NORTH FALLS

Offshore Wind Farm

Supporting Information on Offshore Additional Mitigation

Document Reference:	9.55
Volume:	9
Date:	April 2025
Revision:	0

Project Reference: EN010119

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Project	North Falls Offshore Wind Farm
Document Title	Supporting Information on Offshore Additional Mitigation
Supplier	Royal HaskoningDHV
Supplier Document ID	PB9244-RHD-ZZ-OF-RP-OF-0380

Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
0	April 2025	Deadline 4	RHDHV	NFOW	NFOW

CONTENTS

Glossary of Acronyms

NE	Natural England
MLS	Margate and Long Sands
SAC	Special Area of Conservation
KKE	Kentish Knock East
MCZ	Marine Conservation Zone
RIAA	Report to Inform Appropriate Assessment
AEOI	Adverse Effect on Integrity
DCO	Development Consent Order
GBS	Gravity Base Structure
ES	Environmental Statement
ECS	Worst Case Scenario
OSP	Offshore Substation Platform
OCP	Offshore Convertor Platform
WTG	Wind turbine generator
UXO	Unexploded Ordnance
HDD	Horizontal Directional Drilling
EMF	Electromagnetic Fields
DWR	Deep Water Route

SSC	Suspended Sediment Concentration
AoO	Advice on Operations

Glossary of Terminology

Array area	The offshore wind farm area, within which the wind turbine generators, array cables, 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.
Hydrodynamic	The process and science associated with the flow and motion in water produced by applied forces
Offshore cable corridor	The corridor of seabed from the array area to the landfall within which the offshore export cables will be located.
Offshore export cables	The cables which bring electricity from the offshore substation platform(s) to the landfall, as well as auxiliary cables.
Sandwave	Bedforms with wavelengths of 10 to 100m, with amplitudes of 1 to 10m
Sediment	Particulate matter derived from rock, minerals or bioclastic matter
Sediment transport	The movement of a mass of sediment by the forces of currents and waves
Suspended sediment	The sediment moving in suspension in a fluid kept up by the upward components of the turbulent currents or by the colloidal suspension
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.

1. Introduction

1. This document sets out the implications of additional mitigation commitments the Applicant made at Deadline 1 in order to address Natural England's (NE) concerns regarding potential impacts of construction and operation of North Falls on benthic ecology, particularly regarding the Margate and Long Sands (MLS) Special Area of Conservation (SAC) and Kentish Knock East (KKE) Marine Conservation Zone (MCZ). These mitigation measures are described in Section 2.

2. This document also provides information on the implications of mitigation commitments made at Deadline 4 to address concerns of Harwich Haven Authority, Port of London Authority and London Gateway Port Ltd regarding cable burial depths in the Sunk and Trinity Deep Water Routes.

3. To address comments from Natural England seeking further evidence on the effects on the MLS SAC and KKE MCZ, the effects of the Project, including the additional mitigation have been informed by further evidence provided by hydrodynamic and sediment dispersion modelling (see Hydrodynamic and Sediment Dispersion Modelling Report **[Document Reference 9.54]** and Hydrodynamic and Sediment Dispersion Modelling Results Interpretation **[Document Reference 9.56]**. These effects are discussed for relevant topics in Section 3.

2. Additional Mitigation

2.1 Mitigation in relation to marine physical processes and benthic ecology

2.1.1 Buffer Adjacent to MLS SAC

4. The Applicant consulted Natural England during pre-application site selection of the offshore cable corridor and avoided geographical overlap with the MLS SAC in response to feedback from Natural England. As presented in the Report to Inform Appropriate Assessment (RIAA) Part 2 **[APP-175]**, it is the Applicant's position that there would be no adverse effect on the integrity (AEoI) of the MLS SAC. However, in response to Natural England's comments, the Applicant has committed to additional mitigation. The Applicant has further added a 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) **[REP3-009]**.

2.1.2 Removal of Gravity Based Foundations

5. Gravity Base Structure (GBS) foundations have been removed from the draft DCO. With the removal of GBS, the remaining foundations options include:

- For WTGs:
  - monopile[1] foundations;
  - mono suction bucket foundations;
  - multi-leg pin-piled jacket[1] foundations; and/or
  - multi-leg suction bucket jacket foundations;
- For platforms:
  - monopile[1];
  - multi-leg pin pile jacket[1]; or
  - multi-leg suction bucket jacket

6. This provides the following benefits:

- Reduced footprint of turbine foundations and scour protection (see Section 2.1.3);
- Reduced scour protection volume (Section 2.1.4); and
- Reduced cross section area (see Section 2.1.5).

7. The parameters associated with the remaining foundation types are as described in Section 5.5.3.3 of Environmental Statement (ES) Chapter 5 **[APP-019]**, and the revised worst case scenario associated with the effects on marine geology, oceanography and physical processes and benthic ecology is described in Sections 3.2.1 and 3.3.1, respectively.

2.1.3 Reduced seabed footprints

8. With GBS removed, suction buckets represent the worst case scenario for physical processes and benthic ecology. A summary of the revised parameters associated with habitat loss can be seen in Table 2-1.

9. Section 2.3 presents a comparison of the overall ES and revised worst case scenarios for habitat loss.

[1] Piles will be driven and/or drilled depending on geology

Table 2-1. Comparison of GBS footprint comparison with suction bucket foundations from North Falls design envelope. Revised worst case scenario (WCS) shown in bold

Foundation type	Seabed diameterper base/bucket (m)	Number of bases/ buckets	Footprint of one foundation (m^2)	Max no. of foundations	Total footprint without scour protection (m^2)	Total footprint with scour protection (m^2)
Former GBS worst case scenario for WTGs	65	1	3,318.31	57	189,143.51	4,964,244.00
Suction bucket jacket (Largest turbines)	23	4	1,661.90	34	56,504.69	1,615,991.3
Suction bucket jacket (Smallest turbines)	**15**	**4**	**706.86**	**57**	**40,290.93**	**2,709,161.8**
Mono suction bucket (All turbine sizes)	38	1	1,134.11	57	64,644.55	1,755,087.0
Former GBS worst case scenario for OSP/OCP	65	1	3,318.31	2	6,636.61	174,184.00
OSP/OCP Suction bucket jacket	**25**	**6**	**2,945.24**	**2**	**5,890.49**	**166,714.90**

2.1.4 Scour protection volumes

10. As outlined above, a beneficial aspect of the removal of GBS from the Project's design envelope is the reduced volume of scour protection.

11. As shown in Table 2-1, the worst case scenario for scour protection relates to the suction bucket jackets for the greatest number of turbines (i.e. the smallest turbines). The associated scour protection volumes are shown in Table 2-2, showing a comparison of the original and revised worst case scenarios for scour protection volumes. This represents a significant reduction of the total volume of scour protection included in the draft DCO.

Table 2-2. Revised scour protection volumes following removal of GBS.

Foundation type	Diameter of foundation with scour (m)	Footprint of one foundation with scour (m^2)	Scour volume for one foundation (m^3)
Former GBS WCS	325	87,092.00	163,388.00
Suction bucket jacket (smallest turbine)	123	47,529.16	85,652.38

2.1.5 Foundation cross section

12. When considering foundations cross sections, GBS are significatively larger structures than the remaining options of the North Falls design envelope.

