sand sediment; and
- Subtidal mixed sediments.

266. The effects of INNS will not directly affect physical attributes as set out by Natural England therefore they have not been assessed here.

8.2.1.6.1 Biological attributes

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

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

268. Natural England's AoO states that the biotopes recorded in the array area adjacent to the KKE MCZ that have the potential to be impacted by INNS are either not sensitive to the introduction of INNS, or the impact is Not Relevant in the case of subtidal mixed sediments.

269. For this assessment the biotope A5.451 Polychaete-rich deep Venus community in offshore mixed sediments has been used based on guidance from MarESA. It is noted that this biotope is not included in Natural England's AoO for KKE MCZ, however this was recorded during the Fugro (2021) survey. One of the most comparable biotopes listed in Natural England's AoO, in terms of associated species, is A5.422 *Crepidula fornicata* and *Mediomastus fragilis* in variable salinity infralittoral mixed sediment, however this has not been used to assess the effects of INNS due to *C. fornicata* being an invasive species itself. Therefore, the sensitivity for this assessment is concluded as high.

270. A negligible magnitude of effect for the associated attributes of the KKE MCZ has been determined due to the embedded mitigation to avoid the spread of INNS.

8.2.1.6.2 Summary

271. INNS may be introduced through the use of vessels during construction. However, the risk of introduction and spread of INNS will be mitigated through adherence to the relevant regulations and guidance discussed above.

272. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected KKE MCZ features it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by the risks of the introduction of INNS during the construction of North Falls.

8.2.2 Potential Impacts during operation

8.2.2.1 Impact 2: Increased suspended sediment concentrations

273. Increases in SSC within the water column and subsequent deposition onto the seabed may occur as a result of maintenance activities (Table 5.2).

274. Each O&M activity would be relatively short term and it is likely that the requirements for maintenance would be spread over the project life. As described in Section 8.2.1.1 most of the sediment mobilised by maintenance activities would settle out of suspension rapidly to the seabed, and with low sediment volumes arising from maintenance activities, increased SSCs and associated sediment deposition would be negligible in magnitude.

275. Biological communities recorded in the array area adjacent to the KKE MCZ are either not sensitive or have low sensitivity to increased SSC and subsequent deposition (Natural England, 2025). Therefore, the biotopes will either not be affected or would recover fully within two years. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected KKE MCZ features, it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by increased SSC and subsequent deposition related to the operation of North Falls.

8.2.2.2 Impact 2: Sediment deposition (smothering)

276. The effects of sediment deposition (smothering) have been discussed above in Section 8.2.2.1.

8.2.2.2.1 Summary

277. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected KKE MCZ features, it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by sediment deposition (smothering) related to the operation of North Falls.

8.2.2.3 Impact 3: Re-mobilisation of contaminated sediments

278. Re-mobilisation of contaminated sediments may occur as a result of maintenance activities where there is seabed disturbance. Sediment-bound contaminants could potentially be released in the water column.

279. As described in Section 8.2.1.3, sediment analysis was carried out and found sediment contamination levels to not be of significant concern and are low risk in terms of potential impacts on the marine environment (discussed further in Chapter 9 Marine Water and Sediment Quality of the North Falls ES [Document Reference: APP-023].

280. The Natural England AoO has not assessed the biological communities recorded in the array, adjacent to the MCZ against the relevant pressures to re-mobilisation of contaminated sediments. Note assessed is defined as: "*A sensitivity assessment has not been made for this feature to this pressure. However, this activity-pressure-feature combination should not be precluded from consideration. The best available evidence, relevant to the activity in question, at the time of application, should be sourced and considered in any further assessment.*" (Natural England, 2022b).

281. Due to the sediment analysis results, it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by

re-mobilisation of contaminated sediments related to the operation of North Falls.

8.2.2.4 Impact 4: Effects on bedload sediment transport

282. Indirect effects on bedload sediment transport may occur as a result of changes to the tidal regime and bed shear stress due to the presence of foundations and cable protection.

