NORTH FALLS

Offshore Wind Farm

Report to Inform Appropriate Assessment (Tracked)

Part 2 Benthic Ecology (Annex I habitat in SACs and SPA supporting habitat)

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Contents

Tables

Figures

Plates

Appendices

Appendix 1.1 HRA Screening

Glossary of Acronyms

AEoI	Adverse Effect on Integrity
cSAC	Candidate Special Area of Conservation
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DEP	Dudgeon Extension Project
DO	Dissolved oxygen
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EMODnet	European Marine Observation and Data Network
EMP	Ecological Management Plan
ES	Environmental Statement
ETG	Expert Topic Group
EUNIS	The European Nature Information System
FCS	Favourable Conservation Status
GGOW	Greater Gabbard Offshore Wind Farm
GWF	Galloper Wind Farm
ha	Hectare
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
IFCA	Inshore Fisheries and Conservation Authority
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
km	Kilometre
LA	London Array
LSE	Likely Significant Effect
m	Metre
MARPOL	International Convention for the Prevention of Pollution from Ships
MMO	Marine Management Organisation
MU	Management Unit
NFOW	North Falls Offshore Wind Farm Limited
nm	Nautical Mile
O&M	Operation and Maintenance

OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEIR	Preliminary Environmental Information Report
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
RTD	Red-Throated Diver
RWE	RWE Renewables UK Swindon Limited
SAC	Special Area of Conservation
SACO	Supplementary Advice on Conservation Objective
SPA	Special Protection Area
SPR	Scottish Power Renewables
SSC	Suspended Sediment Concentration
SSER	SSE Renewables Offshore Windfarm Holdings Limited
UK	United Kingdom
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.
Landfall	The location where the offshore export cables come ashore at Kirby Brook.
Offshore cable corridor	The corridor of seabed from the array area to the landfall within which the offshore export cables will be located.
Offshore converter platform	Should an offshore connection to a third party HVDC 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 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.
Onshore cable route	Onshore route within which the onshore export cables and associated infrastructure would be located.
Onshore export cables	The cables which take the electricity from landfall to the onshore substation. These comprise HVAC cables, buried underground.
Onshore project area	The boundary within which all onshore infrastructure required for the Project will be located (i.e. landfall; onshore cable route, accesses, construction compounds; onshore substation and cables to the National Grid substation)
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid.
Platform interconnector cable	Cable connecting the offshore substation platforms (OSP); or the OSP and offshore converter platform (OCP)
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 (WTG)	Power generating device that is driven by the kinetic energy of the wind

2 Annex I habitat in Special Area of Conservation (SACs) and Special Protection Area (SPA) supporting habitat

2.1 Introduction

2.1.1 Background

1. North Falls Offshore Wind Farm (hereafter 'North Falls' or 'the Project') is ~~an extension to the existing Greater Gabbard Offshore Wind Farm (GGOW), in the southern North Sea.~~located approximately 40km off the East Anglian coast in England. When operational, North Falls would have the potential to generate renewable power for approximately 400,000 United Kingdom (UK) homes from up to 57 wind turbines.

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), both of which are highly experienced developers.

~~2.~~3. The offshore project area lies in the region of the Outer Thames Estuary, in the southern North Sea and the onshore project area is located in the Tendring Peninsula of Essex. The offshore project area is relevant to this Part of the RIAA and includes:

- The offshore wind farm area (the 'array area') - within which the WTGs, offshore substation platform(s) (OSPs), offshore converter platform (OCPs, if required), platform interconnector cable and array cables will be located; and
- Offshore cable corridor - the corridor of seabed from the array area to the landfall within which the offshore export cables will be located.

~~3.~~4. Effects associated with the onshore project area are assessed in Part 5 Onshore European and Ramsar Sites~~.~~ **[Document Reference: APP-181]**.

~~4. NFOW is a joint venture between SSE Renewables Offshore Windfarm Holdings Limited (SSER) and RWE Renewables UK Swindon Limited (RWE) both of which are highly experienced developers.~~

2.1.2 Purpose of this document

5. The purpose of the Report to Inform Appropriate Assessment (RIAA) is to provide the information necessary for the competent authority to carry out the Appropriate Assessment of ~~the North Falls Offshore Wind Farm (OWF) (hereafter 'North Falls' or 'the Project').~~North Falls.

6. This Part of the RIAA provides the shadow Appropriate Assessment for offshore Special Area(s) of Conservation (SAC(s)) designated for Annex I Habitats and supporting habitat of Special Protection Area(s) (SPA(s)) screened in based on the Habitats Regulations Assessment (HRA) Screening Report (RIAA Part 1

Appendix 1 ([**Document Reference** 7.1.1): **APP-174**] and summarised in Section 2.3.

2.1.3 Update during Examination

7. This document has been updated to incorporate additional mitigation and further information which relate to the effects on the Margate and Long Sands SAC, including:

- Commitment to a 150m buffer between cables/ cable protection and the Margate and Long Sands SAC;
- Additional dredging in the offshore cable corridor at the Trinity Deep Water Route (DWR), Sunk DWR and Pilot Boarding Diamond Buffer, required as mitigation for effects on shipping and navigation; and
- Additional modelling provided in the Hydrodynamic and Dispersion Modelling Report [9.54, Rev 2].

2.2 Approach to assessment

2.2.1 Consultation

7.8. The offshore HRA screening was submitted to the relevant Expert Topic Groups (ETGs) on 1st October 2021 and 15th November 2022. The following stakeholders were consulted, and responses received are detailed in Table 3.1 of Appendix 1:

- Natural England;
- Royal Society for the Protection of Birds (RSPB);
- Kent and Essex Inshore Fisheries and Conservation Authority (IFCA);
- Essex Wildlife Trust;
- Environment Agency;
- Marine Management Organisation (MMO); and
- The Wildlife Trusts.

8.9. In addition, the draft RIAA was submitted for Section 42 consultation with the Preliminary Environmental Information Report (PEIR) in May 2023.

9.10. Consultation responses relevant to the RIAA which have beenwere received to datepre-application in relation to benthic ecology are summarised in Table 2.1. Responses to comments received through the Examination process are responded to within response documents submitted into the Examination.

Table 2.1 Consultation responses

Consultee	Date / Document	Comment	Response / where addressed in the RIAA
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 benthic survey in response to feedback from Natural England. The data available from Magic mapper (Natural England, 2022d) are considered in the assessment (Sections 2.4.3 and 2.5.3).
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	It should 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 Marine Protected Area 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 2.5.1.2 Point 187 Whilst we welcome the offshore export cable route avoiding Margate and Long Sands SAC there still needs to be consideration of potential indirect impacts from site preparation and/or installation activities to the site, and if appropriate suitable mitigation measures need to be adopted.	A detailed assessment of the potential effects on the integrity of the Margate and Long Sands SAC is provided in Section 2.4

Consultee	Date / Document	Comment	Response / where addressed in the RIAA
		Further consideration to indirect impacts on the SAC should be given throughout the Environmental Impact Assessment (EIA) process.	
The Planning Inspectorate	26/08/2021 Scoping Opinion	Para 199 Table 2.10 Designated sites and study areas. Table 2.10 lists the nearest designated sites to the North Falls array areas but does not state the study area(s) that have been applied. The Inspectorate notes that there are several other offshore designated sites within the vicinity of the Proposed Development (as shown on Figure 1.2) and it's not evident in the report as to why impacts on these sites and their qualifying / protected features have been discounted. The Environmental Statement (ES) should clearly define the study area and explain how the assessment has been undertaken, taking into relevant guidance and using an aspect specific methodology where this is relevant."	Offshore Habitats Regulations Assessment (HRA) screening was undertaken in consultation with the Seabed ETG and is provided in Appendix 1. [Document Reference: APP-174]. Section 5.4 of the HRA screening (Appendix 1) details the conservative study area (50km range) used to identify designated sites for consideration in the HRA screening.
Natural England	28/07/2023 HRA Assessment	Natural England is concerned about the age of the data used (2012), in particular in relation to assessing impacts on Annex I habitats during construction. We advise up to date data is used to inform the baseline to ensure a robust assessment and to ensure confidence in the conclusions drawn.	ES Chapter 8 Marine Geology, Oceanography and Physical Processes of the ES [Document Reference: APP-022] provides details of the data used to inform the baseline which includes site specific data collected in 2021.
Natural England	28/07/2023 HRA Assessment	Natural England is content that Adverse Effect on Integrity (AEoI) can be excluded for Margate and Long Sands Special Area of Conservation (MLS SAC) only if the export cable is routed 10km or more away from the designated site boundary. We look forward to understanding the final route boundary as the project is refined, and up-to-date data is included. We will provide our final advice one this has been completed. Please also refer to our comments on suspended sediment concentrations in the Annex on Marine Geology, Oceanography and Physical Processes.	Following the seabed ETG in October 2023, Natural England has confirmed that this comment can be disregarded. Indirect impacts on the Margate and Long Sands SAC have been assessed in Section 2.4.
Natural England	28/07/2023 HRA Assessment	Please note that the Conservation Advice package for MLS Supplementary Advice on Conservation Objective (SAC) is currently under review. Natural England will inform you of any material changes prior to examination.	We note that Advice on Operations for the Margate and Long Sands SAC has been updated on the 18th March 2024, but no changes to the SACO.

2.2.2 Worst case scenario

~~10.~~11. Table 2.2 outlines the worst case scenario for effects which are of relevance to the Appropriate Assessment.

~~11.~~12. A Likely Significant Effect (LSE) has been identified for the Margate and Long Sands SAC and Outer Thames Estuary SPA supporting habitats as a result of the offshore cable corridor (discussed further in Section ~~2.3~~2.3 and Appendix 1.1~~).~~ **[Document Reference: APP-174]**).

~~12.~~13. The North Falls array area is 4.5km at the nearest point from the Outer Thames Estuary SPA and 11km from the Margate and Long Sands SAC. The findings of the Marine Geology, Oceanography and Physical Processes impact assessment (ES Chapter 8 Marine Geology, Oceanography and Physical Processes ~~(~~[**Document Reference:** ~~3.1.10)~~**APP-022**]) and Hydrodynamic and Dispersion Modelling Report [**9.54, Rev 2**] shows suspended sediments and deposition arising from the array area will return to ~~the seabed within 1km.~~ambient levels before reaching the Outer Thames Estuary SPA and the Margate and Long Sands SAC. Therefore, there is no pathway for LSE on Annex I habitats or supporting habitats of European sites from the North Falls array area, alone or in-combination. The worst case scenario (Table 2.2) therefore relates to effects arising ~~in~~from the offshore cable corridor.

2.2.2.1 Cable burial

14. 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.

15. The Applicant has undertaken engineering analysis of the site specific geophysical data which has been used to inform the worst case scenario for the RIAA.

16. 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]).

17. As the location of seabed preparation is not fully known at this stage, a worst case scenario of MFE along the length of the offshore cable corridor adjacent to the Margate and Long Sands SAC has been assessed taking into account the 150m buffer (Sections 2.1.3 and 2.2.4), however it is unlikely that this extent of seabed preparation would be required adjacent to the SAC.

2.2.3 External cable protection

18. 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 concrete 'mattresses'; rock placement; geotextile bags filled with stone, rock, or gravel; polyethylene or steel pipe half shells, or

sheathes; and bags of grout, concrete, or another substance that cures hard over time

19. As the location of cable protection is not yet known, a worst case scenario has been assessed based on cable protection in the part of the offshore cable corridor which is adjacent to the Margate and Long Sands SAC, taking into account the 150m buffer (see Section 2.2.4), however it is unlikely that this extent of cable protection would be required adjacent to the SAC.

Table 2.2 North Falls worst case scenario relating to seabed effects in the offshore cable corridor

Impact	Worst case	Notes
Construction		
Temporary physical disturbance – offshore cable corridor	Maximum temporary disturbance for seabed preparation within the offshore cable corridor = 3,009,600m^2 based on: Maximum total export cable trench length of 125.4km. Maximum width of temporary disturbance is approximately 24m Anchor placement = 297,850m^2 (based on 9 anchors per vessel, each with 61m^2 footprint; and 545.5 anchoring events) Boulder clearance = 295m^2 (up to 15 boulders of 5m diameter) Unexploded Ordnance (UXO) clearance = 323m^2. Crater areas reported from other offshore wind farms range from approximately 2m^2 to 25m^2, whereas the largest predicted in Ordtek (2018) is around 350m^2. It is assumed 90% of the UXO would be of 25m^2 or less and 10% of up to 350m^2. Up to 6 UXO clearance operations predicted in the array area.1,600m^2. Horizontal Directional Drilling (HDD) exit – 3 bores (2 offshore export cables + 1 contingency). Within the worst-case scenario footprint for the seabed preparation area Total disturbance footprint – 3.31km^2 **There will be no direct disturbance in the Margate and Long Sands SAC** **Of the above works, the following could be within the Outer Thames Estuary SPA** Maximum temporary disturbance for seabed preparation within the offshore cable corridor = 913,920m^2 based on: Maximum total offshore export cable trench length of 76.16km. Maximum width of temporary disturbance is approximately 24m Anchor placement = 297,850m^2 Boulder clearance = 295m^2 (up to 15 boulders of 5m diameter) Total disturbance footprint – 1.21km^2.	Temporary disturbance relates to seabed preparation and installation activities. The long term/ permanent footprint of infrastructure is assessed as an operation phase impact
Increased suspended sediment concentration (SSC) – offshore export cable installation	Export cable sandwave levelling = 1,544,891m^{3}4,634,673m^3 Export cable burial – 125.4km length with average 1m trench width x average 1.2m burial depth = 150,480m^3	Seabed preparation (MFE, dredging using a trailing suction hopper dredger and installation of a bedding and levelling layer) may be required. The worst-case

Impact	Worst case	Notes
	Worst case scenario volume for offshore export cables = ~~0.002Mm³~~4,785,153m³ **Of the above works, the following could be in the section of the offshore cable corridor adjacent to the Margate and Long Sands SAC, but with a minimum buffer of 150m:** Offshore export cable seabed preparation ~~– 4.8km export cable length with average 24m disturbance width x average 5m sediment depth = 576~~= 540,000m³ ~~per cable (2 cables = 1,152,000m³)~~ Offshore export cable burial ~~– 4.8km length with average 1m trench width x average 1.2m burial depth=~~ = 5,760m³ per cable (2 cables = 11,520m³) **Of the above works, the following could be within the Outer Thames Estuary SPA** Offshore export cable seabed preparation – 19.04km length with average 24m disturbance width x average 5m sediment depth = 2,284,800m³ per cable (2 cables = 4,569,600m³) Offshore export cable burial – 19.04km length with average 1m trench width x average 1.2m burial depth = 22,848m³	scenario assumes that sediment would be dredged and returned to the water column at the sea surface during disposal from the dredger vessel. Sandwave levelling may be required prior to offshore cable installation. Any excavated sediment due to sandwave levelling would be disposed of within the North Falls offshore project area, meaning there will be no net loss of sediment from the site. 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 [REP6-055]. 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. The offshore HDD exit location will be subtidal zone c. 1.5km from MLWS. Sediment displacement is included in the totals for the export cable.
Remobilisation of contaminated sediments	Maximum suspension of sediments as described above.	No significant contaminated sediments were recorded in the offshore project area. See ES Chapter 9 Marine Water and Sediment Quality ~~(~~[**Document Reference:**