13. As discussed in ES Chapter 5 Project Description **[APP-019]**, GBS usually comprise of a base, a conical, and a cylindrical section (Figure 2-1).

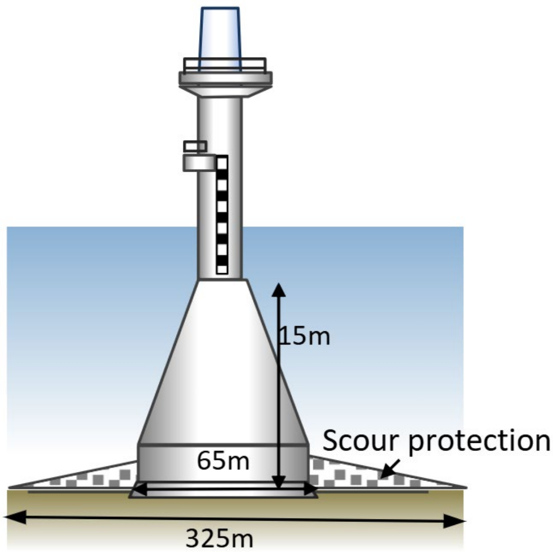
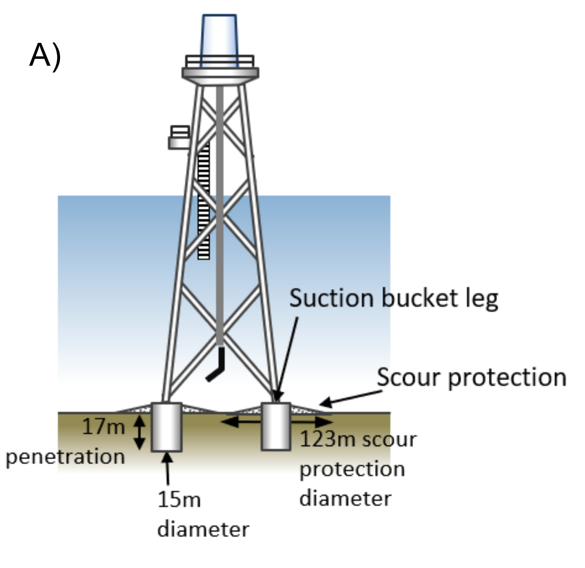
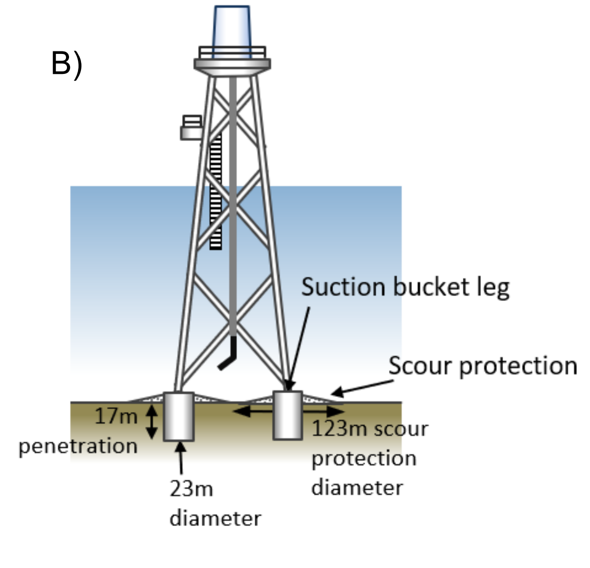


Figure 2-1. Typical gravity-based cross section

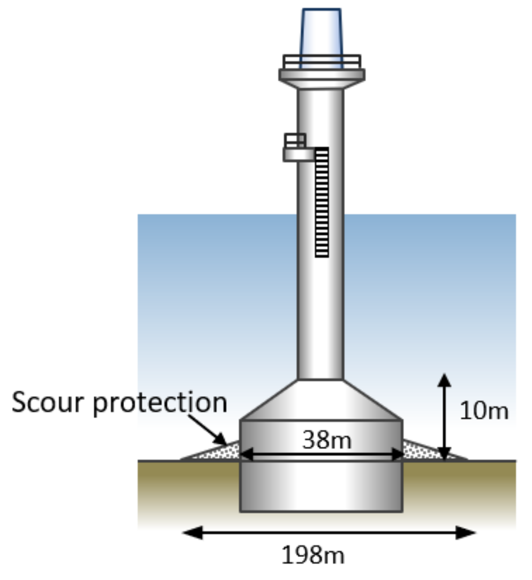
14. As shown in Figure 2-2 below, all remaining foundation options have:

- Smaller diameter of the foundation base;
- Smaller scour protection diameter; and
- Smaller cross-section area within the water column.





Cross section for suction bucket jackets (A – smallest WTG foundations; B- largest WTG foundations)



Cross section for mono-suction bucket

Figure 2-2. Typical suction bucket cross section (jacket and mono)

2.1.6 Buffer Adjacent to KKE MCZ

15. Due to the need to ensure there is no over-sail of turbine rotors beyond the order limits, turbine foundations must be set back by a minimum of 50m from the order limits (and therefore a minimum of 50m from the KKE MCZ). This is based on the smallest WTGs (i.e. minimum parameters) using suction bucket jackets as the worst case scenario (118m WTG rotor radius minus the following foundation parameters):

- Suction bucket jacket leg - max scour protection diameter of 75m from centre of suction bucket, a radius of 37.5m; and
- Leg spacing of 60m (centre of leg to centre of leg at seabed) – thus a radius of 30m from centre of turbine,

16. Therefore, the distance to the MCZ is 118m-37.5-30 (Figure 2-3).

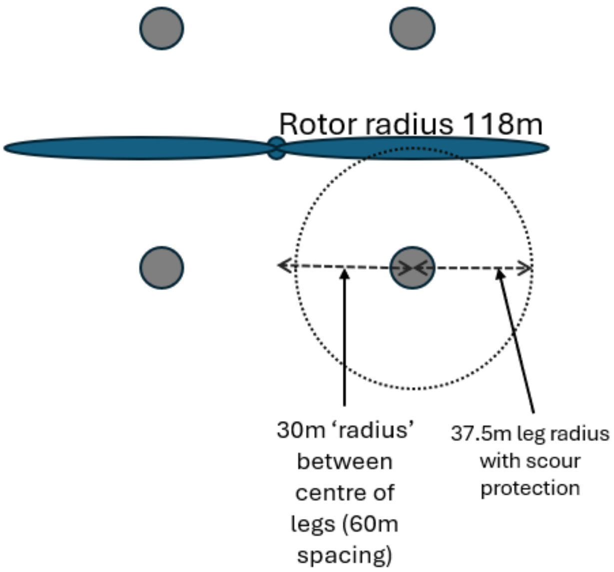


Figure 2-3. Distance between order limits and foundations including scour protection.