283. The hydrodynamic modelling predicts changes in bed shear stress due to the presence of foundations over a period of 15 days that covers a full tidal cycle (Plate 8-7). The results show there is potential for a reduction in bed shear stress of up to 6% of the baseline to occur locally along the south eastern boundary of the array area. Changes of up to 2% may occur within 500m of the array area boundary adjacent to the KKE MCZ. These changes are extremely small in magnitude and will have no discernible impact on the MCZ. Changes in bed shear stress due to the presence of cable protection measures occur immediately adjacent to the structures and there is no effect within the KKE MCZ.

284. As discussed above, the following broadscale marine habitats are features of the MCZ:

- Subtidal coarse sediment;
- Subtidal sand; and
- Subtidal mixed sediments.

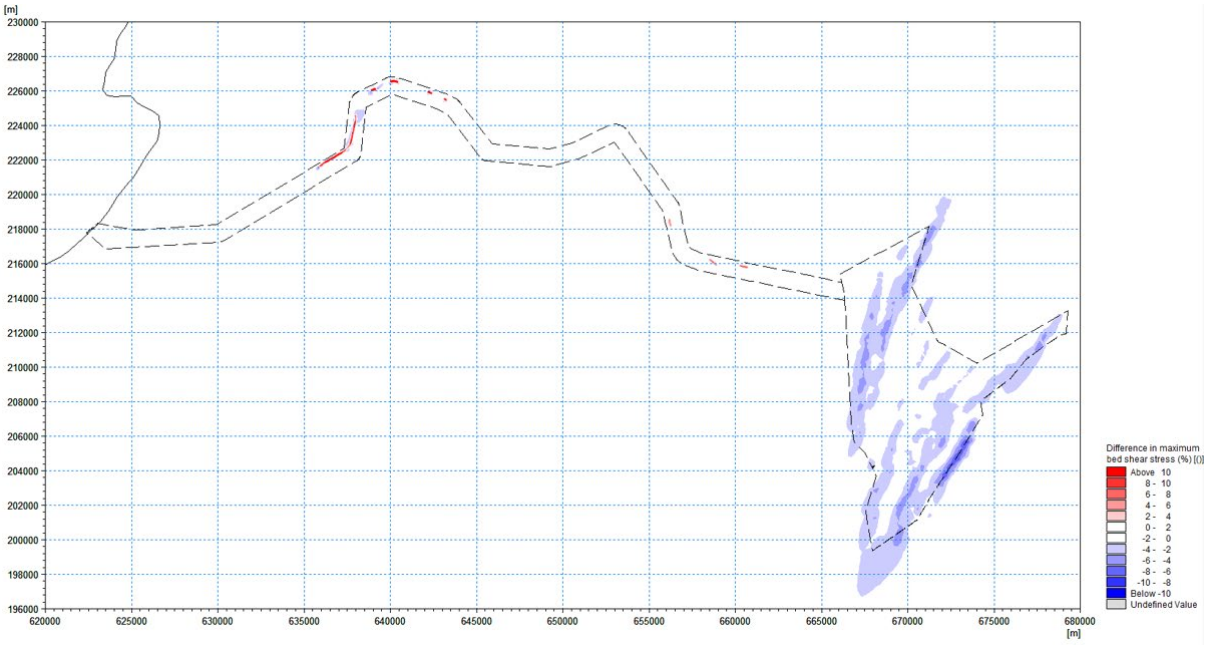

Plate 8-7 Predicted percentage change in bed shear stress due to the Project over a 15 day simulation period (positive indicates increase in bed shear stress and negative indicates a decrease in bed shear stress)

8.2.2.4.1 Physical attributes

285. The effects on bedload sediment transport have been defined using the following pressure identified by Natural England's AoO (Natural England, 2025) for the KKE MCZ:

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

286. Hydrodynamic modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2**) shows changes to tidal current speeds would be less than 3% of the baseline current speeds and localised around the foundations with negligible changes along the eastern edge of the Kentish Knock East MCZ.