Impact	Worst case	Notes
		~~3.1.11)~~**APP-023]** for more detail.
Operation & maintenance (O&M)		
Temporary physical disturbance	Unplanned repairs and reburial of cables may be required during O&M, the following estimates are included: Reburial of c.4% of export cable is estimated over the life of the project (24m disturbance width) = 120,384m^2 Four offshore export cable repairs are estimated over the project life. 600m section removed x 24m disturbance width = 57,600m^2 Anchored vessels placed during the no. of cable repairs included above = 4,914m^2 Total footprint of temporary physical disturbance during maintenance = 182,514m^2 **There will be no direct disturbance in the Margate and Long Sands SAC and this effect was screened out.** **Of the above works, as a worst case scenario, all the works could be within the Outer Thames Estuary SPA.**	Each Operation and Maintenance (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 recovery commencing once the activity is complete.
Permanent/ long term habitat loss – offshore cable corridor	Export cable protection – Up to 12.5km of cable protection may be required in the unlikely event that offshore export cables cannot be buried (based on 10% of the length) x 6m cable protection width = 75,240m^2 **There will be no direct habitat loss in the Margate and Long Sands SAC and this effect was screened out.** **Of the above works, as a conservative worst case scenario, it is assumed all the cable protection could be within the Outer Thames Estuary SPA.**	This represents the maximum estimated area of seabed habitat loss for benthic receptors in respect of North Falls infrastructure.
Suspended sediment	Unplanned repairs and reburial of cables may be required during O&M, the following estimates are included: 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 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 **As the location of unplanned repairs/reburial is unknown, it is assumed that all the works described above could either be within the Outer Thames Estuary SPA or all adjacent to the Margate and Long Sands SAC.**	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.
Bedload transport	Export cable protection – Up to 12.5km of cable protection may be required in the event that offshore export cables cannot be buried (based on 10% of the length) x 6m cable protection width = 75,240m^2	

Impact	Worst case	Notes
	Of the above works, cable protection is assessed in the section of the offshore cable corridor adjacent to the SAC (subject to the 150m buffer), which is c. 6km in length **Of the above works, as a conservative worst case scenario, it is assumed all the cable protection could be within the Outer Thames Estuary SPA.**	
Remobilisation of contaminated sediments	Maximum suspension of sediments as described above.	No significant contaminated sediments were recorded in the offshore project area. See ES Chapter 9 Marine Water and Sediment Quality ~~(~~[**Document Reference: ~~3.1.11)~~APP-023]** for more detail.
Decommissioning		
Impact 1: Temporary physical disturbance	Offshore export cable retrieval (if required)– 125.4km length with average 1m trench width = 125,400m^2 Anchor placement for export cable removal (if required) = 297,850m^2 (based on 9 anchors per vessel, each with 61m^2 footprint; and 545.5 anchoring events)	The following infrastructure is likely to be decommissioned in situ depending on available information at the time of decommissioning, however where it represents the worst case scenario (e.g. for disturbance), removal is assessed: Offshore cables may be removed or left in situ; and Crossings 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. Decommissioning arrangements will be detailed in a Decommissioning Plan, which will be prepared in accordance with the Energy Act 2004.
Impact 2: Increased suspended sediments	Up to 125.4km of export cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan)	
Impact 3: 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.	

~~2.2.3~~2.2.4 Embedded mitigation

~~13.~~20. This section outlines the embedded mitigation relevant to works in the offshore cable corridor, which has been incorporated into the design of North Falls (Table 2.3).

Table 2.3 Embedded mitigation measures

Parameter	Mitigation measures embedded into North Falls design
Offshore cable corridor	The offshore cable corridor was selected in consultation with key stakeholders to select a route which sought to minimise impacts on designated sites, such as avoiding direct impacts on Margate and Long Sands SAC. In light of comments from Natural England during the examination period, the Applicant has further added a minimum buffer of 150m between the MLS SAC and the installation of the offshore cables and any associated cable protection. This is secured by condition 36 of the draft Deemed Marine Licence contained in Schedule 9 of the draft Development Consent Order (DCO) (Document Reference 6.1 as submitted at Deadline 5 and all subsequent versions).
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 cable route 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.

2.3 Screening conclusions

~~14.~~21. The offshore cable corridor runs along the northern boundary of the Margate and Long Sands SAC, and has a small area of overlap with the Outer Thames Estuary SPA.

~~15.~~22. There is therefore potential for indirect effects which could result in LSE on the designated Annex I habitat feature of Margate and Long Sands SAC from North Falls, alone or in combination.

~~16.~~23. As there is no overlap between the offshore project area and the Margate and Long Sands SAC, there is no pathway for direct effects to occur.

~~17.~~24. The following indirect effects during construction, O&M and decommissioning are screened in and assessed in Section 2.4.3:

- Changes to suspended sediment concentrations and bedload transport
- Smothering; and
- Re-mobilisation of contaminated sediments.

~~18.~~25. In addition, an LSE has been identified for the supporting habitats of the Outer Thames Estuary SPA for North Falls, alone or in-combination.

~~19.~~26. All other European sites designated for Annex I habitats are screened out on the basis that they are beyond the zone of influence (ZoI) of the Project and therefore have no potential for LSE, for the Project alone or in-combination with other plans and projects. For further information, see Appendix 1.1 HRA Screening Report. [Document Reference: APP-174].

2.3.1 Further effects considered during Examination

27. While halo effects were not included in the HRA Screening report [APP-174], nor raised by stakeholders during the pre-application consultation (Section 2.2.1), this effect has been considered in response to Natural England's relevant representation [RR-243].

28. As discussed in Section 2.2.4, the Applicant has committed to a 150m minimum buffer between cables/ cable protection and the Margate and Long Sands SAC. At this distance there would be no halo effects[1] and therefore this is screened out of the North Falls assessment for MLS SAC.

29. Consideration is given to halo effects in the Outer Thames Estuary SPA.

2.4 Margate and Long Sands SAC

2.4.1 Site overview

~~20.~~30. Margate and Long Sands SAC has been designated for Annex I habitat: 'Sandbanks which are slightly covered by seawater at all times'. The site accounts for 2-15% of the national Annex I sandbank resource and represents one of the greatest areas of sandbanks in the UK. It is located to the north of the Thanet coast of Kent, and spans in a north-easterly direction for approximately 62km (Natural England, 2018a).

~~21.~~31. The sandbanks are composed of sandy sediments upon the crests and muddier, more gravelly sediments in the troughs between banks. The boundary of the site incorporates the flanks of the banks and the intervening troughs. The troughs have been included in the site designation as they are important for the structure and function of the sandbanks and provide suitable habitat for notable faunal communities.

~~22.~~32. Within the SAC there are areas of varying sediment type, salinity and exposure to tides and wave action, ultimately supporting different associated biological communities.

~~23.~~33. Long Sands sandbank is located in a highly dynamic, tidally influenced estuary mouth. Subsequently, it is heavily influenced by currents from the NS.

34. Since 2024 the site has been deemed to be in unfavourable condition for the coarse sediment and sand sub-features. The rationale given by Natural England in the latest condition assessment (Natural England, 2025a) states:

"Condition assessment is largely based on vulnerability assessment, marine activity information with limited direct monitoring data. The condition assessment

[1] It is noted in their advice to the Dogger Bank South OWF regarding halo effects, Natural England has advised that 50m is an appropriate buffer with regards to halo effects around foundations. No evidence is available regarding halo effects on cable protection.

will be updated when new evidence becomes available. The Annex 1 Sandbank feature, the subtidal sand and coarse sediment subfeatures, and their principal attributes, have been found to be in unfavourable condition as the SAC is under pressure from anthropogenic activities with impacts greater than originally perceived. The introduction of hard strata at the offshore windfarm array and power cables, are having greater than predicted impacts on the form and function and composition of designated Annex 1 Sandbanks within the SAC. While cabling is present in the site, there is a risk from further external cable protection being required due to the highly mobile nature of the site. Natural England considers that cable protection and scour within designated sites, which interact with site features, will result in a lasting change to the habitat feature."

2.4.2 Conservation objectives

~~24.~~35. Conservation objectives are set to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving Favourable Conservation Status (FCS) of its qualifying features, by maintaining or restoring (Natural England, 2018a):

- The extent and distribution of qualifying natural habitats;
- The structure and function (including typical species) of qualifying natural habitats; and
- The supporting processes on which the qualifying natural habitats rely.

~~25.~~36. The Conservation Objectives for the Margate and Long Sands SAC is to ~~maintain~~restore the Annex I Sandbanks which are slightly covered by seawater all the time ~~in~~to Favourable Condition. In particular the sub-features (~~Joint Nature Conservation Committee (JNCC) and~~ Natural England, ~~2012b~~2025):

- ~~Dynamic~~Subtidal coarse sediment
- Subtidal sand ~~communities~~
- ~~Gravelly muddy sand communities~~
- Subtidal mixed sediments

~~26.~~37. 'Favourable Condition' is the term used in the UK to represent 'FCS' for the interest features of SACs. For an Annex I habitat, FCS occurs under the Habitats Directive when (JNCC and Natural England, 2012b):

- Its natural range and areas it covers within that range are stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- The conservation status of its typical species is favourable.

~~27.~~38. The assessment of the potential effects on the integrity of the Annex I Sandbank feature is based on the following targets set by JNCC and Natural England (2012b) for achieving Favourable Condition:

- No decrease in extent from established baseline, subject to natural succession/known cyclical change.

- Consideration of changes in extent will need to take account of the dynamic nature of the sandbank.
- No alteration in topography of the sandbanks, allowing for natural responses to hydrodynamic regime.
- The depth and distribution of the sandbanks reflects the energy conditions and stability of the sediment, which is key to the structure of the feature. However, it should be noted that subtidal sandbanks are naturally dynamic environments and sections of them may be subject to significant fluctuations in height over time, while other sections are more stable.
- Maintain distribution of dynamic and stable sand and mixed sediments allowing for natural fluctuations. Average particle size analysis parameters should not deviate significantly from the baseline established for the sites, subject to natural change.
- Sediment character is key to the structure of the sandbank, and reflects the physical processes acting on it. In addition to this, the sediment character is instrumental in determining the biological communities present on the sandbank.
- Maintain the distribution of subtidal sandbank communities, allowing for fluctuation.
- Notable biotopes should be selected owing to their national significance, sensitivity, or how representative it is as a typical biotope for the biological zone.
- Where a biotope is lost from a baseline known area of presence (outside expected natural variation), leading to a loss of the conservation interest of the site, then condition should be considered unfavourable.
- Changes in the presence or distribution of biotopes may indicate long-term changes in the physical conditions at the site, and deterioration in the overall biological value of the site.
- No decline in biotope quality as a result of reduction in species richness or loss of species of ecological importance, allowing for fluctuation.
- Whilst some change in community composition over time is expected (for example, as part of cyclic changes or successional trends) changes in the overall nature of communities across the key representative biotopes sandbank, may indicate deterioration in the condition of the biodiversity of the sandbanks.
- Species composition is an important contributor to structure of a biotope. The presence and abundance of a characterising species gives an indication of the quality of a biotope, and any change in composition may indicate a cyclic change or trend in the sandbank community. Where changes in species composition are known to be clearly attributable to natural succession, known cyclical change or mass recruitment or dieback of characterising species, then the target value should accommodate this variability. Where there is a change in biotope quality outside the expected variation or a loss of the conservation interest of the site, then condition should be considered unfavourable.

- Maintain age/size class structure of individual species.
- Changes in presence and/or abundance of a species can critically affect the physical and functional nature of the habitat, leading to unfavourable condition. The species selected should serve an important role in the structure and function of the biological community.
- Whilst some change in community structure over time is expected (for example, as part of the cyclic changes or successional trends) changes in the overall nature of communities across the sandbank, including mobile species e.g. fish, crustacean species etc, may indicate deterioration in the condition of the biodiversity of the sandbanks.
- Where the field assessment judges changes in the presence and/or abundance of specified species to be unfavourable, and subsequent investigation reveals the cause is clearly attributable to natural succession and known cyclical change (such as mass recruitment and dieback of characterising species), the final assessment will require expert judgement by Natural England advisers to determine the reported condition of the feature. The features condition could be declared favourable where the expert judgement of Natural England/JNCC advisers is certain that the conservation interest of the feature is not compromised by the failure of this attribute to meet its target condition. Where there is a change outside the expected variation or a loss of the conservation interest of the site, (e.g. due to anthropogenic activities or unrecoverable natural losses) then condition should be considered unfavourable.

2.4.2.1 Management measures

~~28.~~39. There is currently a byelaw in place to prevent deterioration of the sandbank feature of Margate and Long Sands SAC from the direct impacts of bottom towed fishing (MMO, 2017).

~~29.~~40. As there is no overlap between the SAC and the offshore cable corridor there will be no direct impact on the areas protected by the management areas of the byelaw during the construction, O&M or decommissioning of North Falls. Consequently, there are no specific management measures in place for activities related to the construction, O&M or decommissioning of North Falls.

2.4.2.2 Supplementary Advice on Conservation Objectives

~~30.~~41. Natural England have prepared conservation advice for the SAC (Natural England, ~~2012b). This advice identifies six pressure categories which may cause deterioration of sandbank habitats within SACs, either alone or in combination and thus affect Favourable Condition. These have been identified as:~~2023). This advice provides feature targets against the following attributes:

- ~~Physical loss;~~
- ~~Physical damage;~~
- ~~Non-physical disturbance;~~
- ~~Toxic contamination;~~
- ~~Non-toxic contamination; and~~
- ~~Biological disturbance.~~

31. The sensitivity, exposure and vulnerability of Annex I Sandbank features of the Margate and Long Sands SAC to the above pressures is provided in Table 2.4.

Table 2.4 Sensitivity, exposure and vulnerability of Annex I Sandbank features (Natural England, 2012b)

Operations which may cause deterioration or disturbance	Annex I Subtidal sandbanks					
	Dynamic sand communities			Gravelly muddy sand communities		
	Sensitivity	Exposure	Vulnerability	Sensitivity	Exposure	Vulnerability
Physical loss						
Removal	Moderate	Medium	Moderate	Moderate	Medium	Moderate
Smothering	Low	Medium	Low	Low	Medium	Low
Physical damage						
Siltation	Low	Medium	Low	Low	Medium	Low
Abrasion	Low	Medium	Low	Moderate	Medium	Moderate
Selective extraction	Low	Low	Low	Low	Low	Low
Non-physical disturbance						
Noise	None	None	None	None	None	None
Visual	None	None	None	None	None	None
Toxic contamination						
Introduction of synthetic compounds	Moderate	Low	Low	Moderate	Low	Low
Introduction of non-synthetic compounds	Moderate	Low	Low	Moderate	Low	Low
Introduction of radionuclides	Insufficient information	Low	Insufficient information	Insufficient information	Low	Insufficient information
Non-toxic contamination						
Changes in nutrient loading	Moderate	Low	Low	Low	Low	Low
Changes in organic loading	Moderate	Low	Low	Moderate	Low	Low
Changes in thermal regime	Low	Low	Low	Low	Low	Low
Changes in turbidity	Low	Low	Low	Low	Low	Low
Changes in salinity	Moderate	Low	Low	Low	Low	Low
Biological disturbance						
Introduction of microbial pathogens	None	None	None	Low	None	None
Introduction of non-native species and translocation	None	Medium	Moderate	Low	Medium	Low
Selective extraction of species	Low	Medium	Low	Low	Medium	Low

- Distribution: presence and spatial distribution of biological communities
- Extent and distribution
- Structure and function: presence and abundance of key structural and influential species
- Structure: non-native species and pathogens (habitat)
- Structure: sediment composition and distribution
- Structure: species composition of component communities
- Structure: topography
- Structure: volume
- Supporting processes: energy/exposure
- Supporting processes: physico-chemical properties (habitat)
- Supporting processes: sediment contaminants
- Supporting processes: sediment movement and hydrodynamic regime (habitat)
- Supporting processes: water quality

42. Information provided in the SACOs has been used to inform this assessment and determine the significance of effect against each attribute, where applicable.