17. This distance aligns with the standard 50m buffer advised by Natural England for Sabellaria reef and while Sabellaria is not a protected feature of the MCZ, this buffer is considered by the Applicant to be conservative for the coarse sediment, sand and mixed sediment features of the KKE MCZ.

18. Due to the minimum spacing required between turbines (1180m in the downwind direction and 944m in the cross wind direction), the majority of WTG will be over 1km from the KKE MCZ, with only a small number of WTG installed within 1km of the KKE MCZ (approximately 3 WTGs).

2.1.7 Array cable seabed levelling

19. The Applicant has undertaken further engineering analysis of array cable seabed levelling requirements and refined the worst case volumes from 27,293,114m^3 to 24,203,332m^3.

2.2 Mitigation in relation to Shipping and Navigation

20. Port of London Authority, Harwich Haven Authority and London Gateway have requested the Applicant commit to cables being installed at sufficient depth so as not to preclude future dredging to 22m below chart datum (CD) within the Sunk A and Trinity Deep Water Routes (DWR)s and 19m in the Sunk B (see Deep Water Route Cable Installation Areas (Future Dredging Depths), document reference 9.57), to facilitate potential future vessel keel depths over the life of the Project. This would require additional dredging as the current seabed level is 19-20mCD in these areas.

21. Dredging the DWRs to achieve the requested cable burial depth would result in estimated sediment volumes of 309,628m^3 (included in the volumes assessed for the whole offshore cable corridor). The footprint area of works within the DWRs would remain as assessed in the Environmental Statement.

22. Due to the depth of dredging/trenching required to cross the Sunk A and Trinity DWR at a level below 22mCD and the Sunk B DWR at 19m CD, London clay is expected to be present. As a worst case scenario, it is estimated that, of the total sediment above, 304,917 m^3 of this could be clay which could result in a seabed footprint of 200,000m^2 when deposited.

23. Dredged sediment deriving from the areas crossing the Sunk and Trinity DWRs would be deposited in the array area to ensure they do not reduce navigable water depth within the DWRs. The footprint of this disposal is considered in Section 2.3.1.

24. An Outline Sediment Disposal Management Plan **[Document Reference 9.52]** secures that disposal of dredged material will avoid the Sunk and Trinity DWRs.

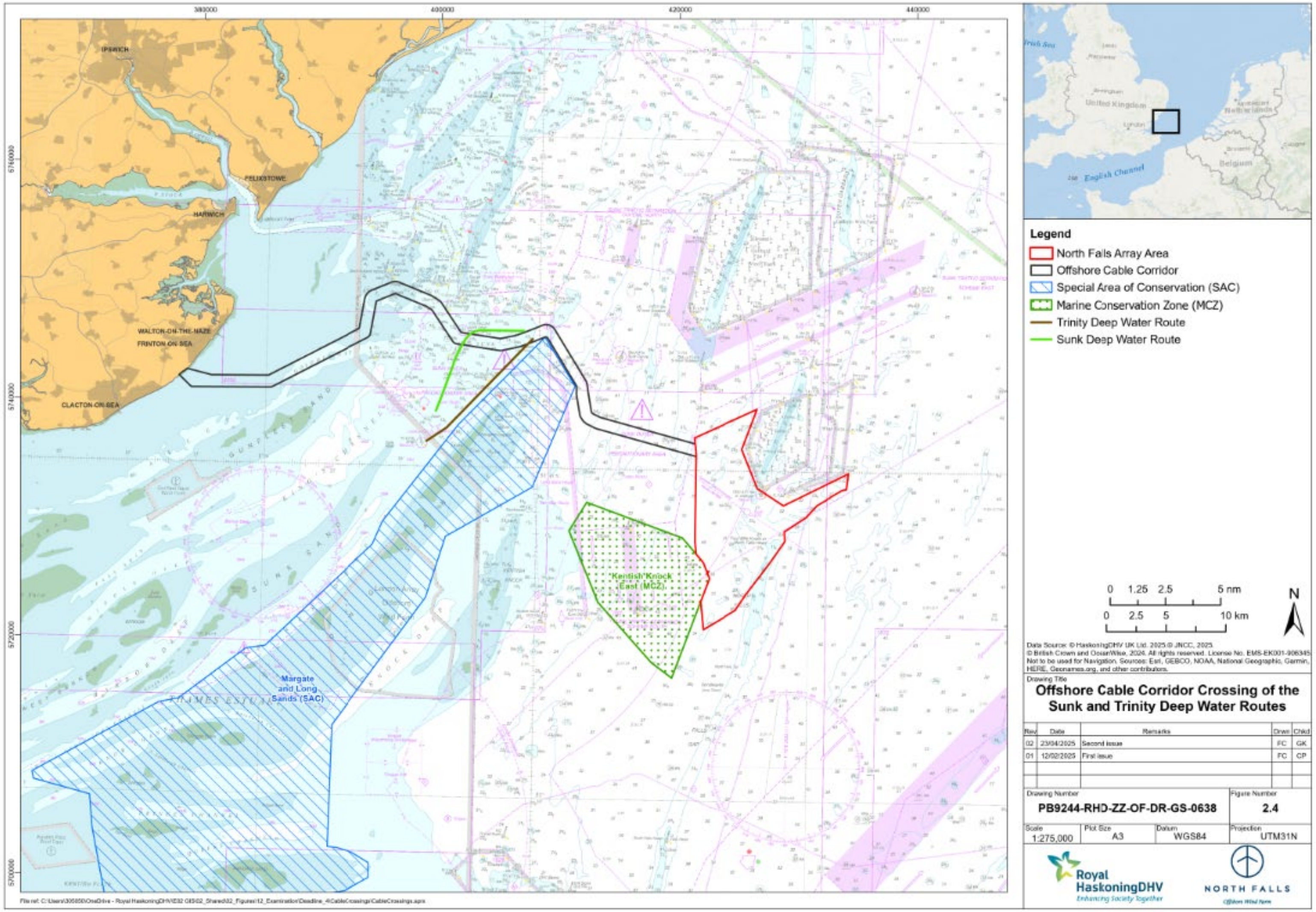


Figure 2-4. Offshore cable corridor crossing of the Sunk and Trinity Deep Water Routes.

2.3 Summary of parameters following additional mitigation

25. The following sections provide a summary of the revised total seabed footprints and sediment volumes, taking into account the range of mitigation measures described above. Further detail on the parameters included in these totals is provided in the worst case scenario tables in Sections 3.2.1 and 3.3.1.

2.3.1 Seabed Footprint Summary

26. As can be seen in Table 2-3, the removal of GBS results in a reduction of 11,238m^2 (5,883,257m^2 minus 5,872,019m^2) of temporary disturbance in the array area during construction.

27. Table 2-4 shows that the removal of GBS also results in a significant reduction in persistent habitat loss of 2,093,008m^2 (5,366,427m^2 minus 3,049,438m^2 + 200,000 m^2). This includes habitat loss associated with the disposal of clay within the array area as a worst case scenario, although this may be winnowed away gradually over time.

28. As discussed in Section 2.2, the additional dredging depths in the DWRs does not change the disturbance and habitat loss areas on the seabed.