8.2.2.4.2 Biological attributes

287. Natural England's AoO states that subtidal coarse sediment and subtidal mixed sediments are not sensitive to effects on bedload sediment transport. Subtidal sand is shown to range from not-sensitive to medium sensitivity. However, out of the ten named biotopes, only one is considered to have medium sensitivity: Sublittoral sand in low or reduced salinity (lagoons) (Natural England, 2025) which, given this area is not a reduced salinity lagoon, is not applicable.

288. As the effects on bedload sediment transport from the Project will have only negligible changes along the eastern edge of the KKE MCZ, there would be no significant changes to the physical environment of the biotopes nor the benthic communities.

8.2.2.4.3 Summary

289. Based on the relevant pressure, receptor sensitivity and assessment of impacts against the attributes of affected KKE MCZ features, it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by indirect effects on bedload sediment transport related to the operation of North Falls.

8.2.2.5 Impact 5: Underwater noise and vibration

290. Underwater noise and vibration may occur during the operational phase as a result of WTG operation, through the tower and foundations into the water. In turn, benthic ecology receptors may be affected.

291. As described in Section 8.2.1.5 there are a number of studies into the effects of underwater noise and vibration on various crustaceans. Evidence suggests that benthic crustacean species exhibit behavioural responses to change in underwater noise and vibration.

292. However, the magnitude of underwater noise and vibration from wind farm operation is much lower than during construction for activities like piling and UXO clearance.

293. Biological communities recorded in the MCZ adjacent to the array area are not sensitive (Natural England, 2022b) to underwater noise changes and therefore would not be affected during O&M activities.

294. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of affected KKE MCZ, it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by underwater noise and vibration.

8.2.2.6 Impact 6: Introduction or spread of INNS

295. INNS have the potential to be introduced in the operational phase. As discussed above in Section 8.2.1.6 the only pathway is through increased vessel activity through the MCZ.

296. As discussed in Section 8.2.1.6, the risk of introduction and spread of INNS will be mitigated through adherence to the relevant regulations and guidance stated in Section 8.1.1.3. Furthermore, the occurrence of vessel activity in the operational phase will be significantly less than in the construction phase.

297. Based on the relevant pressures, receptor sensitivity and assessment of impacts against the attributes of effected KKE MCZ, it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal mixed sediment will not be hindered by the introduction of INNS.

8.2.2.7 Impact 7: Electromagnetic fields

298. There is potential for array/interconnector cables in the array area adjacent to the MCZ to produce EMFs that could interfere with the behaviour of benthic species. With increasing demand for OWFs, the topic of the effects of EMF on benthic species has gained growing interest.

299. Although there is no longer any overlap with the MCZ, EMF has been considered in the assessment due to potential for array cables/platform interconnector cables to be located adjacent to the KKE MCZ.

300. Three broadscale marine habitat features, and the benthic organisms associated with them, have the potential to be affected by EMF during operation:

- Subtidal coarse sediment;
- Subtidal sand; and
- Subtidal mixed sediments.

301. The impact of EMF has been defined using the following pressure identified by Natural England's AoO for the KKE MCZ:

- Electromagnetic changes

302. Studies have found contrasting behaviours in benthic species towards EMF. Spiny lobster *Panulirus argus*, American lobster *Homarus americanus* and the edible crab *Cancer pagarus* have been found to exhibit behavioural responses to EMF where they favoured EMF sources (Boles and Lohmann, 2003, Hutchinson *et al.,* 2020 and Scott *et al.,* 2018). Conversely, yellow rock crabs *Metacarcinus anthonyi* and red rock crabs *Cancer productus* have been found to have no preference to EMF sources (Love *et al.,* 2015). The effects of EMF have been assessed further in Chapter 10 Benthic and Intertidal Ecology of the ES [**Document Reference: APP-024**].