2.4.3 Shadow Appropriate Assessment

32.43. As discussed in Section 2.3 and Appendix 1, the Margate and Long Sands SAC [**Document Reference: APP-023**], there is located adjacent to a 150m buffer between the offshore cable corridor and thereforethe Margate and Long Sands SAC. Therefore this section provides the shadow Appropriate Assessment with regards to indirect effects for the designated feature, Annex I Sandbanks which are slightly covered by seawater all the time.

2.4.3.1 Potential effects during construction

2.4.3.1.1 Changes to suspended sediment concentrations, sediment deposition (smothering) and bedload transport

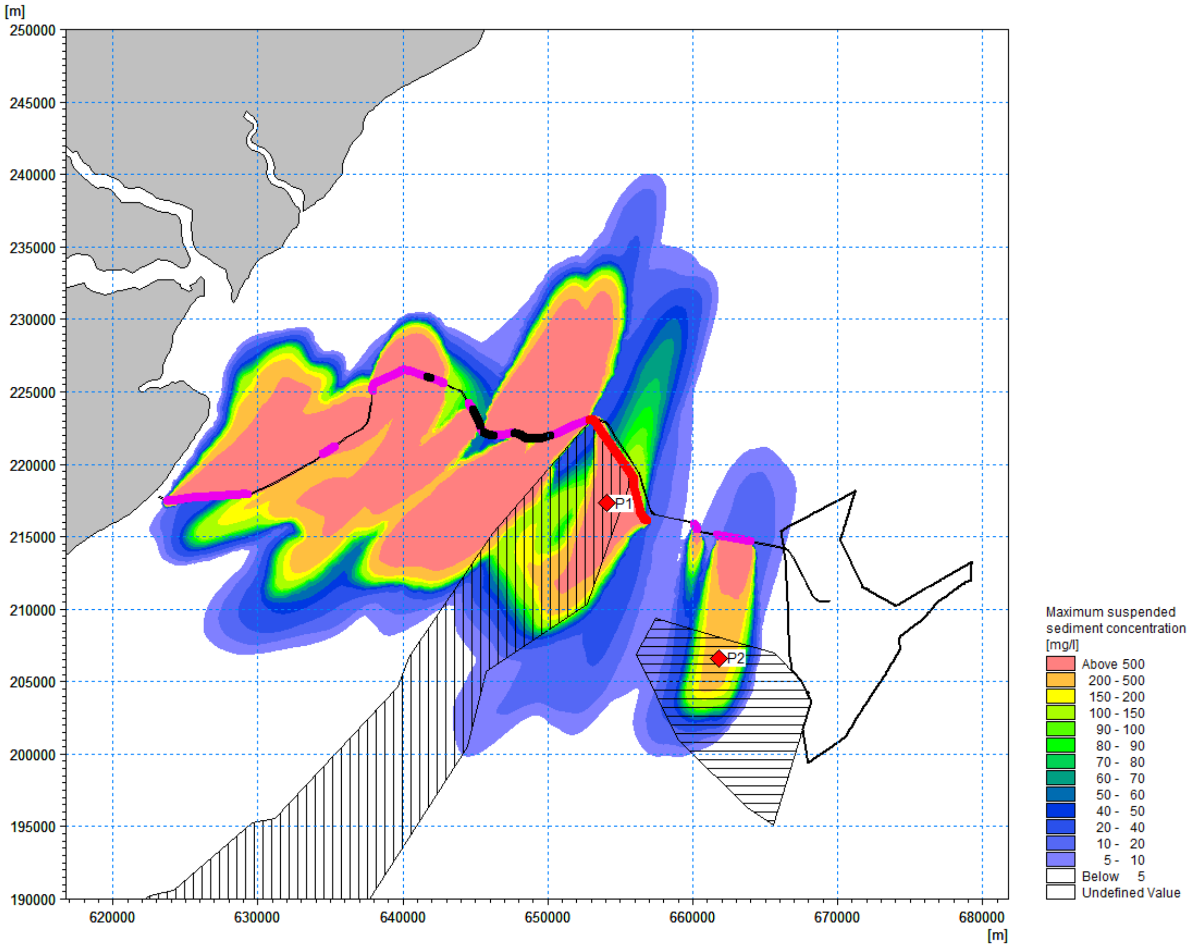
44. Temporary increases in SSC within the water column and associated sediment deposition will occur as a result of seabed preparation (including dredging associated with the DWRs and pilot boarding area) and cable installation.

33.45. ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Document Reference: 3.1.10)**[APP-022]** provides details of increased SSC and subsequent sediment deposition, and changes to bedload sediment transport as a result of the Project.

46. BasedFurther to this, sediment dispersion modelling of installation activities along the offshore cable corridor (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2**) provides further evidence of the effects of North Falls on the worst case scenario,SAC.

Supporting processes

47. Sediment dispersion modelling of sandwave levelling within the offshore cable corridor 150m from the northern boundary of the Margate and Long Sands SAC (**Plate 2-1~~Plate 2-1~~**) (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2, Section 7.2**) shows the peak of the suspended sediment concentration at the seabed in the SAC would be 3,800 mg/l, returning to ambient levels of 15mg/l within approximately ~~1,152,000m³ of sediment would be re-mobilised into the water column~~ 2.5 hours for one cable (**Plate 2-2~~Plate 2-2~~**). This would also be the case for the levelling of the second export cable. There will be no interaction of the plumes released by the first and second cables due to the time between installation.



~~34.~~ **Plate 2-1 Maximum suspended sediment concentration during seabed preparation ~~and 11,520m³ during cable burial~~operations for the offshore export cables occurring near the seabed (vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) Red line shows the modelled area of sand wave clearance adjacent to the ~~Margate and Long Sands SAC.~~ boundary of the MLS SAC (Source: Hydrodynamic and Dispersion Modelling Report [Document Reference 9.54, Rev 2].**

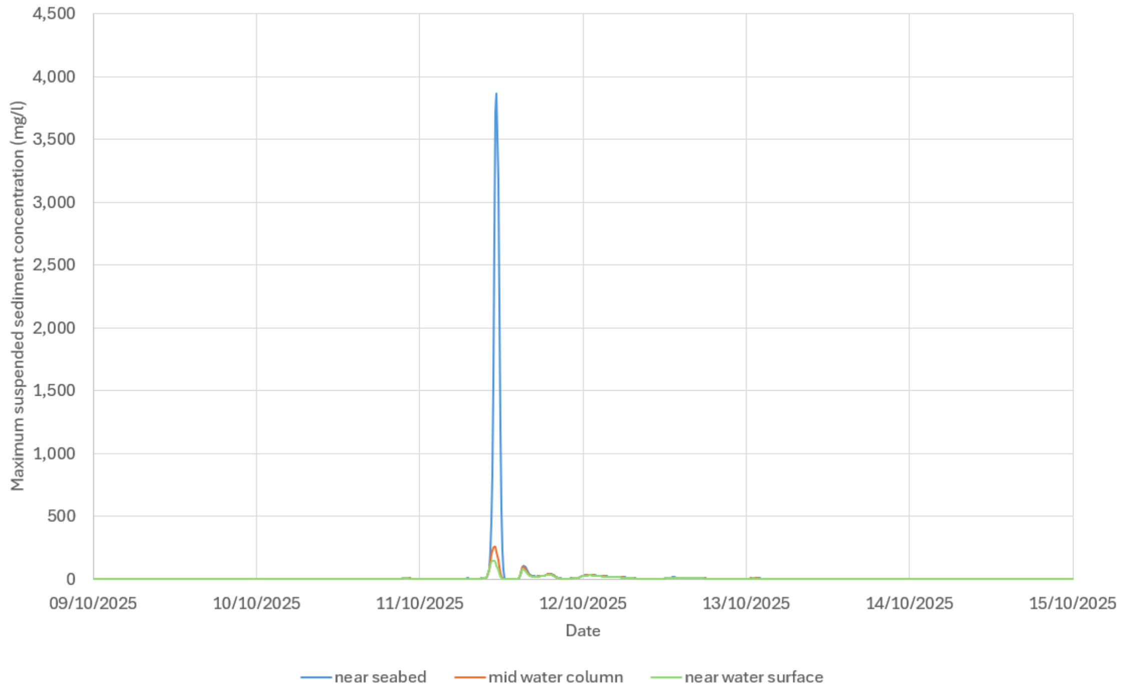


Plate 2-2 Time series of suspended sediment concentration at P1 during indicative offshore export cable levelling (including additional length) for seabed, middle of water column and near water surface (inside MSL SAC)

48. SSC from seabed trenching of a single export cable installation would be less than 25mg/l within the Margate and Long Sands SAC and return to ambient levels of 15mg/l within 2 hours at its maximum extent, near seabed plume (Plate 2-3).

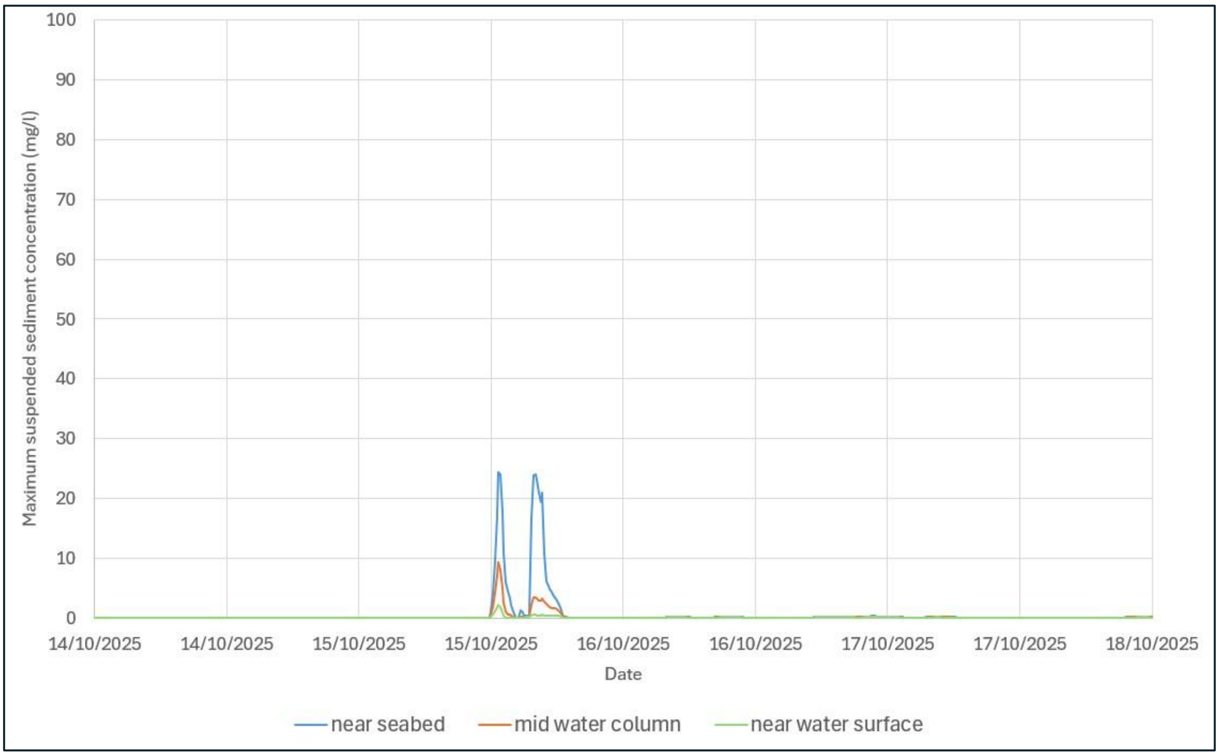


Plate 2-3 Time series of predicted suspended sediment concentrations at P1 (inside Margate and Long Sands SAC) during seabed trenching along the offshore cable corridor for near seabed, middle of water column and near water surface

49. There would be no discernible changes in SSC arising during dredging at the Sunk DWR, Trinity DWR and Pilot Boarding Diamond Buffer[2] within the Margate and Long Sands SAC. Dredged sediment arising from these areas will be disposed of within the array area. The removal of this sediment and the disposal in the array area will not interact with the MLS SAC (Plate 2-4 to Plate 2-6~~Plate 2-6~~).

[2] dredging areas discussed in Section 2.1.1

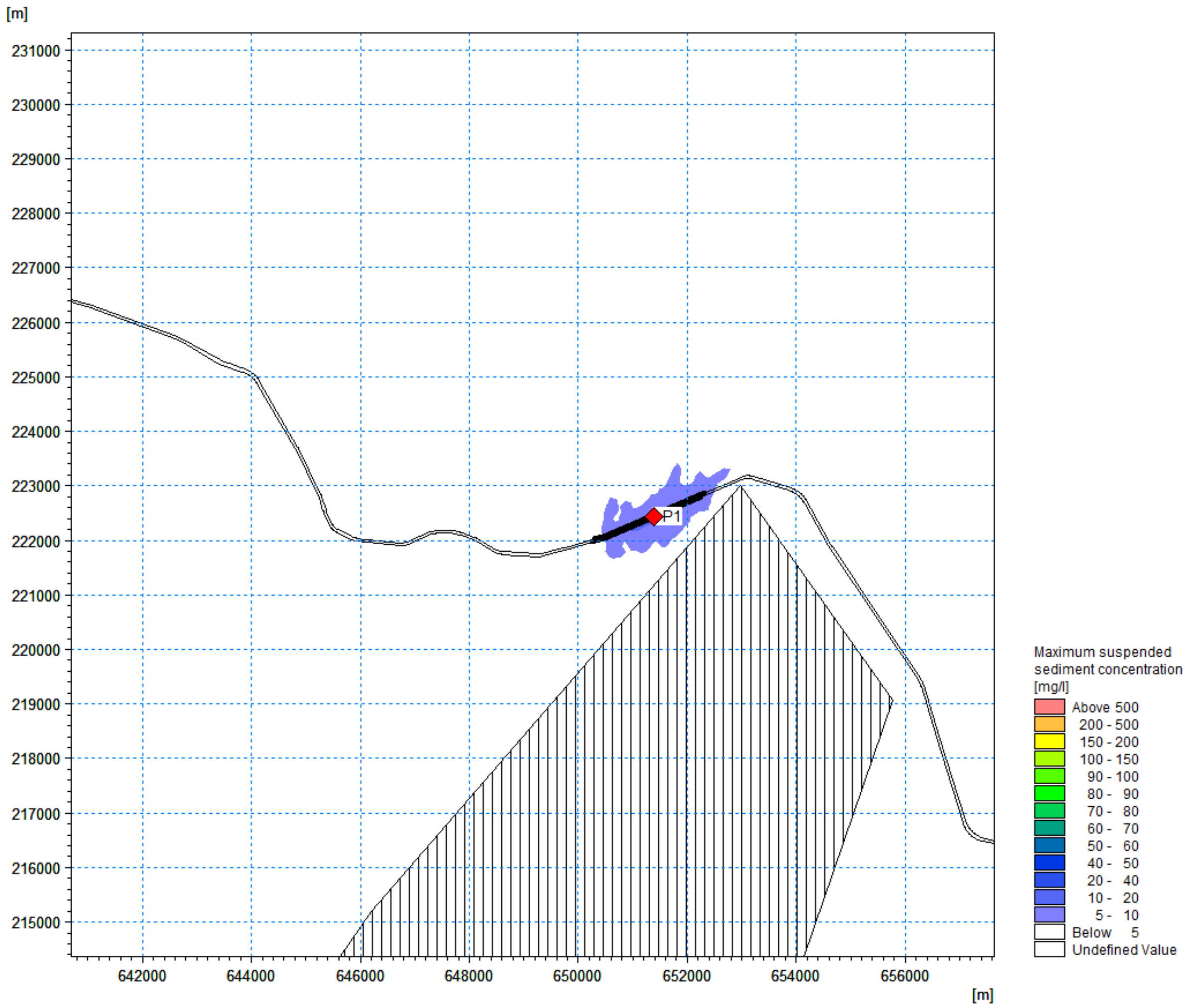


Plate 2-4 Maximum suspended sediment concentration during dredging operations at Trinity DWR occurring near the seabed (red points = time series extraction points, vertical hashed area = MLS SAC)