Table 2-3. Revised temporary disturbance parameters for WTG foundations following removal of GBS

Impact	Worst case scenario (m2)	
	ES	Revised
Temporary physical disturbance during construction in the array area	5,883,257	5,872,019
Temporary physical disturbance during construction in the offshore cable corridor	3,309,345	No change

Table 2-4. Revised persistent habitat loss parameters for WTG foundations following removal of GBS

Impact	Worst case scenario (m2)	
	ES	Revised
Persistent habitat loss during construction in the array area	5,366,427	3,049,438
Persistent habitat loss during construction in the offshore cable corridor	75,240	No change
Estimated long term temporary habitat loss of clay deposit	n/a	200,000

2.3.2 Sediment Volumes Summary

29. Table 2-5 provides a summary of the revised total sediment volumes, taking into consideration all of the mitigation measures described in Section 2, showing

that there is a decrease of $56,184m^3$ for the Project overall ($31,409,779m^3$ minus $31,353,595m^3$).

Table 2-5. Comparison of sediment volumes during seabed preparation/ sandwave levelling

Sediment volumes	Original volume (m3)	Revised volume (m3)
Seabed preparation for installation of turbine and OSP/OCP foundations	1,096,809 + 38,485 = 1,135,294	1,040,625 + 38,485 = 1,079,110
Export cable seabed preparation	1,544,891	4,634,673 (whole OCC, including for DWRs)
Array cable seabed preparation	27,293,114	24,203,332
Platform interconnector cable seabed preparation	1,436,480	no change
Total	**31,409,780**	**31,353,595**

3. Consideration of the Implications of Additional Mitigation

3.1 Screening

30. Table 3-1 summarises the implications of the mitigation described in Section 2 for the conclusions of the ES.

Table 3-1. Consideration of ES topics affected by the additional mitigation described in Section 2

ES Topic	Implications of Additional Mitigation
Marine Geology Oceanography and Physical Processes	As there is a decrease in sediment volumes, seabed footprints and foundation cross section areas compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that the effects will be not significant, as assessed in ES Chapter 8 **[APP-022]** marine geology, oceanography and physical processes. However Natural England has requested further justification of the effects on Margate and Long Sands SAC and Kentish Knock East MCZ. Modelling has been undertaken based on the revised parameters, taking into account all mitigation described in Section 2. **This is discussed in Hydrodynamic and Sediment Dispersion Modelling Results Interpretation [Document Reference: 9.56] and summarised in Section 3.2.**
Marine Water and Sediment Quality	As there is a slight decrease in sediment volumes compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that effects will be not significant as assessed in ES Chapter 9 **[APP-023]** marine water and sediment quality.
Benthic Ecology	As there is a decrease in sediment volumes and seabed footprints compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that effects will be not significant as assessed in ES Chapter 10 **[APP-024]** benthic and intertidal ecology.

ES Topic	Implications of Additional Mitigation
	However, Natural England has requested further justification of the effects on Margate and Long Sands SAC and Kentish Knock East MCZ. Modelling has been undertaken based on the revised parameters, taking into account all mitigation described in Section 2. **This is discussed in Section 3.3.**
Fish and Shellfish Ecology	As there is a decrease in sediment volumes and seabed footprints compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that effects will be not significant as assessed in ES Chapter 11 **[APP-025]** fish and shellfish ecology.
Marine Mammals	As there is a decrease in sediment volumes and seabed footprints compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that indirect effects of changes to prey resource and water quality will not be significant as assessed in ES Chapter 12 **[APP-026]** marine mammals.
Offshore Ornithology	As there is a decrease in sediment volumes and seabed footprints compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that indirect effects of changes to prey will not be significant as assessed in ES Chapter 13 **[APP-027]** offshore ornithology.
Commercial Fisheries	There is no change to the worst case scenario parameters of relevance to commercial fisheries, described in Table 14.3 of ES Chapter 14 [**APP-028**]. In addition, effects will be not significant for fish and shellfish ecology, and the conclusions regarding effects on commercial fisheries remain as presented in ES Chapter 14 **[APP-028]**.
Shipping and Navigation	ES Chapter 15 **[APP-029]** concluded that the effects on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage would be tolerable and as low as reasonably practicable (ALARP). In response to feedback from the relevant stakeholders, the additional mitigation described in Section 2.2 is provided to further ensure the effects are tolerable and ALARP.
Offshore Archaeology and Cultural Heritage	As there is a decrease in sediment volumes and seabed footprints compared with those assessed in the ES, impacts would be reduced accordingly. Further supporting the conclusion that effects will be not significant as assessed in ES Chapter 16 **[APP-030]** offshore archaeology and cultural heritage.
Infrastructure and Other Users	As there is no change to the overall infrastructure requirements, the conclusions regarding effects on infrastructure and other users remain as presented in ES Chapter 18 **[APP-032]**.
Socio-economics	As there is no change to the conclusions of ES Chapter 14 Commercial Fisheries **[APP-028]** and ES Chapter 15 Shipping and Navigation **[APP-029]**, the conclusions regarding effects on socio-economics remain as presented in ES Chapter 31 **[APP-045]**. The additional mitigation described in Section 2.2 is provided to further ensure there are no likely significant effects on the socio-economic impacts of the local ports.

3.2 Marine Geology, Oceanography and Physical Processes

3.2.1 Revised Marine Geology, Oceanography and Physical Processes Worst Case Scenario

31. Table 3-2 shows changes to the worst case scenario table compared with Table 8.2 in ES Chapter 8 Marine Geology, Oceanography and Physical Processes, **[APP-022]**.

Table 3-2 Marine Geology, Oceanography and Physical Processes worst case scenarios

Potential impact	Parameter	Worst case
Construction		
Impact 1a: Changes in Suspended Sediment Concentration (SSC) due to seabed preparation for installation of turbine and OSP/OCP foundations	Volume of sediment disturbed	• Seabed preparation volume for each wind turbine generator (WTG) foundation = ~~**1,096,809**~~ **1,040,625m^3** • Seabed preparation volume for two offshore substation platforms = **38,485m^3** Worst case scenario volume for seabed preparation for foundation installation = **1,079,110m^3** ~~**1.14Mm^3**~~
Impact 1b: Changes in SSC due to drill arisings for installation of piled foundations for wind turbines and OSPs/OCP	Volume of drill arisings	Drill arisings at 10% of the wind turbines = **34,728m^3** (based on 10% of 34 of the largest turbines which is the worst case scenario and an average drill arising per turbine foundation of 10,214m^3) Drill arisings at one monopile OSP/OCP = 11,451m^3 (based on 50% of the OSPs/OCP needing drilling) Worst case scenario volume for drill arisings for foundation installation = **46,179m^3** Note that drill arisings would not occur if ~~GBS~~ suction buckets are used and therefore this parameter cannot be added to the maximum seabed levelling for ~~GBS~~ suction buckets described above.
Impact 2a: Changes in seabed level due to seabed preparation for installation of turbine and OSP/OCP foundations	As Construction Impact 1a	As Construction Impact 1a
Impact 2b: Changes in seabed level due to drill arisings for installation of piled foundations for wind turbines and OSPs/OCP	As Construction Impact 1b	As Construction Impact 1b
Impact 3: Changes in SSC due to export cable installation	Volume of sediment disturbed	• HDD exit pits = three (two offshore export cables and one contingency) (volumes included below) • Export cable seabed preparation = ~~**1,544,891**~~ **4,634,673m^3**