303. The effects of EMF will not directly affect physical attributes as set out by Natural England therefore they have not been assessed here.

8.2.2.7.1 Biological attributes

304. The following biological attributes of protected features are relevant to EMF impacts:

- Distribution: presence and spatial distribution of biological communities.

305. Natural England's AoO states that biotopes which have the potential to be associated with EMF currently have insufficient evidence to assess. This is defined as: "*The evidence base is not considered to be developed enough for assessments to be made of sensitivity at the pressure benchmark. This activity-pressure-feature combination should therefore be taken to further assessment. The best available evidence, relevant to the activity in question, at the time of application, should be sourced and considered in any further assessment.*"

306. Using the previously discussed evidence for effects of EMF and further information provided by MarESA, the sensitivity of each feature has been concluded as negligible due to evidence suggesting that there is no direct interaction between EMF and the biotopes (Natural England, 2022b).

8.2.2.7.2 Summary

307. Based on the relevant pressures, receptor sensitivity, and the assessment of impacts against the attributes of affected KKE MCZ features it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by EMF related to the operation of North Falls.

8.2.3 Potential Impacts during decommissioning

308. As discussed in Section 5.6, the final decommissioning details will be finalised nearer to the end of the lifetime of the Project to ensure it is in line with the most recent guidance, policy and legislation.

309. The scope of the decommissioning works is likely to include removal of all of the wind turbine components and part of the foundations (those above seabed level), removal of some or all of the platform interconnector, array and offshore export cables. Scour and cable protection would likely be left in situ.

310. Effects on the features of the KKE MCZ would be no greater than, and are expected to be less than, those of the construction phase for all effects (Section 8.2.1).

311. Based on the relevant pressures, receptor sensitivity, and the assessment of impacts against the attributes of affected KKE MCZ features it can be concluded that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by any of the effects related to the decommissioning of North Falls.

8.3 Cumulative Effects

8.3.1 Identification of potential cumulative effects

312. The first step in the CEA process is the identification of which residual effects assessed for North Falls on their own have the potential for a cumulative effect with other projects, plans and activities. This information is set out in Table 8.4 below.

Table 8.4 Potential cumulative effect

Impact	Potential for cumulative effect	Rationale
Construction		
Increased SSC and deposition	Yes	Increases in SSC are expected to be localised at the point of discharge and short-term. The small quantities of fine sediment may be transported further; however, it will be widely and rapidly dispersed and not increase the volume of sediment already present in the benthos. The elevation of SSC is expected to be lower than concentrations that would develop in the water column during storm conditions. However, due to nearby offshore wind farms, cumulative effects must be assessed.
Re-mobilisation of contaminated sediments	No	The level of contaminated sediment found in the offshore site investigation will not hinder the conservation objectives of the MCZs therefore there is no potential for cumulative effect with other plans and projects.
Effects on bedload sediment transport	No	Effects to bedload sediment transport are considered to be short term and temporary and will not hinder the conservation objectives of the MCZs therefore there is no potential for cumulative effect with other plans and projects.
Underwater noise and vibration	No	The sensitivity of benthic ecology receptors to underwater noise and vibration is considered to be negligible and underwater noise effects will be localised, with the highest magnitude noise sources being short term and intermittent.
Introduction or spread of INNS	Yes	Biosecurity measures will be used to prevent the introduction of INNS. The risk of introduction to the southern North Sea is not considered to be significantly increased as a result of the project. However, due to the potential for larvae to disperse over distances greater than one hundred kilometres (Álvarez-Noriega *et al.,* 2020), this impact must be considered.
Operation		
Increased SSC and deposition	Yes	Effects will occur at isolated locations for a time-limited duration and are local in nature with a negligible impact magnitude. However, due to nearby offshore wind farms, cumulative effects must be assessed.
Re-mobilisation of contaminated sediments	No	The level of contaminated sediment found in the offshore site investigation will not hinder the conservation objectives of the MCZs therefore there is no potential for cumulative effect with other plans and projects.