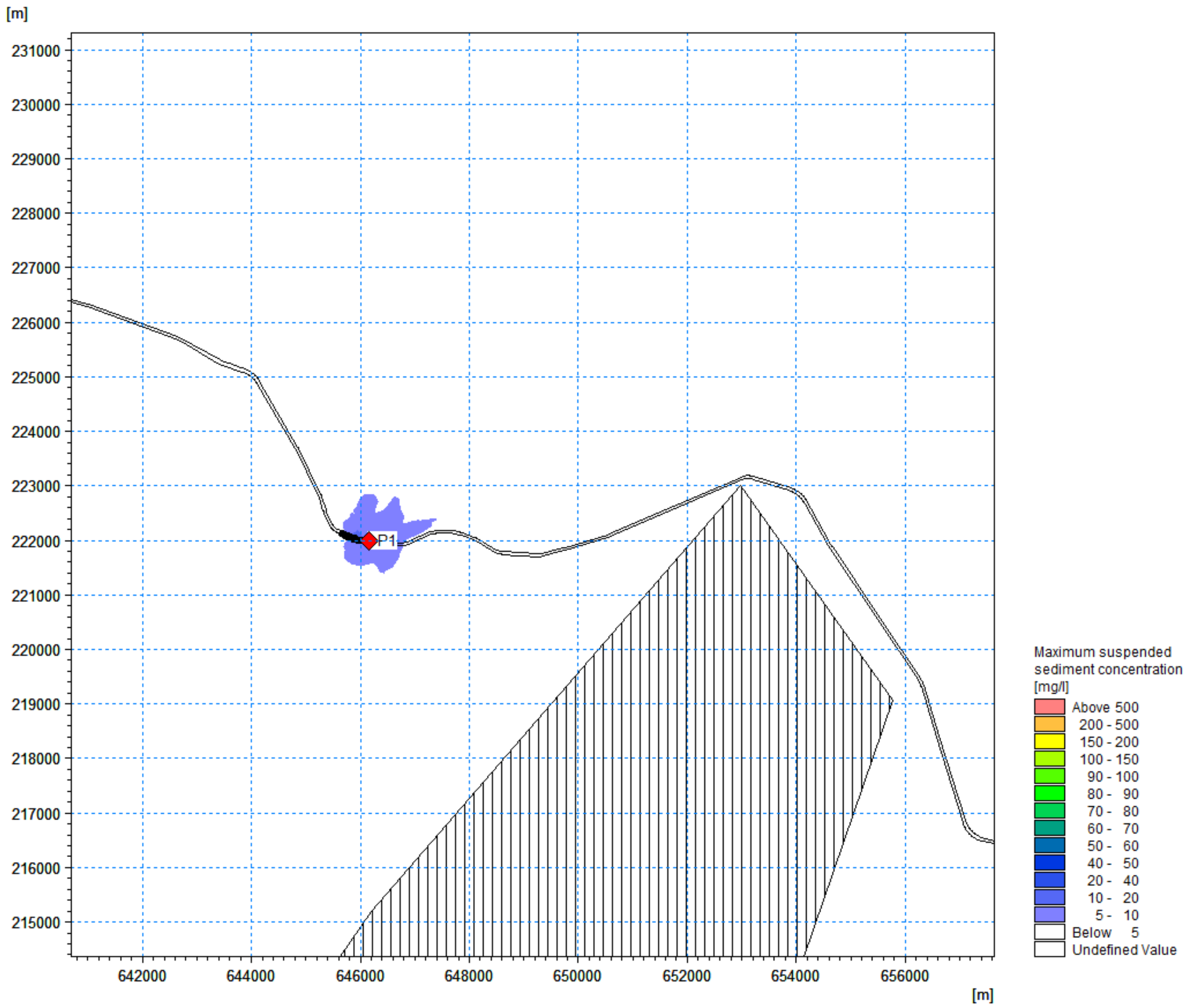


Plate 2-5 Maximum suspended sediment concentration during dredging operations at Sunk DWR occurring near the seabed (red points = time series extraction points, vertical hashed area = MLS SAC)

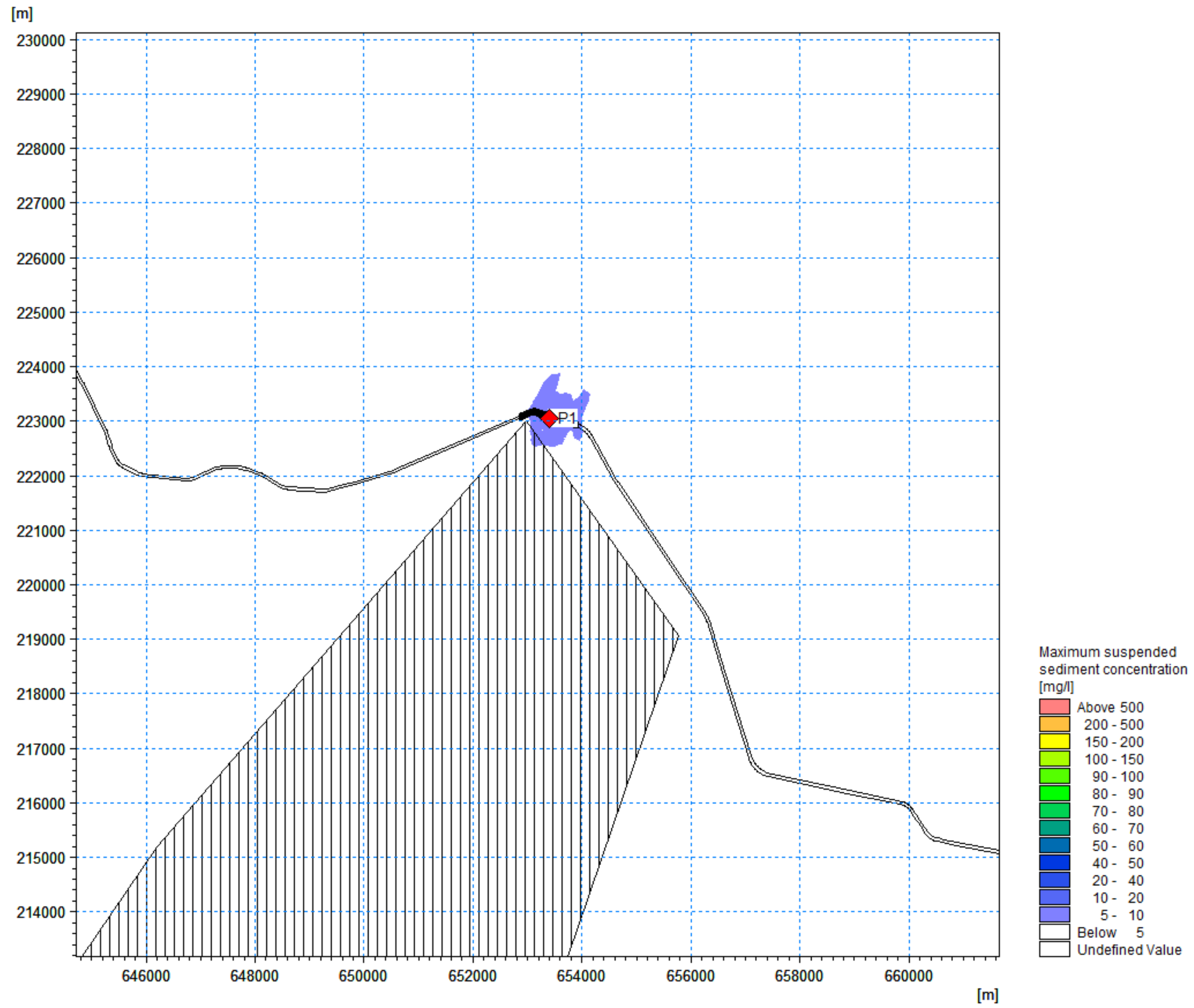


Plate 2-6 Maximum suspended sediment concentration during dredging operations at Pilot Boarding Area occurring near the seabed (red points = time series extraction point)

50. Deposition of SSCs arising from the above works could result in 5cm to 15cm sediment depth in an area of c. 1.5km^2 (0.23% of the SAC) overlapping the MLS SAC, as shown by the sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 02**).

51. Changes to bedload sediment transport due to seabed preparation (including dredging of existing DWRs) and cable installation are not predicted. Suspended sediment will be naturally deposited in close proximity to the area of disturbance, and will become reworked by prevailing tidal currents. If levelling of sand waves is required, the deposited sediment will become entrained as bedload and sand waves will reform and continue to be dynamic and mobile, migrating in sync with the tidal regime.

52. Dredging within the Sunk DWR, Trinity DWR and Pilot Boarding Buffer Area will deepen the existing channels. However, this will not change bedload sediment transport as the channels will remain a sink for sediment. Whether this is dredged further by the ports would be subject to future marine licencing and is not applicable to North Falls.

53. Therefore, there is no potential for an AEoI of this attribute due to increased SSC and sediment deposition.

The extent and distribution of qualifying habitat

35. ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Document Reference: 3.1.10) describes the expected movement of sediment suspended during the construction phase for the above offshore export cable installation activities.

36. Fine sands and mud are most prevalent along the offshore cable corridor and within the SAC. Fine sand and mud is likely to form a passive plume which would become advected by tidal currents. Due to the sediment sizes present, this is likely to exist as a measurable but modest concentration plume. Sediment would settle to the seabed in proximity to its release (within a few hundred metres up to around 1km) within a short period of time (hours to days), however magnitudes would be indistinguishable from background levels.

54. As the disturbed sediment arising from within the offshore cable corridor is similar to the sediment composition withinThe sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2**) shows the effects of North Falls on seabed level as a result of sediment deposition.

55. Changes in seabed level in the SAC greater than 5cm and less than 15cm would arise from seabed levelling in the offshore cable corridor. This would overlap with a worst case scenario of 1.5km^2 of the SAC (which represents 0.23% of the SAC) (Plate 2-7).

56. Particle size distribution in the offshore cable corridor adjacent to the SAC is shown in Table 2.4. The substrate in this area is predominantly gravel/cobble which will settle rapidly to the seabed, with the plume and subsequent deposition being predominantly the sand fraction. This sediment is comparable to the designated feature of the SAC and will be mobile, driven by the existing physical processes, and therefore will be re-distributed by the prevailing waves and tidal currents.

Table 2.4 Particle size distribution in the offshore cable corridor adjacent to the SAC

Sediment Category	Sediment Size (Mm)	Percentage (%)
Silt/Clay	0.031	14.66
Fine Sand	0.13	6.63
Medium Sand	0.3	13.95
Coarse Sand	1.3	11.57
Gravel/Cobble	2	53.19

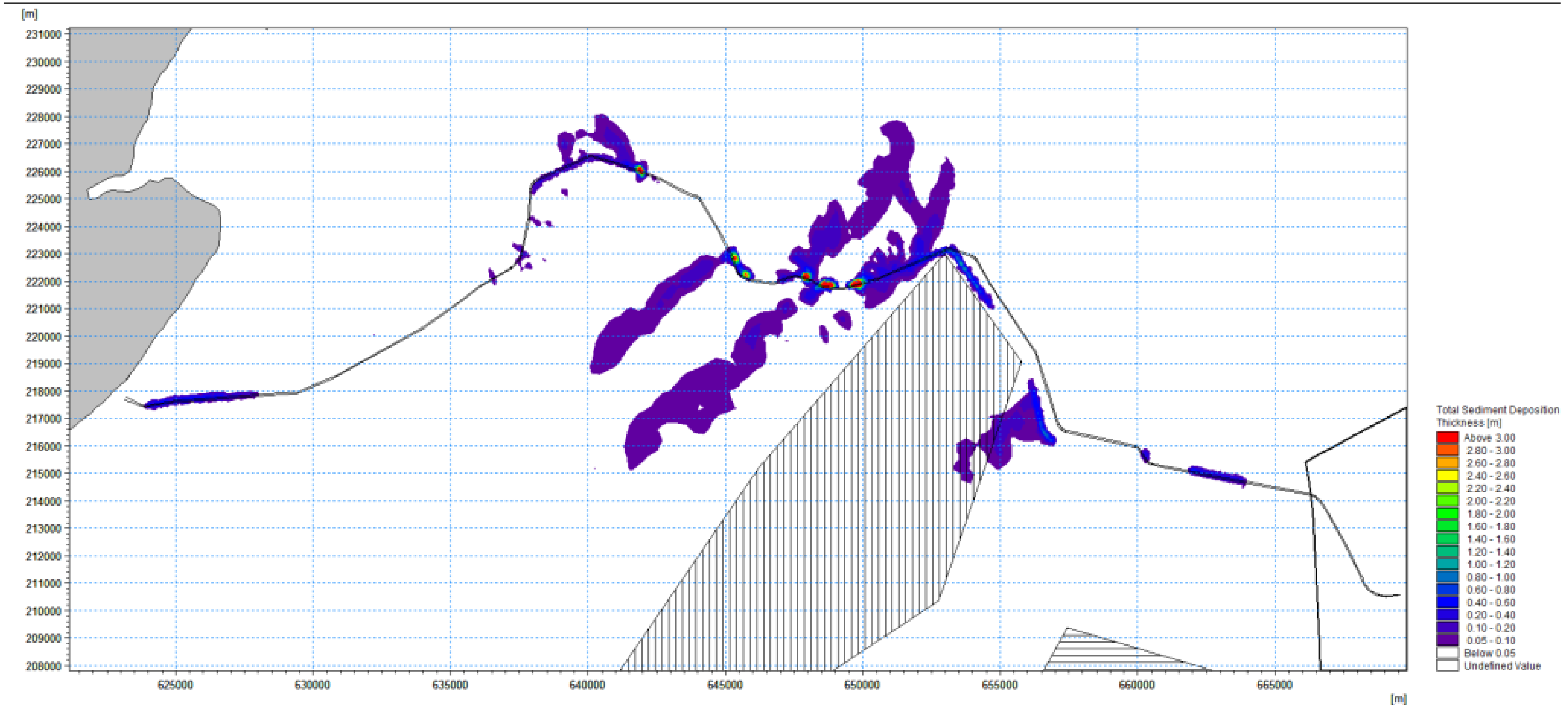


Plate 2-7 Total sediment deposition thickness during export cable levelling operations (vertical hashed area = MLS SAC)

57. Furthermore, the area of sediment deposition would be mostly within an area of the SAC which is not Annex I Sandbank (JNCC, 2019), with only 0.24km^2 of overlap with the Annex I Sandbank, as shown in Figure 2.1Figure 2.1 below.