Potential impact	Parameter	Worst case
(Options 1 and 2 only)		• Export cable burial = 125.4km long (two cables of 62.7km each) with an average 1m trench width x average 1.2m burial depth = **150,480m³** Worst case scenario volume due to export cable installation = **~~1.70~~4.79Mm³** A pre-grapnel run would be required during cable installation, however this is run along the surface of the seabed and would have minimal SSC volume.
Impact 4: Changes in seabed level due to export cable installation	As Construction Impact 3	As Construction Impact 3
Impact 5: Changes in SSC due to offshore array and platform interconnector cables installation	Volume of sediment disturbed	• Array cable seabed preparation = **~~27,293,114~~24,203,332m³** • Array cable burial = **204,000m³** • Platform interconnector cable seabed preparation = **1,436,480m³** • Platform interconnector cable burial = **24,000m³** A pre-grapnel run would be required during cable installation, however this is run along the surface of the seabed and would have minimal SSC volume.
Impact 6: Changes in seabed level due to offshore array and platform interconnector cables installation	As Construction Impact 5	As Construction Impact 5.
Impact 7: Interruptions to bedload sediment transport due to sandwave levelling/ seabed preparation for offshore export cable and array cable installation	Volume of sediment disturbed	As Construction Impact 5.
Impact 8: Indentations on the seabed	Seabed disturbance footprint	• Vessel jack up assuming six jack up locations per wind turbine/OSP (275m² per jack up leg x six legs x six locations x 354 jack up operations) = **584,100m²** • Anchoring during wind turbine/OSP installation = **274,704m²** (based on vessels with eight anchors, each with 116.4m² footprint and five anchoring events per wind turbine/OSP) • Anchoring during array/ platform interconnector cable installation = **235,878m²** (based on nine anchors per vessel, each with 61m² footprint; and 432 anchoring events • Anchor during offshore export cable installation = **297,850m²** (based on nine anchors per vessel, each with 61m² footprint; and 546 anchoring events) • Boulder clearance = **295m²** (up to 15 boulders of 5m diameter in the offshore cable corridor) • Boulder clearance= **491m²** (up to 25 boulders of up to 5m diameter in the array area) • Array area Unexploded Ordnance (UXO) clearance = **1025m²**. Crater areas reported from other offshore wind farms range from

Potential impact	Parameter	Worst case
		approximately 2 to 25m^2, whereas the largest predicted in Ørdtek (2018) is around 350m^2. It is estimated 13 of the UXO craters would be of 25m^2 or less and two craters of up to 350m^2. Up to 15 UXO clearance operations are predicted along the array area. • Offshore cable corridor UXO clearance = **1600m^2**. It is estimated 22 of the UXO craters would be of 25m^2 or less and three craters of up to 350m^2. Up to 25 UXO clearance operations are predicted along the export cable route. Worst case scenario seabed indentations = **1.38km^2**
Operation and maintenance		
Impact 1: Changes to the tidal regime due to the presence of structures on the seabed (wind turbines and OSP/OCP foundations)	Cross sectional area within the water column	Worst case wind turbine cross-sectional area based on Mono suction bucket ~~GBS~~ with 38m ~~65m~~ diameter base up to 10m ~~at 15m~~ above the seabed. Bucket ~~GBS~~ cross sectional area = **380m^2** ~~**600m^2**~~**.** Foundation would continue as a 17m diameter column to the water surface. Total worst case scenario cross-sectional area based on 57 Mono suction buckets ~~GBS~~ = **21,660m^2** ~~**34,200m^2**~~
Impact 2: Changes to the wave regime due to the presence of structures on the seabed (wind turbines and OSP/OCP foundations)	Cross sectional area within the water column	As Operational Impact 1.
Impact 3: Changes to the sediment transport regime due to the presence of structures on the seabed (wind turbines and OSP/OCP foundations)	Cross sectional area within the water column	As Operational Impact 1.
Impact 4: Loss of seabed area due to infrastructure footprint within the array area	Loss of seabed area	Total worst case wind turbine footprint based on 57 suction bucket jacket x 4 legs, with 15m diameter suction bucket jacket = **40,291**~~**GBS**~~ = ~~**189,144m^2**~~ Scour protection assumes that all turbines have scour protection of up to **45,867m^2** ~~83,774m^2~~ (excluding wind turbine foundation footprint) = **2,614,419m^2** ~~**4,775,118m^2**~~ Two offshore electrical platforms with scour protection including foundation structure footprint area = **166,715m^2 (83,357.5m^2 each)** ~~**174,184m^2** (87,092m^2 each~~) Array cable protection = 204,000m^2 Inter-platform cable protection = 24,000m^2 Worst case scenario total persistent footprint in the array area = **3,055**~~**5.37k**~~**m^2** .

Potential impact	Parameter	Worst case
Impact 5: Morphological and sediment transport effects due to cable protection measures within the array area	Length of cable protection	Array cable protection – Up to 34km of cable protection may be required in the unlikely event that array cables cannot be buried (based on 20% of the length) x 6m cable protection width = 204,000m^2 Platform interconnector cable protection – Up to 4km of cable protection may be required in the unlikely event that array cables cannot be buried (based on 20% of the length) x 6m cable protection width = 24,000m^2 Height of cable protection = up to 1.4m
Impact 6: Morphological and sediment transport effects due to cable protection measures within the offshore cable corridor	Length of cable protection	Up to 12.5km of cable protection may be required in the unlikely event that export cables cannot be buried (based on 10% of the length) x 6m cable protection width = 75,240m^2
Impact 7: Changes in SSC due to cable repairs and reburial	Volume of sediment disturbed	Unplanned repairs and reburial of cables may be required during O&M, the following estimates are included: • Reburial of about 2.75% of array/platform interconnector cable is estimated over the life of the Project (24m disturbance width) x average 1.2m depth = 150,480m^3 • Reburial of 4% of offshore export cable is estimated over the life of the Project (24m disturbance width) x average 1.2m depth = 144,461m^3 • Five array/platform interconnector cable repairs are estimated over the Project life. 600m section removed x 24m disturbance width x average 1.2m depth = 86,400m^3 Four export cable repairs are estimated over the Project life. 600m section removed x 24m disturbance width x average 1.2m depth = 69,120m^3
Impact 8: Indentations on the seabed	Seabed disturbance footprint	Anchored vessels placed during the cable repairs included above = 4,914m^2 Maintenance of offshore infrastructure would be required during O&M. An estimated 177 major component replacement activities may be required per year, using jack up vessels and/or anchoring = 292,050m^2 One UXO clearance operation per year over the lifetime of the Project with a crater footprint estimate of up to 350m^2
Decommissioning		

Impact 1: Changes in SSC due to foundation removal
Impact 2: Changes in seabed level due to foundation removal
	Volume of sediment disturbed	Cutting of piles below the seabed surface:
		• 480 pin-piles of 6m diameter
		  ○ 57 wind turbines x eight piles
		  ○ Two OSPs x 12 piles
		Or
		• 59 monopiles of 17m diameter (57 wind turbines + two OSPs/OCP)
		Or
		Removal of largest foundations (Suction bucket jacket ~~GBS~~):
		• 57 WTG x 4 legs X 15m ~~65m~~ diameter
		• Two OSPs x 6 legs X 25m ~~65m~~ diameter
		Or
		A mixture of the above foundation types.