Impact	Potential for cumulative effect	Rationale
Effects on bedload sediment transport	No	Effects to bedload sediment transport are localised, occurring within the wake of individual structures and changes in bed shear stress are small in magnitude at less than 5% of the baseline (Hydrodynamic and Dispersion Modelling Report [8.54, Rev 2]). Numerical modelling of cumulative changes in bed shear stress show there is no interaction with other projects, with the exception of Five Estuaries which is located adjacent to North Falls. However, any changes due to interactions between North Falls and Five Estuaries remain within 5% of the baseline, and do not extend any further into the MCZ. The changes will therefore not hinder the conservation objectives of the MCZs.
Underwater noise and vibration	No	The sensitivity of benthic ecology receptors to underwater noise and vibration is considered to be negligible and underwater noise effects will be localised, with the highest magnitude noise sources being short term and intermittent.
Introduction or spread of INNS	Yes	Biosecurity measures will be used to prevent the introduction of INNS. The risk of introduction to the southern North Sea is not considered to be significantly increased as a result of the project. However, due to the potential for larvae to disperse over distances greater than one hundred kilometres (Álvarez-Noriega *et al.,* 2020), this impact must be considered.
Electromagnetic fields	No	EMF will be highly localised around the offshore cable corridor so there is no potential for cumulative impact.
Decommissioning		
Increased SSC and deposition	Yes	Effects will occur at isolated locations for a time-limited duration and are local in nature with a negligible impact magnitude. However, due to nearby offshore wind farms, cumulative effects must be assessed.
Re-mobilisation of contaminated sediments	No	The level of contaminated sediment found in the offshore site investigation will not hinder the conservation objectives of the MCZ's therefore there is no potential for cumulative effect with other plans and projects.
Effects on bedload sediment transport	No	Effects to bedload sediment transport are considered to be short term and temporary and will not hinder the conservation objectives of the MCZ's therefore there is no potential for cumulative effect with other plans and projects.
Underwater noise and vibration	No	The sensitivity of benthic ecology receptors to underwater noise and vibration is considered to be negligible and underwater noise effects will be localised, with the highest magnitude noise sources being short term and intermittent.
Introduction or spread of INNS	Yes	Biosecurity measures will be used to prevent the introduction of INNS. The risk of introduction to the southern North Sea is not considered to be significantly increased as a result of the project. However, due to the potential for larvae to disperse over distances greater than one hundred kilometres (Álvarez-Noriega et al., 2020), this impact must be considered.

313. The second step in the CEA process is the identification of projects, plans and activities screened in (Appendix 1 [**Document Reference: APP-238**]) within vicinity of the BCRC Estuaries and KKE MCZs, that have the potential to interact with the proposed North Falls activities. These are presented in Table 8.5 and Figure 8-1 (where data is available).

314. The CEA presents relevant cumulative effects of projects based on their stage of development using the tiered approach as devised by Natural England and Defra (2022), as follows:

- Tier 1: built and operational projects;
- Tier 2: projects under construction;
- Tier 3: projects that have been consented (but construction has not yet commenced);
- Tier 4: projects that have an application submitted to the appropriate regulatory body that have not yet been determined;
- Tier 5: projects that have produced a PEIR and have characterisation data within the public domain;
- Tier 6: projects that the regulatory body are expecting to be submitted for determination (e.g., projects listed under the Planning Inspectorate programme of projects); and
- Tier 7: projects that have been identified in relevant strategic plans or programmes.

315. These tiers are used as they are considered more appropriate in comparison to the tiers in The Planning Inspectorate (2019) Advice Note 17 for the types of projects and plans considered in this assessment, in particular for the OWF stages.