58. Changes in seabed level greater than 5cm from seabed trenching for export cable installation are spatially restricted and do not interact with the MLS SAC and will therefore not change the condition of the SAC.

59. The sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2**) shows the additional dredging for the Sunk DWR, Trinity DWR and Pilot Boarding Diamond Buffer would also not interact with the SAC.

37.60. As there would be negligible change to seabed level from sediment deposition within the Annex I Sandbank feature of the SAC, there will be no significant change to the extent and distribution of the Annex I Sandbank habitat within the SAC upon settlement. Therefore, there is no potential for an AEoI of this attribute due to increased SSC and subsequent deposition.

Supporting processes

ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Document Reference: 3.1.10) describes the effects on bedload

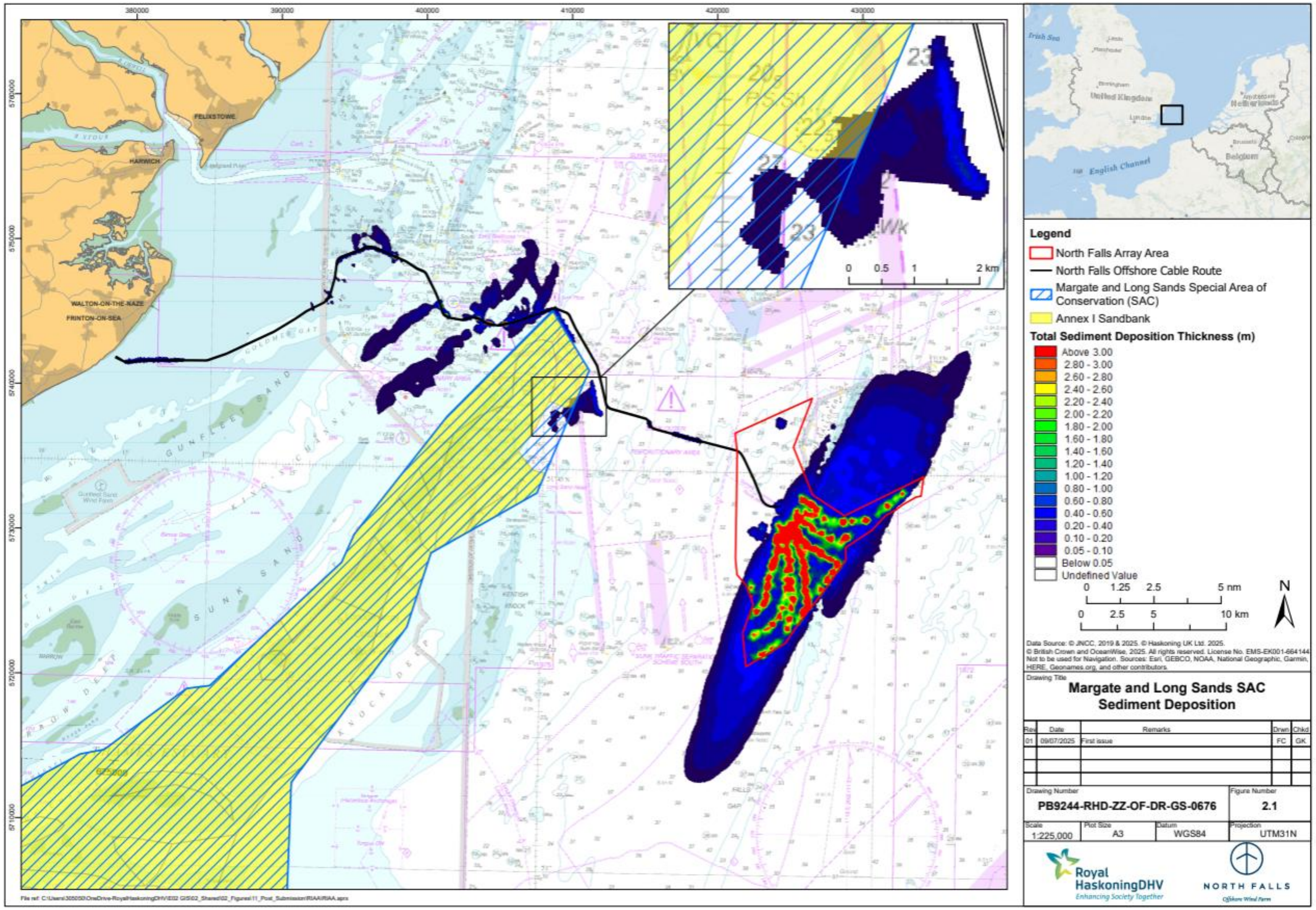


Figure 2.1~~1~~ Total sediment deposition thickness during export cable levelling ~~to~~operations with the location of deposition within the SAC ~~and cable installation.~~

38. The dredged sand will be disposed of within the offshore project area, close origin, where practicable and is therefore likely to remain within the sandbank system. Given the local favourable conditions that enable sandwave development in the study area, the sediment would be naturally transported back into any levelled areas within a short period of time. Levelled areas will naturally act as a sink for sediment in transport and will be replenished in the order of a few days to a year.

39. For Galloper Wind Farm (GWF), a plume modelling simulation was carried out which indicated that suspended sediment would persist in the water column for hours to days, before depositing a thin layer on the seabed. Overall changes from SSC and deposition of fine sands and mud-sized sediment will not be measurable above background levels (ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Document Reference: 3.1.10)).

40. **Therefore, there is no potential for an AEoI of this attribute due to increased SSC, sediment and bedload sediment transport processes.**

Structure and function of sandbank communities

~~41.~~61. Increased suspended sediments have the potential to affect benthic ecology receptors by blocking feeding apparatus as well as by smothering sessile species upon redeposition. Therefore, there is potential for increased SSC and subsequent deposition to affect sandbank benthic and fish communities within the SAC due to seabed preparation and cable installation.

~~42.~~62. The sandbanks within the Margate and Long Sands SAC consist of the following sub-features (Natural England, ~~2012b~~2015a):

- ~~Dynamic sand communities; and~~
- ~~Gravelly muddy sand communities.~~

~~43. Dynamic sand communities experience strong tidal currents and consequently there is high sediment mobility. In turn, infaunal communities are adapted to suspended sediment and deposition, for example, by rapidly re-burying themselves following disturbance. Characteristic species of this sub-feature are polychaetes and amphipod communities of low biodiversity.~~

~~44. Gravelly muddy sand communities are identified on the flanks of sandbanks. There is reduced sediment movement within these communities allowing for a range of infaunal and epifaunal species and more diverse communities. Characteristic species include bryozoans, hydroids and sea anemones. Sand mason worms *Lanice conchilega* and keel worms *Pomatoceros* sp. along with bivalves and crustaceans are also associated with this sub-feature (Natural England, 2012b).~~

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

63. The sub-feature subtidal coarse sediment is not sensitive to changes in SSC (Natural England, 2025b). The relevant biotopes used to characterise subtidal mixed sediments and subtidal sand in Natural England's AoO have been defined as being not sensitive or having low sensitivity to changes in SSC (Natural England, 2025b).

64. As discussed above, increased SSC in the SAC will be short term and will return to ambient levels within approximately 2.5 hours. Furthermore, no significant deposition is predicted in the Annex I Sandbank feature of the SAC, as discussed above.

65. As discussed in Section 2.4.1 the coarse sediment and sand sub-features of the Annex I Sandbank of the MLS SAC are deemed to be in unfavourable condition due to anthropogenic introduction of hard strata within the SAC. As the offshore cable corridor avoids any direct overlap with the SAC and the 150m buffer (discussed in Section 2.2.3) increases the distance between the installation of cables and associated cable protection and the Margate and Long Sands SAC, North Falls will have no adverse effect on the restoration objective.

~~45.~~66. Sample data ranging from 2008 to 2014 (shown in Natural England, 2022d) recorded subtidal sand (European Nature Information System (EUNIS) habitat A5.2) in the northern extent of the SAC, including:

- *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (A5.261); and
- *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (A5.242).

46.67. The results of the 2021 North Falls benthic survey conducted by Fugro (ES Appendix 10.1 ([**Document Reference:** 3.3.4)) correlated well**APP-094**]) align with this data, with the following biotopes recorded in the northern extent of the SAC:

- *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (A5.261); and
- Infralittoral coarse sediment (A5.13).

47.68. In the 2021 survey no *S. spinulosa* aggregations were reported in the offshore cable corridor or the northern extent of the SAC surveyed. During a 2014 survey of Margate and Long Sands SAC by Natural England, Sabellaria reef was recorded approximately 4km from the offshore cable corridor (data accessed in Natural England, 2022d). Natural England (2012) states that, while a significant amount of *S. spinulosa* is present in the SAC, Sabellaria reef was not included as a designated feature of the SAC, as the distribution was patchy and aggregations were typically present in crust form rather than Annex I reef.

48.69. Both dynamic sand communities and gravelly muddy sand communities have low sensitivity to suspended sediment and smothering (Natural England, 2012b). While Sabellaria reef is not currently recorded within the ZoI, it is ephemeral and so has potential to become established. ThisHowever, this receptor is not sensitive to suspended sediment and smothering.

49.70. Based on the low sensitivity of benthic communities and due to the effectsshort term, temporary increase in SSC and small scale changes from SSC causing indistinguishable change to background levelsdeposition on benthic communities, there is no potential for an AEoI of this attribute due to increased SSC and, subsequent deposition and changes in bedload transport during construction.

2.4.3.1.2 Smothering

50.71. The effects of smothering are closely related to increased SSC and have been discussed above in Section 2.4.3.1.1.2.4.3.1.1. In summary, as the disturbed sediment arising from within the offshore cable corridor is similar to the sediment composition within the SAC and the communities present are of low sensitivity to smothering, there will be no AEoI of this attribute due to smothering.

2.4.3.1.3 Re-mobilisation of contaminated sediments

51.72. The re-suspension of sediment during seabed preparation and the installation of cables within the offshore cable corridor could lead to the release of contaminated sediment which may have an effect on benthic biological communities associated with the protected features of the SAC.

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

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

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

54.75. 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.

55.76. A comparison of the sediment quality data against Cefas Action Levels has been undertaken in ES Chapter 9 Marine Water and Sediment Quality of the ES ([**Document Reference:** 3.1.11).**APP-023**]. ES 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.

56.77. Based on the absence of contaminants at levels of concern recorded within the North Falls offshore cable corridor, it can be concluded that there is no potential for an AEoI due to re-mobilisation of contaminated sediments during construction.

2.4.3.2 Potential effects during operation

2.4.3.2.1 Changes to suspended sediment concentrations, sediment deposition and bedload transport

57.78. Increases in SSC in the water column and subsequent deposition onto the seabed may occur during O&M activities. Potential activities include reburial and repairs to the offshore export cables. based on the worst case scenario shown in Section 2.2.2.

58. 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 deposited. Four offshore export cable repairs are estimated over the project life, with the location of these repairs unknown. As a worst case scenario, it is assumed that all works could be adjacent to the Margate and Long Sands SAC.

79. In addition, surface laid cable protection has potential to influence tidal currents and associated bedload sediment transport. Cables will be buried where possiblepracticable, however, as a worst case scenario, it has been assumed that surface-laid cable protection measures would need to be provided to surface-laid cables could be required (e.g. in areas of hard substrate and cable crossings.). An estimate of 10% of the export cable length requiring cable protection is included in the worst case scenario (Section 2.2.2). While it is likely that cables adjacent2.2.2) and as a worst case scenario, it is assumed that cable protection could be deployed along the section of the offshore cable corridor which is adjacent to the SAC, taking into account the 150m minimum buffer.

Supporting processes

80. As with construction (Section 2.4.3.1.1), increases in SSC would be short term temporary, returning to ambient levels in under 2.5 hours. However, as shown in Section 2.2.2, SSC volumes would be significantly less during O&M compared with construction and therefore the plumes would also be less and would not lead to a discernible change to seabed level.

59.81. The effects of cable protection near to sensitive areas[3] has been modelled in the Hydrodynamic and Dispersion Modelling Report [**Document Reference 9.54, Rev 02, Sections 5.4 and 5.5**]. A length of cable protection next to the Margate and Long Sands SAC would be buried, as a worst case scenario, the presence of cable protection adjacent to has been modelled during spring tides and neap tides for peak flood and peak ebb. In all runs, changes to current speed are less than 2% across the northern boundary of the SAC is assessed. Cablecable protection height would be upnear to 1.4mthe Margate and water depths inLong Sands SAC and the effects do not extend beyond the offshore cable corridor to the north of(**Plate 2-8Plate 2-9**). The difference in bed sheer stress is also less than 2% across the SAC are approximately 18m to 30m.cable protection and localised to within the offshore cable corridor (**Plate 2-9Plate 2-10**).

The extent and distribution of qualifying habitat

60. As with construction (Section 2.4.3.1.2), suspended sediment arising from maintenance activities would be indistinguishable from background levels. In addition, works would be relatively short term in duration and small-scale.

61. Therefore, there is no potential for an AEoI of this attribute due to increased SSC and subsequent deposition during operation.

Supporting processes

62. In areas of active sediment transport, any linear protrusion on the seabed could potentially have an effect on sediment transport.

63.82. Where the seabed is composed of mobile sand, such as is present at this location, it can be transported under existing tidal conditions. If the cable protection does present an initial obstruction to this bedload transport the sediment would first accumulate one side or both sides of the obstacle (depending on the gross and net transport at that location) to the height of the protrusion. With continued build-up, it would then form a 'ramp' over which sediment transport would eventually occur by the natural bedload processes, thereby bypassing the protection. TheTaking into account the highly localised and small (less than 2%) change in tidal currents determined by the hydrodynamic modelling, the gross patterns of bedload transport across the offshore export cables would therefore not be impacted significantly. Therefore, there will be no potential for an AEoI of this attribute due to increased SSC and subsequent deposition during the operational phase.

[3] Nearshore, Margate and Long Sands SAC and Kentish Knock East MCZ

83. Therefore, there will be no potential for an AEoI of this attribute due to increased SSC, subsequent deposition and changes to bedload transport during the operational phase.