Impact 3: Changes in SSC due to removal of	As Construction Impact 1	Up to 125.4km of export cable, two cables of 62.7km each, (removal to be determined in consultation with key stakeholders as part of the decommissioning plan)

Potential impact	Parameter	Worst case
parts of the export cable		
Impact 4: Changes in seabed level due to removal of parts of the export cable	As Construction Impact 1	
Impact 5: Changes in SSC due to removal of parts of the array and interconnector cables	Volume of sediment disturbed	Up to 190km of array/platform interconnector cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan)
Impact 6: Changes in seabed level due to removal of parts of the array and platform interconnector cables	As Construction Impact 3	
Impact 7: Indentations on the seabed due to decommissioning vessels	Volume of sediment disturbed	• Vessel jack up assuming six jack up locations per wind turbine (275m^2 per jack up leg x six legs x six locations) = 564,300m^2 • Jack up vessel footprints for OSPs/OCP = 19,800m^2 • Anchoring during wind turbine and OSP/OCP decommissioning = 274,704m^2 (based on vessels with eight anchors, each with 116.4m^2 footprint; and five anchoring events per wind turbine/OSP/OCP) • Anchoring during array/platform interconnector cables removal (if required) = 235,878m^2 (based on nine anchors per vessel, each with 61m^2 footprint; and 432 anchoring events) Anchor placement for export cable removal (if required) = 297,850m^2 (based on nine anchors per vessel, each with 61m^2 footprint; and 546 anchoring events)

3.2.2 Significance of effects on Marine Geology, Oceanography and Physical Processes

32. As discussed in the Hydrodynamic and Sediment Dispersion Modelling Results Interpretation **[Document Reference: 9.56]**, the significance of effects on marine geology, oceanography and physical processes remain not significant, as presented in ES Chapter 8 **[APP-022]**.

3.3 Benthic Ecology

3.3.1 Revised Benthic and Intertidal Worst Case Scenario

33. Table 3-3 shows changes to the worst case scenario table compared with Table 10.2 in ES Chapter 10 Benthic and Intertidal Ecology **[APP-024]**.

Table 3-3 Benthic and Intertidal Ecology worst-case scenarios

Element of the project infrastructure	Worst case
Construction	
Temporary physical disturbance	Array area: • Seabed preparation area for WTG = 208,125m² ~~219,362m².~~ • OSPs/OCP[2] seabed preparation = 7,697m² • Array cable seabed preparation = 4,080,000m² • Platform interconnector cable seabed preparation = 480,000m² • Vessel jack up = 584,100m² • Anchoring during WTG and OSP/OCP installation = 274,704m² • Anchoring during array/platform interconnector cable installation = 235,878m² • Boulder clearance = 491m² • UXO clearance = 1,025m² • Worst case scenario total disturbance footprint in the array area = 5.87km² Offshore export cables: • Maximum temporary disturbance for seabed preparation within the offshore cable corridor = 3,009,600m² • Anchor placement = 297,850m² • Boulder clearance = 295m² • UXO clearance = 1,600m². • 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 = 3.31km² **There will be no direct disturbance in the Margate and Long Sands SAC or the Kentish Knock East MCZ.**
Impact 2: Increased suspended sediment concentrations	Array area: Seabed preparation volumes for WTG = **1,040,625m³** ~~1,096,809m³~~ OSPs/OCP seabed preparation = 38,485m³ *Worst case scenario volume for foundations =* ***~~1.14Mm3~~*****1,079,110m³** Array cable seabed preparation = 24,203,332m³ Array cable burial = 204,000m³ Platform interconnector cable seabed preparation = 1,436,480m³ Platform interconnector cable burial = 24,000m³ *Worst case scenario volume for array and interconnector platform cables = 25,867,812m³* Total array area suspended sediments = ~~30.1Mm³~~26,946,922m³ **The above works would be at least 50m from the Kentish Knock East MCZ.**

[2] Under options 1 and 2 there would be up to two offshore substation platforms (OSPs); whereas for option 3 there would be one offshore converter platform (OCP) and up to one OSP, i.e. under all scenarios there would be a maximum of two platforms, with no change to the worst case foundation infrastructure.

Element of the project infrastructure	Worst case
	NB, drill arising would not occur in the event that the ~~GBS~~ suction buckets are used and therefore the following parameters cannot be added to the maximum seabed levelling for ~~GBS~~ suction buckets described above. Drill arisings at 10% of WTGs = 34,728m^3 Drill arisings at 1 x monopile OSPs/OCP = 11,451m^3 Total = 46,179m^3 Export cable: Export cable seabed preparation = ~~1,544,891m^3~~ 4,634,673m^3 Export cable burial = 150,480m^3 *Worst case scenario volume for offshore export cables = ~~1,695,371m^3~~ 4,785,153m^3* **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 = 540,000m^3 (for 2 cables) • Offshore export cable burial = 5,760m^3 per cable (2 cables = 11,520m^3)
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 ES Chapter 9 Marine Water and Sediment Quality (APP-023) for more detail.
Impact 4: Underwater noise and vibration	Maximum hammer energy: • 4,400kJ (pin-piles) • 6,000kJ (monopiles) Starting hammer energies of 15% would be used for 10 minutes. Ramp up will then be undertaken for the next 80-120 minutes up to the maximum hammer energy.
Operation & Maintenance (O&M)	
Impact 1: Temporary physical disturbance	Unplanned repairs and reburial of cables may be required during O&M, the following estimates are included: • Reburial of c.2.75% of array cable length is estimated over the life of the project (24m disturbance width) = 112,200m^2 • Reburial of c.2.75% of platform interconnector cable is estimated over the life of the project (24m disturbance width) = 13,200m^2 • Reburial of c.4% of export cable is estimated over the life of the project (24m disturbance width) = 120,384m^2 • Five array cable repairs are estimated over the project life. 600m section removed x 24m disturbance width = 72,000m^2 • Four 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 Maintenance of offshore infrastructure would be required during O&M. An estimated 177 major component replacement activities may be required per year, using jack up vessels and/or anchoring = 292,050m^2 One UXO clearance per year anywhere in the offshore project area with a crater footprint estimate of up to 350m^2. **There will be no direct disturbance in the Margate and Long Sands SAC or the Kentish Knock East MCZ.**