Table 8.5 Summary of projects considered for the CEA in relation to the BCRC Estuaries and KKE MCZs

Project, plan or activity	Tier status	BCRC Estuaries MCZ	KKE MCZ	Rationale
Galloper Offshore Wind farm (GWF)	1	No at c.50km between GWF and the MCZ there is no pathway for cumulative effect	Yes (maintenance impacts only)	Both GGOW and GWF are operational therefore there is potential cumulative effect from ongoing maintenance activities. Including: • Increased SSC • Introduction or spread of INNS
Greater Gabbard Offshore Windfarm (GGOW)	1	No at c.50km between GGOW and the MCZ there is no pathway for cumulative effect	Yes (maintenance impacts only)	
Five Estuaries offshore wind farm	4	Yes	Yes	Potential for cumulative effect during construction and operational phases due to the proximity of the projects. Including: • Increased SSC • Introduction or spread of INNS
NeuConnect Interconnector	2	Yes	Yes	The NeuConnect Interconnector bisects the North Falls offshore cable corridor and there is potential for temporal overlap of cable installation activities. Including: • Increased SSC • Introduction or spread of INNS
South & East Anglia (SEA) Link	5	No, at c.35km between the cable and the MCZ there is no pathway for cumulative.	Yes	The emerging preferred and alternative routes for Sea Link intersect with the North Falls offshore cable corridor. Therefore, there is potential for cumulative effects, subject to the final location and programme for the interconnector.
Thames D aggregates production agreement area 524	1	No at c.55km between the aggregate site and the MCZ there is no pathway for cumulative effect	Yes	There is potential for some interaction between dredging and aggregate exploration during construction and operational phases of North Falls. Including: • Increased SSC • Introduction or spread of INNS