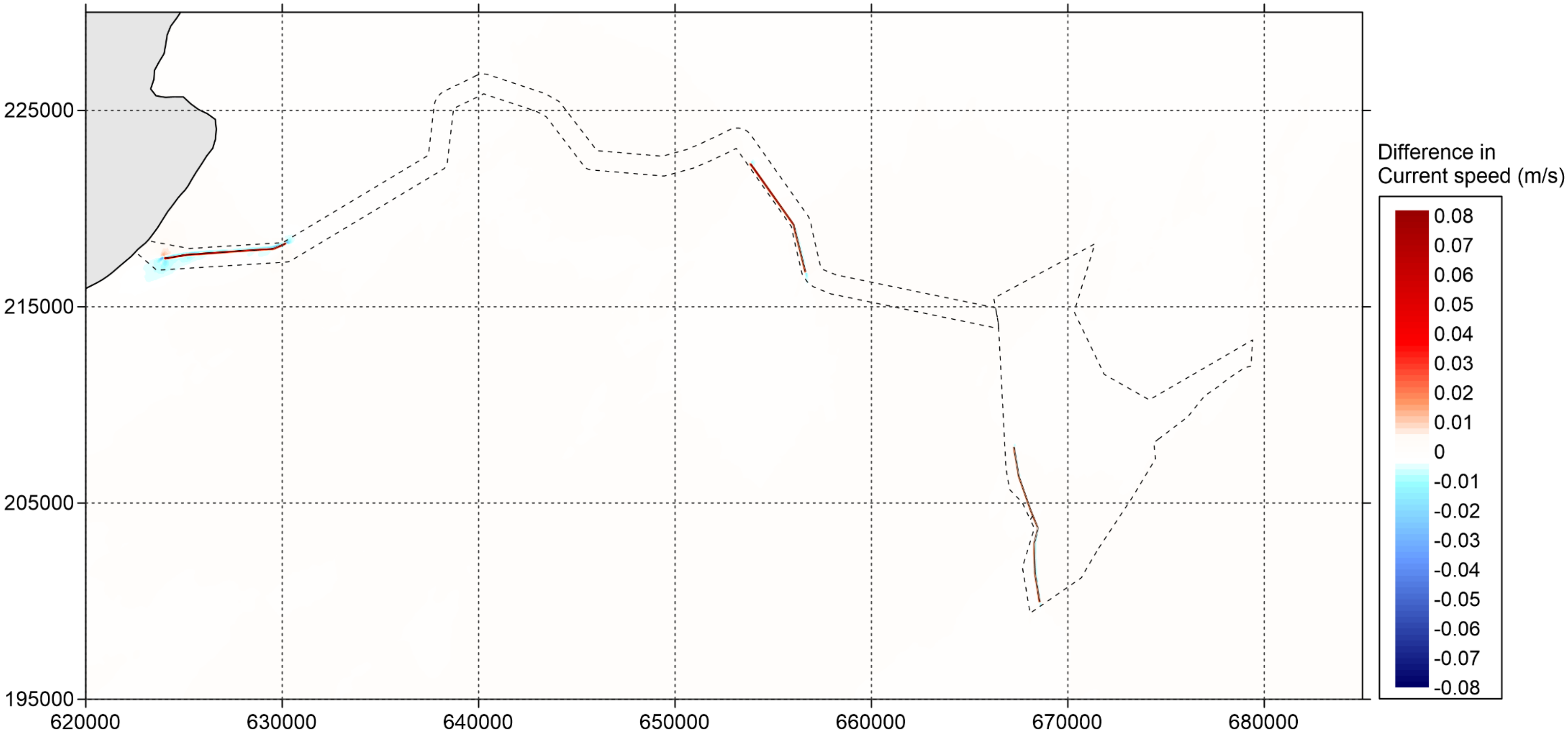


Plate 2-8~~9~~ Difference in current speed (in metres/second) between the baseline and worst case scenario for cable protection during spring tide (positive means increase of current speed by option and vice versa) – peak flood

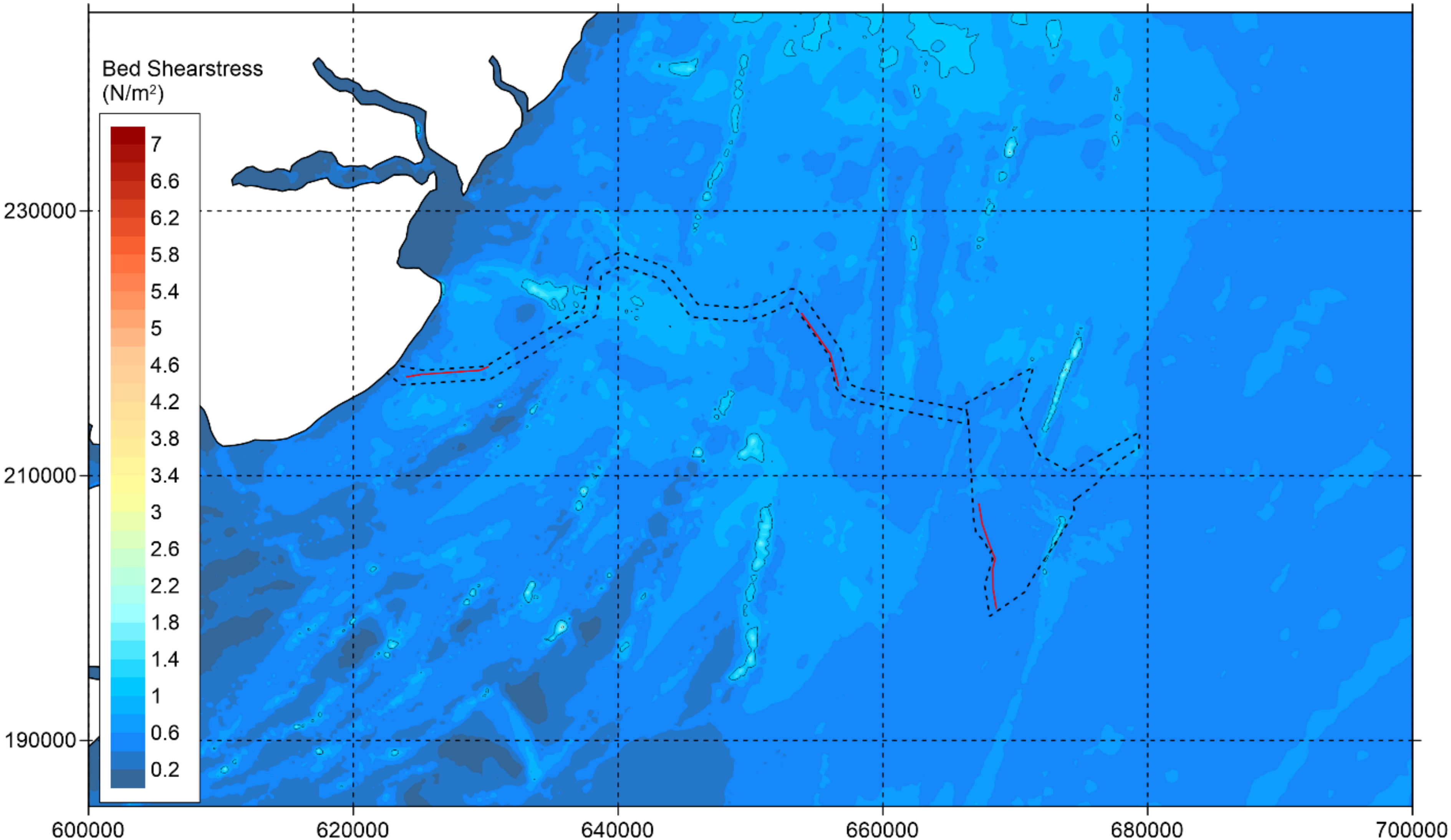


Plate 2-~~910~~ Worst cable protection locations - Bed shear stress during neap tide - peak flood

The extent and distribution of qualifying habitat

84. As discussed above, there will be no discernible changes to the SSC, deposition or bedload transport within the SAC during operation and maintenance, therefore there will be no significant change to the extent and distribution of the Annex I Sandbank habitat within the SAC. There is therefore no potential for an AEoI of this attribute due to changes in SSC, deposition and bedload transport during operation and maintenance.

Structure and function of sandbank communities

64.85. Maintenance works in the offshore cable corridor have potential to affect benthic communities within the SAC. As described in Section 2.4.3.1.1As described in Section 2.4.3.1.1, sandbank communities within the SAC have low sensitivity to siltation and smothering (Natural England, 2012b). As discussed above, there will be no discernible changes to the SSC, deposition or bedload transport within the SAC during operation and maintenance, therefore there will be no significant change to the benthic community within the SAC.

65. 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 in close vicinity to the works.

66.86. Based on the low sensitivity of benthic communities and the effects from SSC causing indistinguishable change to background levels, it can be concluded that there is no potential for an AEoI of this attributethe structure and function of sandbank communities due to increased SSC and subsequent, deposition during the operational phase.and changes to the bedload transport can also be ruled out.

2.4.3.2.2 Smothering due to increased suspended sediment

67.87. As discussed in Section 2.4.3.1.22.4.3.1.2, the effects of smothering are closely related to those of increased SSC. The effects of increased SSC have been discussed above in Section 2.4.3.2.12.4.3.2.1 and due to O&M activities causing an indistinguishable change from background levels, combined with the low sensitivity of benthic communities to smothering, it can be concluded that there will be no AEoI of this attribute due to smothering.

2.4.3.2.3 Re-mobilisation of contaminated sediments

68.88. As discussed in Section 2.4.3.1.32.4.3.1.3, sediment analysis carried out by SOCOTEC found no significant levels of contaminants in the offshore project area and so there is no potential for an AEoI due to re-mobilisation of contaminated sediments during maintenance.

2.4.3.3 Potential effects during decommissioning

69.89. A decision regarding the final decommissioning policy is yet to be decided 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 Project to ensure it is in line with the most recent guidance, policy and legislation.

70.90. The scope of the decommissioning works would most likely involve removal of the accessible installed components. This is outlined in ES Chapter 5 Project Description (Document Reference: 3.1.7)**[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 some or all of the export cables. Scour and cable protection would likely be left in situ.

~~71.~~91. During the decommissioning phase, there is potential for cable removal activities to cause effects that would be comparable to those identified for the construction phase (Section ~~2.4.3.1), specifically:~~ 2.4.3.1).

- ~~Changes to suspended sediment concentrations;~~
- ~~Smothering due to increased suspended sediment~~
- ~~Re-mobilisation of contaminated sediments~~

~~72.~~92. Sediment transport effects associated with cable protection, if left in situ, would remain as assessed for the operational phase (Section 2.4.3.2~~2.4.3.2.1~~).

~~73.~~93. The decommissioning effects will be comparable to or less than the construction and operational phase. Therefore, an AEoI can be ruled out.

2.4.3.4 Effect of project alone

~~74.~~94. With no potential for an AEoI of the attributes discussed above, an AEoI of the SAC can therefore be ruled out for North Falls alone.

2.4.3.5 In-combination effects

~~75.~~95. The in-combination assessment considers other developments (plans or projects) in planning, construction or operation where the predicted effects on the Margate and Long Sands SAC may have the potential to interact with effects from the proposed construction, O&M or decommissioning of North Falls.

~~76.~~96. Plans and projects within the 50km search area have been identified are listed below in Table 2.5.

Table 2.5 Summary of plans and projects considered for the in-combination assessment in relation to the SAC

Plan or project	Status	Tier Status[4]	Construction period	Closest distance to the SAC (km)	Confidence in data	Included in the in-combination assessment	Rationale
NeuConnect Interconnector	Pre-construction	2	2023-2028	0	High	Yes	The NeuConnect Interconnector bisects the North Falls offshore cable corridor and the SAC so there is potential for temporal overlap of cable installation activities.
BritNed Interconnector	Operational since 2009	1	N/A	0	High	No	The BritNed Interconnector passes through the SAC but has been operational since 2009. Therefore this is part of the baseline.
Nautilus Interconnector	Pre-application	6	2025-2028	Cable route unknown	Low	No	There is insufficient information available to assess in-combination effects.
Sea Link	~~Pre-application~~Undergoing DCO Examination	5	2026-2030	2.04	Medium	Yes, for offshore construction effects only	The emerging preferred route for Sea Link intersects with the North Falls offshore cable

[4] Tiers in accordance with Natural England and Defra (2022) and based on project status at the time of writing.

Plan or project	Status	Tier Status[4]	Construction period	Closest distance to the SAC (km)	Confidence in data	Included in the in-combination assessment	Rationale
							corridor. Therefore, there is potential for in-combination effects.
Tarchon Energy Interconnector	Pre-planning	6	2027-2030	Cable route unknown	N/A	No	There is insufficient information available to assess in-combination effects.
GGOW	Operational since 2012	1	N/A	11.34	Medium	No	Both GGOW and GWF are operational and beyond the ZoI for the SAC, therefore there is no potential in-combination effect on the SAC.
GWF	Operational since 2018	1	N/A	18.02	Medium	No	
Five Estuaries OWF	~~In planning~~Waiting for DCO decision	4	Late 2020's	0	High	Yes	The Five Estuaries offshore cable corridor follows a similar route to the North Falls offshore cable corridor and is expected to have a similar construction programme.
East Anglia TWO OWF	Consent granted	3	Construction planned mid 2020s	39.03	High	No	Beyond the ZoI for the SAC.
Thanet OWF	Operational since 2010	1	N/A	6.87	Medium	No	Both OWFs are beyond the ZoI for the SAC.
Gunfleet Sands OWF	Operational since 2010	1	N/A	12.49	Medium	No	

Plan or project	Status	Tier Status[4]	Construction period	Closest distance to the SAC (km)	Confidence in data	Included in the in-combination assessment	Rationale
London Array (LA) OWF	Operational since 2013	1	N/A	0	Medium	No	LA has been operational since 2013 and is therefore part of the existing conservation status of the SAC.
Outer OTE aggregate exploration and option are 528/2	Unknown	4	N/A	7.88	Low	No	Due to distance from the SAC there will be no AEoI of the site from temporal overlap of dredging / aggregate exploration and the Project.
Thames D aggregates production agreement area 524	Production agreement secured 2022	1	2022-2036	20.09	Low	No	
Southwold East aggregates production agreement area 430	Operational since 2012	1	N/A	49.45	Medium	No	
North Inner Gabbard aggregate production area 498	Operational since 2015	1	N/A	25.11	Medium	No	
Shipwash aggregate production	Operational since 2016	1	N/A	10.88	Medium	No	

Plan or project	Status	Tier Status[4]	Construction period	Closest distance to the SAC (km)	Confidence in data	Included in the in-combination assessment	Rationale
agreement area 507							
North Falls East aggregate production agreement area 501	Operational since 2017	1	N/A	35.50	Medium	No	
Longsand aggregate production agreement area 508	Operational since 2014	1	N/A	0	Medium	No	Insufficient information available to assess.
Longsand aggregate production agreement area 509	Operational since 2015	1	N/A	0	Medium	No	
Longsand aggregate production agreement area 510	Operational since 2015	1	N/A	0	Medium	No	

2.4.3.5.1 In-combination effect 1: Increased SSC and deposition

~~77.~~97. There is potential for a temporal and spatial interaction during the construction and maintenance of the NeuConnect, and Sea Link Interconnectors, the Five Estuaries export cables and the North Falls offshore export cables. This could result in an in-combination effect from increased SSC with subsequent deposition (smothering). In addition, ongoing aggregate production is licenced within the SAC (areas 508, 509 and 510), however there is insufficient information to assess the in-combination effects with aggregate sites. ~~Finer sand and mud that is present in the suspended sediment are likely to form a passive plume which would become advected by tidal currents. Due to the sediment sizes present this is likely to exist as a measurable but modest concentration plume for around half a tidal cycle (up to six hours). Sediment would eventually settle to the seabed in proximity to its release (within a few hundred metres up to around 1km) within a short period of time (hours to days). SSCs with a lower particle size would extend further from the site of construction activity however magnitudes would be indistinguishable from background levels. Changes to seabed levels are estimated to have minimal change of <1mm and be indistinguishable from background levels.~~Sediment dispersion modelling of sandwave levelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Rev 2, Section 7.2**) shows the peak of the suspended sediment concentration in the SAC would be just below 3,800 mg/l near the seabed, returning to ambient conditions in approximately 2.5 hours for one cable. As identified in the modelling report and in Section 2.4.3.1.1 above, this would also be the case for the installation of the second export cable. There will be no interaction of the plumes released by the first and second cables due to the time between installation. Similarly, plumes from the installation of cables for other plans or projects would not interact with North Falls due to health and safety restrictions prohibiting the launch of vessels to work simultaneously in the same geographic location. SSC from seabed trenching of a single export cable installation are expected to be less than those arising from sandwave and megaripple levelling. At its maximum extent, the near seabed plume which could interact with the Margate and Long Sands SAC would be less than 25mg/l and return to ambient levels within 2 hours.