Element of the project infrastructure	Worst case
Impact 2: Persistent habitat loss	Array area: WTG: • Total worst case WTG footprint without scour protection, = **40,291m^2** ~~189,144m^2~~ • Scour protection – assumes all WTGs have scour protection area of up to **45,867m^2** ~~83,774m^2~~ (excluding WTG foundation footprint) = **2,614,433m^2** ~~4,775,118m^2~~ • **Clay deposit area = 200,000m^2** Cables: • Array cable protection – Up to 34km of cable protection may be required in the unlikely event that array cables cannot be buried (based on 20% of the length) x 6m cable protection width = 204,000m^2 • Interconnector cable protection – Up to 4km of cable protection may be required in the unlikely event that array cables cannot be buried (based on 20% of the length) x 6m cable protection width = 24,000m^2 Two OSPs/OCP with scour protection = **160,824m^2 (80,412m^2 each)**~~174,184m^2 (87,092m^2 each)~~ Worst case scenario total persistent footprint in the array area = 3.25~~5.37~~km^2 Export cable: Export cable protection = 75,240m^2 **There will be no direct habitat loss in the Margate and Long Sands SAC or the Kentish Knock East MCZ.**
Impact 3: Increased suspended sediment concentrations	Unplanned repairs and reburial of cables may be required during O&M, the following estimates are included: • Reburial of c. 2.75% of array/platform-interconnector cable is estimated over the life of the project (24m disturbance width) x average 1.2m depth = 150,480m^3 • Reburial of c. 4% of offshore export cable is estimated over the life of the project (24m disturbance width) x average 1.2m depth = 144,461m^3 • Five array cable repairs are estimated over the project life. 600m section removed x 24m disturbance width x average 1.2m depth = 86,400m^3 Four 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/burial is unknown, it is assumed as a worst case that all the works described above could be at least 150m from the Margate and Long Sands SAC and at least 50m from the Kentish Knock East MCZ.**
Impact 4: 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 (APP-019) for more detail.
Impact 5: Underwater noise and vibration	WTG operational noise as described in Appendix 12.2 Underwater Noise Modelling Report.
Impact 6: Interactions of Electromagnetic Fields (EMF)	Embedded mitigation described in Section 10.3.3 of ES Chapter 10 Benthic and Intertidal ecology [APP-024] Array cables: • Maximum cable length: 170km • Maximum voltage: 132kV • Minimum target burial depth: 0.6m (average burial depth: 1.2m)

Element of the project infrastructure	Worst case
	• Up to 20% of total array cable length requiring protection (up to 34km) Platform interconnector cable: • Maximum cable length: 20km • Maximum voltage: 275kV • Minimum target burial depth: 0.6m (average burial depth: 1.2m) • Up to 20% of total array cable length requiring protection (up to 4km) Offshore export cables: • Up to 2 cables • Maximum offshore cable length: 125.4km • Maximum voltage: up to 275kV • Minimum target burial depth: 0.6m (average burial depth: 1.2m) Up to 10% of total export cable length requiring protection (up to 12.5km)
Impact 7: Colonisation of introduced substrate, including non-native species	57 WTG and 2 OSPs/OCP Volume of array cable protection = 285,600m^3 Volume of platform interconnector cable protection = 33,600m^3 Volume of export cable protection = 105,336m^3
Decommissioning	

Impact 1: Temporary physical disturbance	• Cable retrieval (if required)
	  ○ Array cable – 170km length with average 1m trench width = 170,000m^2
	  ○ Platform interconnector cable – 20km length with average 1m trench width = 20,000m^2
	  ○ Export cable – 125.4km length with average 1m trench width = 125,400m^2
	• Vessel jack up assuming 6 jack up locations per wind turbine (275m^2 per jack up leg x 6 legs x 6 jack up events per 57 turbines) = 564,300m^2
	• Jack up vessel footprints for two OSPs/OCP (275m^2 per jack up leg x 6 legs x 6 jack up events per two platforms) = 19,800m^2
	• Anchoring during WTG and OSP/OCP decommissioning = 274,704m^2 (based on vessels with 8 anchors, each with 116.4m^2 footprint; and 5 anchoring events per WTG/OSP)
	• Anchoring during array/platform interconnector cable removal (if required) = 235,878m^2 (based on 9 anchors per vessel, each with 61m^2 footprint; and 432 anchoring events)
	Anchor placement for export cable removal (if required) = 297,850m^2 (based on 9 anchors per vessel, each with 61m^2 footprint; and 546 anchoring events)
	
	There will be no direct disturbance in the Margate and Long Sands SAC or the Kentish Knock East MCZ.

Impact 2: Increased suspended sediments	Array area: Cutting of piles below the seabed surface: • 480 pin-piles of 6m diameter • 57 wind turbines x 8 piles • 2 OSPs/OCP x 12 piles Or • 59 monopiles of 17m diameter (57 wind turbines + 2 OSPs/OCP) Or Removal of largest foundations: • 57 WTG x ~~65m diameter~~ 4 legged suction buckets with 15m diameter each • 2 OSPs/OCP x ~~65m diameter~~ 6 legged suction buckets with 25m diameter each

Element of the project infrastructure	Worst case
	Or A mixture of the above foundation types. The foundation types could also include suction caissons, however these do not represent a worst case scenario for decommissioning. <u>Offshore export cables:</u> Up to 125.4km of export cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan) <u>Array cables:</u> Up to 170km of array cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan) <u>Platform interconnector cables:</u> Up to 20km of array cable (removal to be determined in consultation with key stakeholders as part of the decommissioning plan)
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 ES Chapter 9 Marine Water and Sediment Quality (APP-023) for more detail.
Impact 4: Underwater noise and vibration	WTG operational noise as described in Appendix 12.2 Underwater Noise Modelling Report.

3.3.2 Effects on Margate and Long Sands SAC

34. Section 2.4 of the RIAA Part 2 **[APP-175]** provides the assessment of effects on Margate and Long Sands SAC. The following sections update the shadow Appropriate Assessment to take account of the new and additional Deadline 4 sediment dispersion and hydrodynamic modelling, where relevant. The MLS SAC is located adjacent to the offshore cable corridor and therefore construction, operation and maintenance and decommissioning in the offshore cable corridor is assessed. Effects as a result of the array area are not applicable to the MLS SAC.

35. For effects not influenced by the sediment dispersion and hydrodynamic modelling, the effects remain as presented in the RIAA Part 2 **[APP-175]**, noting the worst case scenario has been reduced, as outlined in Section 3.3.1 and therefore the RIAA presents a conservative assessment and concludes no AEOI.

36. In January 2025, the condition assessment (Natural England, 2025a) was updated to unfavourable for the coarse sediment and sand features. The rationale given by Natural England in the condition assessment relates to the placement of infrastructure within the SAC. This does not influence the shadow Appropriate Assessment for the Project as the offshore cable corridor avoids any direct overlap with the SAC. In addition, the 150m buffer discussed in Section 2.1.1 increases the distance between the installation of cables and associated cable protection and the Margate and Long Sands SAC.