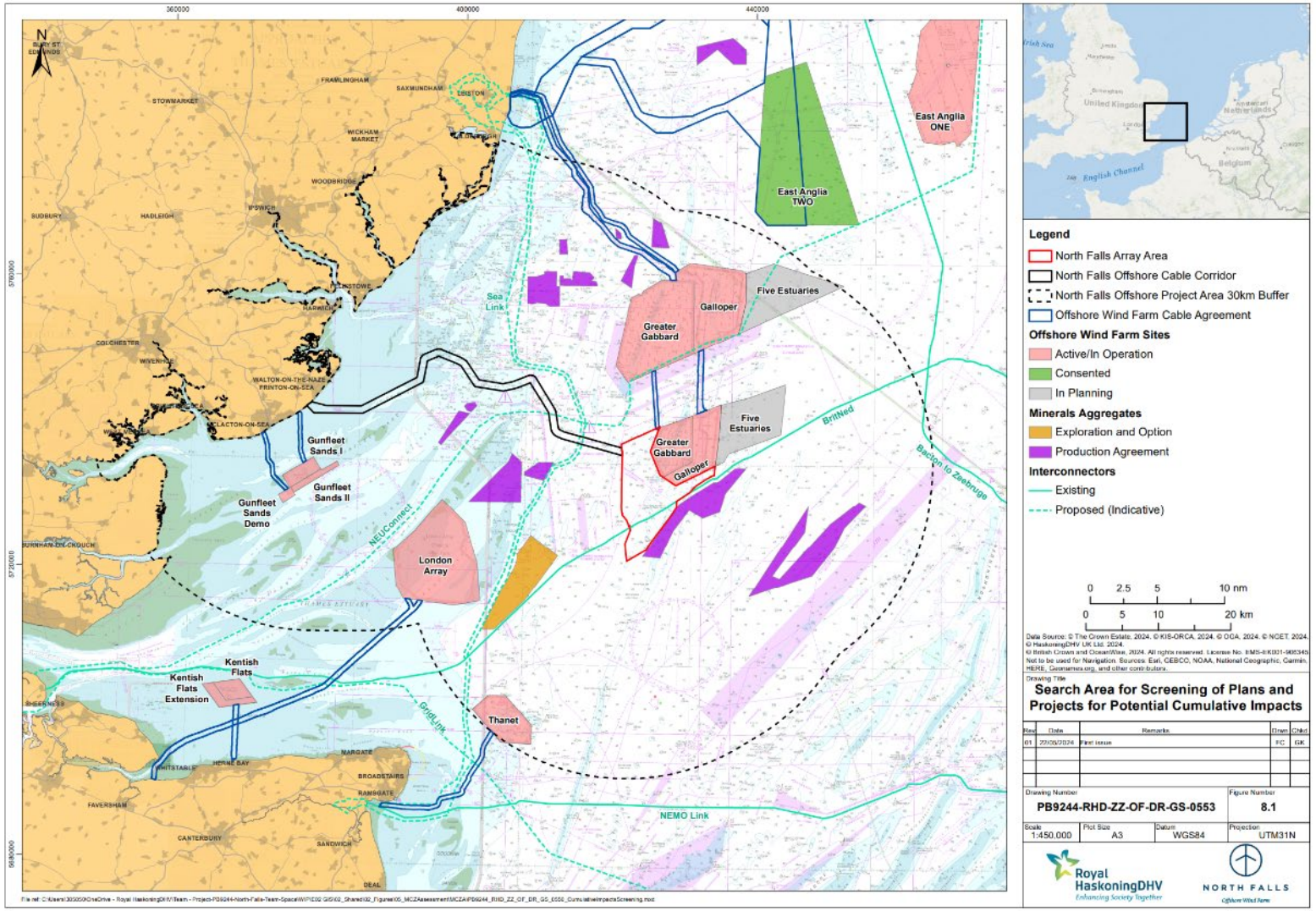

Figure 8-1 Screening of Plans and Projects for Potential Cumulative Impact

8.3.2 Assessment of cumulative effects

8.3.2.1 Increased suspended sediment concentrations and deposition (smothering)

316. There is potential for construction or maintenance works for North Falls to be conducted at the same time, or similar time, to Five Estuaries, as well as maintenance works at GGOW and GWF. There is also potential for overlap with the latter stages of the NeuConnect interconnector construction programme and dredging works from the Thames D aggregates production agreement area 524.

317. Cumulative effects from temporary physical disturbance and increased suspended sediment could pose an effect to BCRC Estuaries MCZ and KKE MCZ.

318. As discussed in Sections 8.1.1.1, 8.1.2.1, 8.1.3, 8.2.1.1, 8.2.2.1 and 8.2.3, the effects of North Falls will be localised and relatively short term, through the duration of the construction period. The projects with a potential cumulative effect are within a 15km distance to the MCZs and no closer than the Project itself. Furthermore, the magnitude of effect from cumulative projects has been determined as negligible.

319. The features of the MCZs are considered to have no sensitivity to the effects of SSC (Natural England, 2022a and 2022b).

320. It can therefore be concluded that the conservation objectives for the designated features of both MCZs will not be hindered by increased suspended sediment concentrations and deposition cumulatively with other projects.

8.3.2.2 Invasive species

321. The cumulative risk is associated with the movement of vessels in and out of the region. However, as previously considered in Sections 8.1.1.3, 8.1.2.3, 8.1.3, 8.2.1.6, 8.2.2.6 and 8.2.3 the introduction of INNS through vessels will be mitigated through adherence with MARPOL, Ballast Water Management Convention and The Environmental Damage Regulations 2015 guidelines. It is expected that other projects would be required to follow similar mitigation.

322. It can therefore be concluded that the conservation objectives for the designated features of both the MCZs will not be hindered by invasive species.

9 Stage 1 Assessment Conclusion

323. Based on the information presented in the preceding sections, which include assessments on the relevant broadscale habitats and habitat FOCI, it can be concluded that the conservation objectives for the BCRC Estuaries MCZ and the KKE MCZ will not be hindered by the construction, operation and decommissioning phases of North Falls.

324. Consultation feedback from the preliminary Stage 1 Assessment has been considered and incorporated into this MCZA for the DCO application.

325. Based on the outcome of this Stage 1 Assessment, a Stage 2 Assessment is not required.

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