~~78.~~98. While it is unlikely that all cables would be installed within the ZoI of the SAC at the same time due to the logistics of cable laying vessels working in close proximity, if a temporal and/or spatial overlap occurred between the projects, there would not be an AEoI of the Margate and Long Sands SAC in relation to indirect effects of SSCs and smothering. This is due to the similarity in sediment composition of potential SSCs from the likely ZoI of projects screened in to thein-combination assessment, compared to the sediments found within the SAC. Therefore, should the in-combination effect increase the SSC at any one time and/or increase the duration over which the effects occur, the change to the form and function of the Annex I Sandbank feature of the SAC would still be indistinguishable. Furthermore, the benthic communities within the SAC are not sensitive to the effects of smothering and therefore an increase in SSC and subsequent deposition will not have an AEoI of the SAC.

2.4.3.5.2 In-combination effect 2: Re-mobilisation of contaminated sediments

~~79.~~99. Re-mobilisation of contaminated sediments will not have in-combination effects with other plans and projects due to the absence of contaminants at levels of concern recorded within the North Falls offshore cable corridor. This is discussed in Section 5.2.3.1.3.2.4.3.1.3.

2.4.3.5.3 In-combination conclusion

80.100. In conclusion, it is considered that there would be no AEoI of the Margate and Long Sands SAC as a result of the Project in-combination effects with other projects and plans during construction, O&M, or decommissioning.

2.5 Outer Thames Estuary SPA supporting habitat

2.5.1 Site overview

81.101. Details of the ornithological features of the SPA are discussed in RIAA Part 4 Offshore Ornithology ([**Document Reference:** 7.1.4).**APP-178**].

82.102. With regards to the supporting benthic habitats of the SPA, Natural England has identified five benthic habitats as the supporting features of the SPA. These are shown in Table 2.6 with the extent of each within the SPA.

Table 2.6 Supporting habitats of the SPA

Habitat type	Extent within the SPA (ha)
Subtidal coarse sediment	73,606.64
Subtidal sand	220,295.55
Subtidal mud	12,549.14
Subtidal mixed sediment	62,100.63
Circalittoral rock	335.2

2.5.2 Conservation objectives

83.103. The conservation objectives for the Outer Thames Estuary SPA are as follows (Natural England, 2019a):

84. *"With regard to the SPA and the individual species and/or assemblages of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;*

85. *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*

- *The extent and distribution of the habitats of qualifying features*
- *The structure and function of the habitats of qualifying features*
- *The supporting processes on which the habitats of the qualifying features rely*
- *The population of each of the qualifying features, and,*
- *The distribution of the qualifying features within the site."*

86.104. Further detail on these objectives is provided in the Supplementary Advice which was updated in September 2019 (Natural England, 2019b). Table 2.7 lists out the attributes and targets associated with the conservation objectives relating to the habitats of the SPA, and also provides a screening of which of these attributes are considered for further assessment. For those attributes screened out it is considered that there is no potential for LSE from the Project.

Table 2.7 Conservation objectives: Attributes and targets for supporting habitats of the Outer Thames Estuary SPA and effect screening

Attribute	Target	Screened in / out
Supporting habitat: air quality	Maintain concentrations and deposition of air pollutants at below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	Screened out. Offshore air quality is not relevant to the supporting habitats of the SPA assessed in this Part of the RIAA. In addition there is no pathway for North Falls to have a LSE on offshore air quality in the SPA.
Supporting habitat: conservation measures	Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.	Screened in.
Supporting habitat: extent and distribution of supporting habitat for the non-breeding season	Maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding) at the following levels: Subtidal sand (220,295.55); Subtidal coarse sediment (73,606.64); Subtidal mixed sediments (62,100.63 ha); Subtidal mud (12,549.14 ha); Circalittoral rock (335.2 ha); and Water column.	Screened in. Note however that the ‘water column’ habitat is not screened in as there is no pathway for seabed effects of the Project to change the extent and distribution of the overlying waters as there will be no infrastructure in the water column or at the surface within the SPA.
Supporting habitat: food availability (bird)	Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) at preferred sizes.	Screened in.
Supporting habitat: water depth	Maintain the depth of inshore waters currently used as feeding or moulting sites.	Screened out. Changes in depth could only occur where surface laid cable protection is present. At worst 7.52ha of cable protection could be deployed within an area of 392,451.7ha or 0.002% of the entire SPA and this would be in discrete locations and a maximum height of 1.4m above the seabed which has no potential to have an LSE on feeding or moulting.
Supporting habitat: water quality – contaminants	Reduce aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels.	Screened in.
Supporting habitat: water quality – dissolved oxygen (DO)	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Screened out.

Attribute	Target	Screened in / out
		Excessive nutrients and/or high turbidity can lead to a drop in DO, there is no pathway for this effect from the Project as it is not a source of nutrients or high turbidity.
Supporting habitat: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration from existing levels.	Screened out. There is no pathway for this effect from the Project as it is not a source of nutrients.
Supporting habitat: water quality – turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Screened in.

2.5.3 Shadow Appropriate Assessment

~~87.~~105. The following section provides a summary of the effects of construction and operation on the supporting habitats of the Outer Thames Estuary SPA in context of the conservation objectives.

~~88.~~106. Other conservation objectives which relate directly to red-throated diver (RTD) (i.e. population and distribution of RTD) are covered in RIAA Part 4 Offshore Ornithology ~~(~~[**Document Reference:** ~~7.1.4).~~**APP-178**].

2.5.3.1 Potential effects during construction

2.5.3.1.1 Structure, function and supporting processes

~~89.~~107. Chapter 8 of the ES Marine Geology, Oceanography and Physical Processes ~~(Docume~~ **[Document Reference: APP-022]** describes the effects on bedload sediment transport from sandwave levelling which may occur within the SPA to prepare the seabed for offshore ~~-~~export cable installation.

~~90.~~108. The dredged sand will be disposed of within the offshore project area, close to the location of origin, where practicable and is therefore likely to remain within the sandbank system. Given the local favourable conditions that enable sandwave development in the study area, the sediment would be naturally transported back into any levelled areas within a short period of time. Levelled areas will naturally act as a sink for sediment in transport and will be replenished in the order of a few days to a year.

~~91.~~109. Due to the localised nature of the effect and the likelihood of recovery following construction, there is no potential for an AEoI of this attribute.

2.5.3.1.2 Extent and distribution of supporting habitat

~~92.~~110. The potential effects on the extent and distribution of supporting habitat during construction relate to temporary physical disturbance from seabed preparation and cable burial. The maximum total offshore export cable trench length within the SPA is 38.08km (based on 19.04km x 2 cables) with a maximum width of temporary disturbance approximately 24m. The total maximum temporary disturbance for cable installation is 913,920m^2.

~~93.~~111. Table 2.8 shows the areas of each habitat type (European Marine Observation and Data Network (EMODnet), 2022; shown in Figure 2.1) within the area of overlap between the offshore cable corridor and the SPA.

Table 2.8 Habitat types within the offshore cable corridor

Habitat type	Area within offshore cable corridor (ha)	Length of cable overlap (m)
Subtidal coarse sediment	700.83	3.3
Subtidal sand	671	2.8
Subtidal mud	278.94	2.8
Subtidal mixed sediment (including Sabellaria reef)	3,145.66	12.6
Circalittoral rock	N/A	N/A

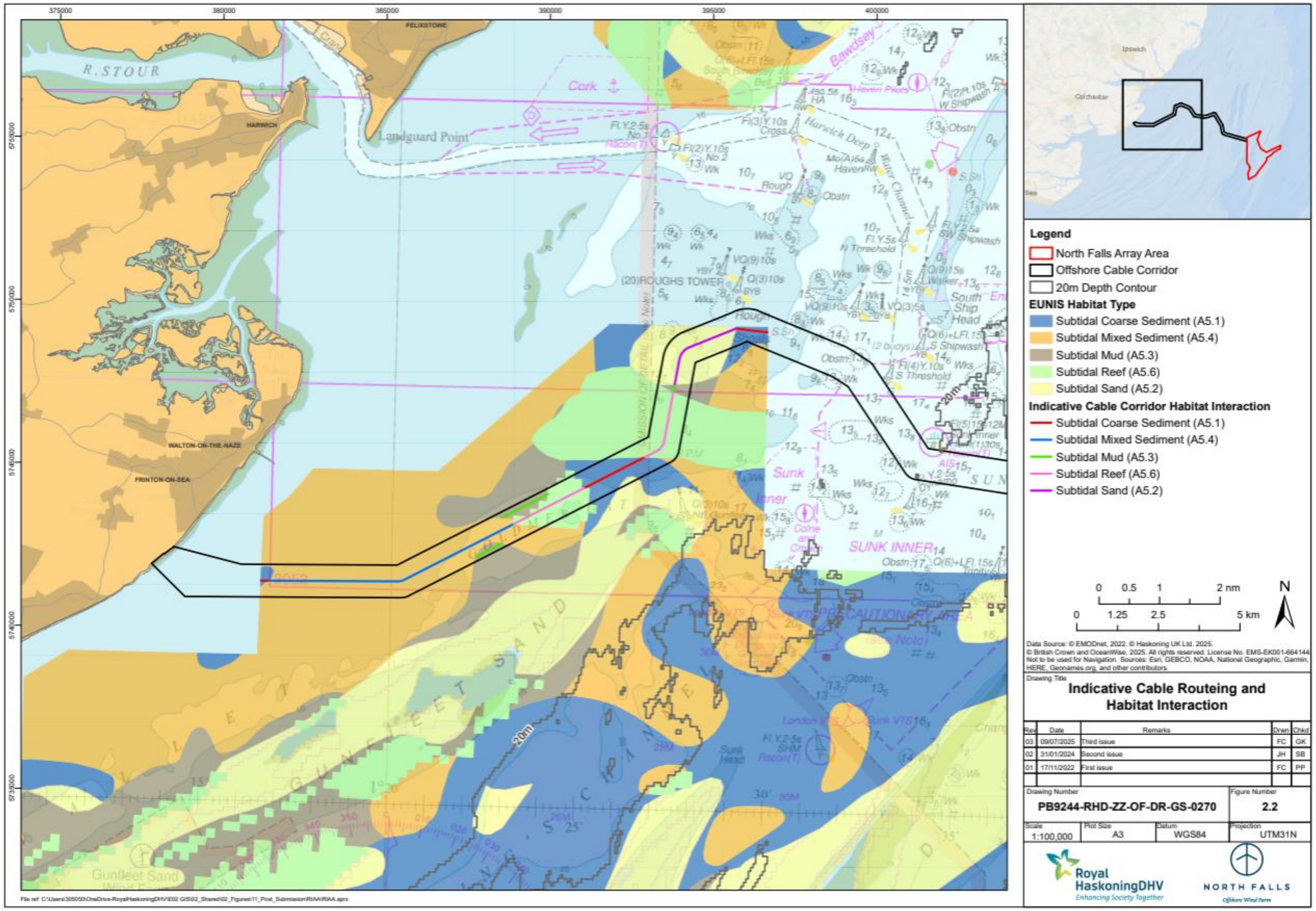


Figure 2.212 Indicative cable routeing and habitat interaction

94.112. The potential physical disturbance effect on each habitat was then calculated as follows:

- The total length of each habitat type within the SPA and within the offshore cable corridor was calculated by drawing indicative routes within the corridor which intersected with the habitat types.
- These indicative routes were drawn to intersect as much of each habitat type as possible whilst remaining realistic (Figure 2.1).
- The maximum assumed disturbance width of 24m was used to determine the area of effect for each cable
- The length of indicative cable route is all located in waters of <20m depth. Duckworth *et al*. (2020) show that during foraging, almost all dives by RTD had a maximum dive depth of <20 metres, therefore it is these shallow areas that are considered most relevant as supporting habitat to RTD.

Table 2.9 Effect upon supporting habitat

Habitat Type	Area within SPA (ha)	Length of cable overlap (m)	Effect Area (m^2)	Effect Area (ha)	Effect area as % total habitat type within SPA
Subtidal coarse sediment	73,606.64	3,300 x 2 cables	158,400	15.84	0.02%
Subtidal sand	220,295.55	2,800 x 2 cables	134,400	13.44	0.01%
Subtidal mud	12,549.14	2,800 x 2 cables	134,400	13.44	0.11%
Subtidal mixed sediment	62,100.63	12,600 x 2 cables	604,800	60.48	0.09%

95.113. Table 2.9 shows that in each case, the area is no more than 0.11% of the entire area of the habitat types within the SPA. In the case of subtidal coarse sediment and subtidal sand, only a fraction of the total habitat area potentially affected would be ecologically important to RTD (0.02% and 0.01% respectively).

96.114. Due to the nature of the sediment and the dynamic physical processes in the area, recovery of the substratum is likely to be rapid in areas which are temporarily disturbed. Given the tolerance and recoverability of the benthic communities present (see ES Chapter 10 Benthic and Intertidal Ecology ([**Document Reference:** 3.1.12),**APP-024**], recovery is expected quickly following cessation of installation. A review of post construction monitoring reports from all UK OWFs, for which data was available, has concluded no significant effects on benthic habitats and associated faunal communities due to cable laying (MMO, 2014).

97.115. Due to the small scale extent of temporary distribution to the supporting habitat, there is no potential AEoI of this attribute.

2.5.3.1.3 Distribution, abundance and availability of prey

~~98.~~116. RTD mainly forage for fish that live near the surface or in the main water column, although in the winter they will sometimes take bottom-dwelling fish (Natural England, 2012a). Key prey species include sand eels, sprat, flatfish and members of the cod family, and herring being particularly important in the southern NS (Natural England, 2019). Their diet can also include crustaceans, molluscs and marine worms (Natural England, 2012a).

~~99.~~117. Table 2.10 presents the overlap of spawning and nursery areas of the species listed above with the SPA and the offshore cable corridor (this is based upon the mapping of spawning and nursery areas presented in the ES (ES Chapter 11 Fish and Shellfish Ecology ~~(~~[**Document Reference:** ~~7.1.13)).~~**APP-025**]).

Table 2.10 RTD prey species: Spawning and nursery areas in relation to the SPA (mapping based on Coull *et al* 1998 and Ellis *et al* 2010)

Species	Spawning area within SPA	Within offshore cable corridor	Nursery area within SPA	Within offshore cable corridor
Herring	Yes, spawning off Kent.	No	Yes, part of high intensity areas from Norfolk to the English Channel.	Yes
Plaice	Yes, part of high intensity area from across southern North Sea to the English Channel.	No	Yes, low intensity nursery from the Humber to the English Channel.	Yes
Sandeel	Yes, part of low intensity area from across southern North Sea to the English Channel.	Yes	Yes, low intensity nursery across southern North Sea to the English Channel.	Yes
Dover sole	Yes, part of high intensity area from Norfolk to the English Channel.	Yes	Yes, low intensity nursery from the Humber to the English Channel, high intensity nursery within inner Thames.	Yes
Sole	Yes, spawning from across southern North Sea to the English Channel.	Yes	Yes, nursery from across southern North Sea to the English Channel.	Yes
Whiting	No	No	Yes, low intensity nursery across southern North Sea to the English Channel.	Yes
Mackerel	No	No	Yes, low intensity nursery across southern North Sea to the English Channel.	Yes
Cod	Yes, part of low intensity area from across southern North Sea to the English Channel.	Yes	Yes, low intensity nursery across southern North Sea to the English Channel.	Yes
Sprat	Yes, spawning from across southern North Sea to the English Channel.	No	Yes, nursery from across southern North Sea to the English Channel.	Yes

~~100.~~118. For species such as herring and sandeel, the coarser sediment types are favoured habitats (see ES Appendix ~~13~~11.1 Fish and Shellfish Ecology Technical Report ~~(~~[**Document Reference:** ~~3.3.12)).~~**APP-095**]). Whilst the SPA overlaps with areas considered 'high intensity' spawning or nursery grounds for certain species (shown in Table 2.10), these areas are vast covering large sections of the North Sea.

101.119. As shown in Section 2.5.3.1.2, only a limited area of the supporting habitats would be affected temporarily by disturbance during construction within the offshore cable corridor overlapping the SPA. The ES Chapter 11 Fish and Shellfish Ecology ([**Document Reference:** 3.1.13)**APP-025**] shows that all effects on fish would be of negligible or low magnitude.

102.120. RTD feed opportunistically, exploiting whichever small demersal fish prey are available. Therefore, this small scale temporary change would have no AEoI of this attribute.

103.121. Disturbance of RTD within the SPA is discussed in RIAA Part 4 Offshore Ornithology ([**Document Reference:** 7.1.4).**APP-178**].

2.5.3.1.4 Contamination

104.122. As discussed in Section 2.4.3.1.3, sediment analysis carried out by SOCOTEC found no significant levels of contaminants in the offshore project area and so there is no potential for an AEoI due to re-mobilisation of contaminated sediments.

2.5.3.1.5 Maintain natural levels of turbidity

105.123. The effects of increased SSC have been discussed in Section 2.4.3.1.1 and in ES Chapter 8 Marine Geology and Physical Processes ([**Document Reference:** 3.1.10).**APP-022**]. It can be concluded that increased SSC during construction activities will be indistinguishable from background levels and would be similar to that of a storm event. Therefore, habitats within the SPA will be tolerant of change in SSC and there will be no AEoI of this attribute of the supporting habitats.

2.5.3.2 Potential effects during operation

2.5.3.2.1 Structure, function and supporting processes

106.124. Cables will be buried where practicable, however, as a worst case scenario it has been assumed that cable protection measures would need to be provided to surface-laid cables e.g. in areas of hard substrate and cable crossings. An estimate of 10% of the cable length requiring cable protection is included in the worst case scenario (2.2.2).

107.125. The effect that offshore export cable protection may have on the supporting processes of the Outer Thames Estuary SPA primarily relates to the potential for interruption of sediment transport processes. The seabed in the section of the offshore cable corridor overlapping the Outer Thames Estuary SPA is composed of mobile sand which is transported under existing tidal conditions. IfThe Hydrodynamic and Dispersion Modelling Report [**Document Reference, 9.54, Rev 02**] shows the effects of cable protection does present an obstruction to this bedload transportin the sediment would first accumulate one side or both sides of nearshore area where the obstacle (depending onoffshore cable corridor overlaps the gross and net transportOuter Thames Estuary SPA. The modelling shows a difference in current speed occurring at that location) to the heightstart and end of the protrusion. With continued build-up, it would then form a 'ramp' over which sediment transport would eventually occur by bedload processes, thereby bypassing thecable protection., however these changes are less than +/-

5%. The gross patterns of bedload transport across the offshore export cables would therefore not be affected significantly. There would therefore be no potential for an AEoI of this attribute during the operational phase.

2.5.3.2.2 Extent and distribution of supporting habitat

~~108.~~126. Table 2.11 shows the effect of habitat loss from cable protection on each of the habitat types, using a worst case assumption that all of the required cable protection footprint for the entire offshore cable corridor occurs within each of the habitat types.

~~109.~~127. Table 2.12 shows the effect of temporary disturbance from cable maintenance on each of the habitat types, using a worst case assumption that all of the estimated maintenance for the entire offshore cable corridor (Table 2.2) occurs within each of the habitat types.

Table 2.11 Footprint of habitat loss from cable protection in the SPA

Habitat type	Extent within the SPA (ha)	Maximum area of cable protection (ha)	Effect area as % total habitat type within SPA (%)
Subtidal coarse sediment	73,606.64	7.52	0.01
Subtidal sand	220,295.55	7.52	0.003
Subtidal mud	12,549.14	7.52	0.06
Subtidal mixed sediment	62,100.63	7.52	0.01

Table 2.12 Footprint of cable maintenance disturbance

Habitat type	Extent within the SPA (ha)	Maximum area of disturbance (ha)	Effect area as % total habitat type within SPA (%)
Subtidal coarse sediment	73,606.64	18.25	0.02
Subtidal sand	220,295.55	18.25	0.01
Subtidal mud	12,549.14	18.25	0.15
Subtidal mixed sediment	62,100.63	18.25	0.03

~~110.~~128. As shown in Table 2.11, even with the worst case assumption, the percentage of the area of each habitat lost due to cable protection is less than 0.06% of the entire area of the habitat type within the SPA.

~~111.~~129. With regard to temporary habitat disturbance during potential maintenance, Table 2.12 shows that even with the worst case assumption, the percentage of the area of each habitat lost due to cable protection is less than 0.15% of the entire area of the habitat type within the SPA.

130. Although placement of cable protection would represent permanent habitat loss, this area is small in relation to the overall area of each habitat type. Any halo effect surrounding the cable protection would be highly localised and patchy.

~~112.~~131. Temporary disturbance from maintenance activities would have a very small footprint and, as with disturbance from construction, recovery is expected quickly following cessation of maintenance activities. There would therefore be no potential for an AEoI of this attribute during the operational phase.

2.5.3.2.3 Distribution, abundance and availability of prey

~~113.~~132. As shown in Section 2.5.3.2.2, a limited area of the supporting habitats would be affected temporarily by disturbance during maintenance or permanently through cable protection. ES Chapter 11 Fish and Shellfish Ecology ~~(~~[**Document Reference:** ~~3.1.13)~~**APP-025**] concludes that the impacts on fish would be of low magnitude.

~~114.~~133. As with the construction phase (Section 2.5.3.1.3), given that the areas of supporting habitat affected are small relative to the supporting habitat available and RTD feed opportunistically, exploiting whichever prey are available, there would be no AEoI of this attribute during O&M.

~~115.~~134. The effects of displacement of RTD in the SPA is assessed in RIAA Part 4 Offshore Ornithology ~~(~~[**Document Reference:** ~~7.1.4).~~**APP-178**].

2.5.3.2.4 Contamination

~~116.~~135. As discussed in Section 2.4.3.1.3, sediment analysis carried out by SOCOTEC found no significant levels of contaminants in the offshore project area and so there is no potential for an AEoI due to re-mobilisation of contaminated sediments.

2.5.3.2.5 Maintain natural levels of turbidity

~~117.~~136. The effects of increased SSC have been discussed in Section 2.4.3.1.1 and in ES Chapter 8 Marine Geology and Physical Processes ~~(~~[**Document Reference:** ~~3.1.10).~~**APP-025**]. It can be concluded that increased SSC during construction activities will be indistinguishable from background levels and would be similar to that of a storm event. Therefore, habitats within the SPA will be tolerant of change in SSC and there will be no AEoI of this attribute of the supporting habitats.

2.5.3.3 Potential effects during decommissioning

~~118.~~137. A decision regarding the final decommissioning policy is yet to be decided 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 Project to ensure it is in line with the most recent guidance, policy and legislation.

~~119.~~138. The scope of the decommissioning works would most likely involve removal of the accessible installed components. This is outlined in ES Chapter 5 Project Description ~~(~~[**Document Reference:** ~~3.1.7)~~**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 some or all of the export cables. Cable protection would likely be left in situ.

~~120.~~139. During the decommissioning phase, there is potential for cable removal activities to cause effects that would be comparable to those identified for the construction phase (Section 2.5.3.1).

~~121.~~140. Effects associated with cable protection, if left in situ, would remain as assessed for the operational phase (Section 2.5.3.2).

~~122.~~141. The decommissioning effects will therefore be comparable to or less than the construction and operational phase. Therefore, an AEoI can be ruled out.

2.5.3.4 Effect of project alone

~~123.~~142. With no potential for an AEoI of the attributes discussed above, an AEoI of the supporting habitats of the SPA can therefore be ruled out. The effects on RTD are assessed in RIAA Part 4 Offshore Ornithology ~~(~~[**Document Reference:** ~~7.1.4).~~**APP-178**].

2.5.3.5 In-combination effects

~~124.~~143. The in-combination assessment considers other developments (plans or projects) in planning, construction or operation where the predicted effects on the Outer Thames Estuary SPA supporting habitats may have the potential to interact with effects from the proposed construction, O&M or decommissioning of North Falls.

~~125.~~144. Plans and projects within the 50km search area have been identified are listed below in Table 2.13.

Table 2.13 Summary of plans and projects considered for the in-combination assessment in relation to the supporting habitats of the SPA

Plan or project	Status	Tier Status	Construction period	Closest distance to the SPA (km)	Confidence in data	Included in the in-combination assessment	Rationale
NeuConnect Interconnector	Pre-construction	~~3~~2	2023-2028	0	High	Yes	The NeuConnect Interconnector bisects the North Falls offshore cable corridor and the SPA so there is potential for temporal overlap of cable installation activities.
BritNed Interconnector	Operational since 2009	1	N/A	0	High	No	The BritNed Interconnector passes through the SPA but has been operational since 2009. Therefore this is part of the baseline of the supporting habitat status.
Nautilus Interconnector	Pre-application	6	2025-2028	Cable route unknown	Low	No	There is insufficient information available to assess in-combination effects.
Sea Link	~~Pre-application~~Undergoing DCO Examination	~~6~~5	2026-2030	0	Medium	Yes, for offshore construction effects only	The emerging preferred route for Sea Link intersects with the North Falls

Plan or project	Status	Tier Status	Construction period	Closest distance to the SPA (km)	Confidence in data	Included in the in-combination assessment	Rationale
							offshore cable corridor. Therefore, there is potential for in-combination effects.
Tarchon Energy Interconnector	Pre-planning	6	2027-2030	Cable route unknown	N/A	No	There is insufficient information available to assess in-combination effects.
GGOW	Operational since 2012	1	N/A	8.4	Medium	No	Both GGOW and GWF are operational and beyond the ZoI for the supporting habitats of the SPA, therefore there is no potential in-combination effect.
GWF	Operational since 2018	1	N/A	10.2	Medium	No	
Five Estuaries OWF export cables	~~In planning~~Waiting for DCO decision	~~6~~4	Late 2020s	0	High	Yes	The Five Estuaries offshore cable corridor follows a similar route to the North Falls offshore cable corridor and has a similar construction programme.

Plan or project	**Status**	Tier Status	**Construction period**	**Closest distance to the SPA (km)**	**Confidence in data**	**Included in the in-combination assessment**	**Rationale**
East Anglia ONE North and East Anglia TWO OWF export cables	Consent granted	3	Construction planned mid 2020s	0	High	Yes	Export cable corridor for these projects overlaps the SPA.
Thanet OWF	Operational since 2010	1	N/A	8.1	Medium	No	Operational since 2013 and is therefore part of the existing conservation status of the SPA.
Gunfleet Sands OWF	Operational since 2010	1	N/A	0	Medium	No	
LA OWF	Operational since 2013	1	N/A	0	Medium	No	
Outer OTE aggregate exploration and option are 528/2	Unknown	4	2016-2024	0	Low	No	Licence relates to exploration only and so LSE is unlikely.
Thames D aggregates production agreement area 524	Production agreement secured 2022	1	2022-2036	9.5	Low	No	Due to distance from the SPA (c.9.5km) there will be no AEoI of the site from temporal overlap of dredging and the Project.
Southwold East aggregates production agreement area 430	Operational since 2012	1	2012-2025	1.6	Medium	No	Sites which were operational at the time of the North Falls characterisation surveys are a component of the
North Inner Gabbard	Operational since 2015	1	2015-2030	11.8	Medium	No	

Plan or project	Status	Tier Status	Construction period	Closest distance to the SPA (km)	Confidence in data	Included in the in-combination assessment	Rationale
aggregate production area 498							baseline environment.
Shipwash aggregate production agreement area 507	Operational since 2016	1	2016-2031	0	Medium	No	
North Falls East aggregate production agreement area 501	Operational since 2017	1	2017-2032	24.9	Medium	No	
Longsand aggregate production agreement area 508	Operational since 2014	1	2014-2029	0	Medium	No	Insufficient information available to assess.
Longsand aggregate production agreement area 509	Operational since 2015	1	2015-2030	0	Medium	No	
Longsand aggregate production agreement area 510	Operational since 2015	1	2015-2030	0	Medium	No	

2.5.3.5.1 In-combination effect 1: Temporary physical disturbance

~~126.~~145. Relevant projects which have potential spatial and temporal overlap with the Outer Thames Estuary SPA and North Falls offshore export cable construction, operation, maintenance and decommissioning are the NeuConnect and Sea Link Interconnectors; and the Five Estuaries, East Anglia ONE North and East Anglia TWO offshore export cables.

~~127.~~146. Scottish Power Renewables (SPR) (2020) assesses the affected area of each habitat type within the East Anglia ONE North and TWO offshore cable corridor. The area of disturbance of each habitat type within the 20m water depth which is potentially ecologically important to RTD, ranges from 0.007% to 0.2% of the habitat available within the SPA.

~~128.~~147. Five Estuaries is also in its application phase, having submitted a Development Consent Order (DCO) to the Planning Inspectorate for the project, which was accepted on 22 April 2024. The conclusions of the Five Estuaries in-combination assessment also found the installation of offshore export cables for both projects to have minimal effects.

~~129.~~148. With Five Estuaries, NeuConnect, SeaLink, East Anglia ONE North and East Anglia TWO, effects would be less than 1% of each of the supporting habitats (as per Section 2.5.3.1). Locations of effect would be discrete and the effect would be temporary.

2.5.3.5.2 In-combination effect 2: Loss of habitat

~~130.~~149. During operation, disturbance events would be episodic and spatially discrete. The permanent habitat loss from cable protection (assuming a worst case of all cable protection being within the SPA and maximum overlap with each habitat type) is small in absolute terms and relative to the total extent of each of the habitat types, even if multiple projects are considered.

2.5.3.5.3 In-combination conclusion

~~131.~~150. In conclusion, it is considered that there would be no AEoI of the Outer Thames Estuary SPA supporting habitat as a result of the Project in-combination effects with other projects and plans during construction, O&M, or decommissioning.

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