3.3.2.1. Potential effects during construction

3.3.2.1.1. Changes to suspended sediment concentrations and bedload transport

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

38. Further to this, sediment dispersion modelling of installation activities along the offshore cable corridor (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54**) provides further evidence of the effects of North Falls on the SAC. The implications of the modelling on the Marine Geology, Oceanography and Physical Processes is discussed further in the Hydrodynamic and Sediment Dispersion Modelling Results Interpretation **[Document Reference 9.55]**.

3.3.2.1.1.1. Supporting processes

39. Sediment dispersion modelling of sandwave levelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54, Section 7.2**) shows the peak of the suspended sediment concentration at the SAC would be just below 400 mg/l near the seabed, returning to ambient conditions in approximately 1 hour for one cable. 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.

40. 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.

41. SSC arising during dredging at the Sunk DWR and Trinity DWR (Section 2.2) would not interact with the Margate and Long Sands SAC. Dredged sediment arising from the Sunk DWR and Trinity DWR 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.

42. Deposition of SSCs arising from the above works will have no discernible effect on the MLS SAC, as shown by the sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54**) and discussed further below (Section 3.3.2.1.1.2).

43. As discussed above, dredging at the Sunk DWR and Trinity DWR would require sediment to be disposed of in the array area, however

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

3.3.2.1.1.2. The extent and distribution of qualifying habitat

45. The sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54**) shows the effects of North Falls on seabed level as a result of sediment deposition. Changes in seabed level

greater than 5cm from levelling of sand waves and megaripples are spatially restricted and do not interact with the MLS SAC and will therefore not change the condition of the SAC.

46. Similarly, seabed trenching for export cable installation will have minimal, localised changes to the seabed level. These changes will not interact with the MLS SAC. The additional dredging for the Sunk DWR and Trinity DWR would also not interact with the SAC.

47. As discussed above, the dredged sediment 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.

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

3.3.2.1.1.3. Structure and function of sandbank communities

49. Increased suspended sediments have the potential to affect benthic ecology receptors by blocking feeding apparatus. Therefore, there is potential for increased SSC to affect sandbank benthic and fish communities within the SAC due to seabed preparation and cable installation.

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

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

51. The sub-feature subtidal coarse sediment is not sensitive to changes in SSC (Natural England, 2025b). Subtidal mixed sediments and subtidal sand have been defined as sensitive to changes in SSC (Natural England, 2025b). However, as discussed above, increased SSC in the SAC will be short term and will return to ambient levels within approximately 1 hour. Furthermore, no discernible deposition is predicted in the SAC.

52. Due to the short term, temporary increase in SSC and discernible changes from deposition on benthic communities, there is no potential for an AEoI of this attribute due to increased SSC and subsequent deposition during construction.

3.3.2.2. Potential effects during operation

3.3.2.2.1. Changes to bedload transport

53. Surface laid cable protection has potential to influence tidal currents and associated bedload sediment transport.

54. Cables will be buried where possible, however, as a worst case scenario, it has been assumed that surface-laid cable protection measures would be required 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 (Section 3.3.1).

55. The Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54, Sections 5.4 and 5.5**] shows the effects of cable protection in indicative areas of cable crossings and more challenging burial conditions. This shows the effects of the cable protection will be highly localised, with a maximum change in current speeds of 2% in proximity to the cable protection. Changes in sediment transport potential (bed shear stresses) is therefore also localised, with changes being 10% at the cable protection location and ranging from less than 2% to 4% within 2.5km.

56. Should cable protection be required in the section of the offshore cable corridor which is adjacent to the Margate and Long Sands SAC, there will be a buffer of 150m between the cable protection and the SAC (in accordance with the mitigation described in Section 2.1.1) and therefore there will be a negligible change to bedload transport in the SAC.

3.3.2.2.1.1. Supporting processes

57. Where the seabed is composed of mobile sand, it can be transported under existing tidal conditions. If the cable protection does present an initial obstruction to bedload transport the sediment would first accumulate one side or both sides of the obstacle 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. Taking into account the localised and small (2%) change in tidal currents determined by the hydrodynamic modelling, the gross patterns of bedload transport across the offshore export cables would 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.

3.3.2.2.1.2. The extent and distribution of qualifying habitat

58. As there will be no discernible changes to the bedload transport within the SAC, there is no potential for an AEoI of this attribute due to changes in bedload transport during operation.

3.3.2.2.1.3. Structure and function of sandbank communities

59. For the reasons described above, an AEoI of the structure and function of sandbank communities due to changes to the bedload transport can also be ruled out.

3.3.2.3. Potential effects during decommissioning

60. 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 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.

61. 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 **[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.

62. 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 3.3.2.1).

63. Sediment transport effects associated with cable protection, if left in situ, would remain as assessed for the operational phase (Section 3.3.2.2).

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

3.3.2.4. Summary of project alone effect

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

3.3.2.5. In-combination effects

66. 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.

67. As the conclusions of the shadow Appropriate Assessment have not changed, the in-combination assessment remains as assessed in Section 2.4.3.5 in the RIAA Part 2 **[APP-175]**.

3.3.3 Effects on Kentish Knock East MCZ

68. Section 6.3 of the Marine Conservation Zone Assessment (MCZA) Report **[APP-237]** provides an assessment of effects on the KKE MCZ. This assessment has been reviewed and updated below to take account of the Hydrodynamic and Sediment Dispersion Modelling Report **[Document Reference 9.54]** where relevant, taking into consideration the additional mitigation described in Sections 2.1 to 2.1.7.

69. The KKE MCZ is adjacent to the array area and therefore construction, operation and maintenance and decommissioning in the array area is assessed. Effects as a result of the offshore cable corridor are not applicable to the KKE MCZ.

70. In April 2025, the Advice on Operations (AoO) (Natural England, 2025c) was updated. This version of the AoO has been taken into consideration.

71. For effects not influenced by the sediment dispersion and hydrodynamic modelling, the effects remain as presented in the MCZA Report **[APP-237]**, noting the worst case scenario has been reduced, as outlined in Section 3.3.1

and therefore the MCZA Report now presents a more conservative assessment and concludes there will be no hinderance of the conservation objectives of the KKE MCZ.

3.3.3.1. Potential Impacts during construction

3.3.3.1.1. Increased suspended sediment concentrations and sediment deposition

72. Temporary increases in SSC within the water column, and subsequent deposition onto the seabed may occur as a result of seabed preparation and drill arisings.

73. Sediment dispersion modelling (Hydrodynamic and Sediment Dispersion Modelling Report, **Document Reference 9.54**) shows that drilling for both the larger and smaller WTGs will generate low levels of SSC, with predicted maximum concentrations of 5mg/l restricted to the immediate vicinity of each structure that requires drilling. These changes in SSC will not interact with the Kentish Knock East MCZ.

74. Sediment plumes during seabed preparation for the WTG foundations would interact with a small part of the Kentish Knock East MCZ, as shown in Plate 1. A worst case location on the eastern side of the MCZ, closest to the array area has been used to measure the maximum SSC within this MCZ. A maximum near seabed SSC of around 1,400mg/l is expected, returning to ambient concentrations within around 4 hours.

75. Sediment deposition within the MCZ as a result of seabed preparation for foundations will not exceed 5cm and will therefore be indiscernible.

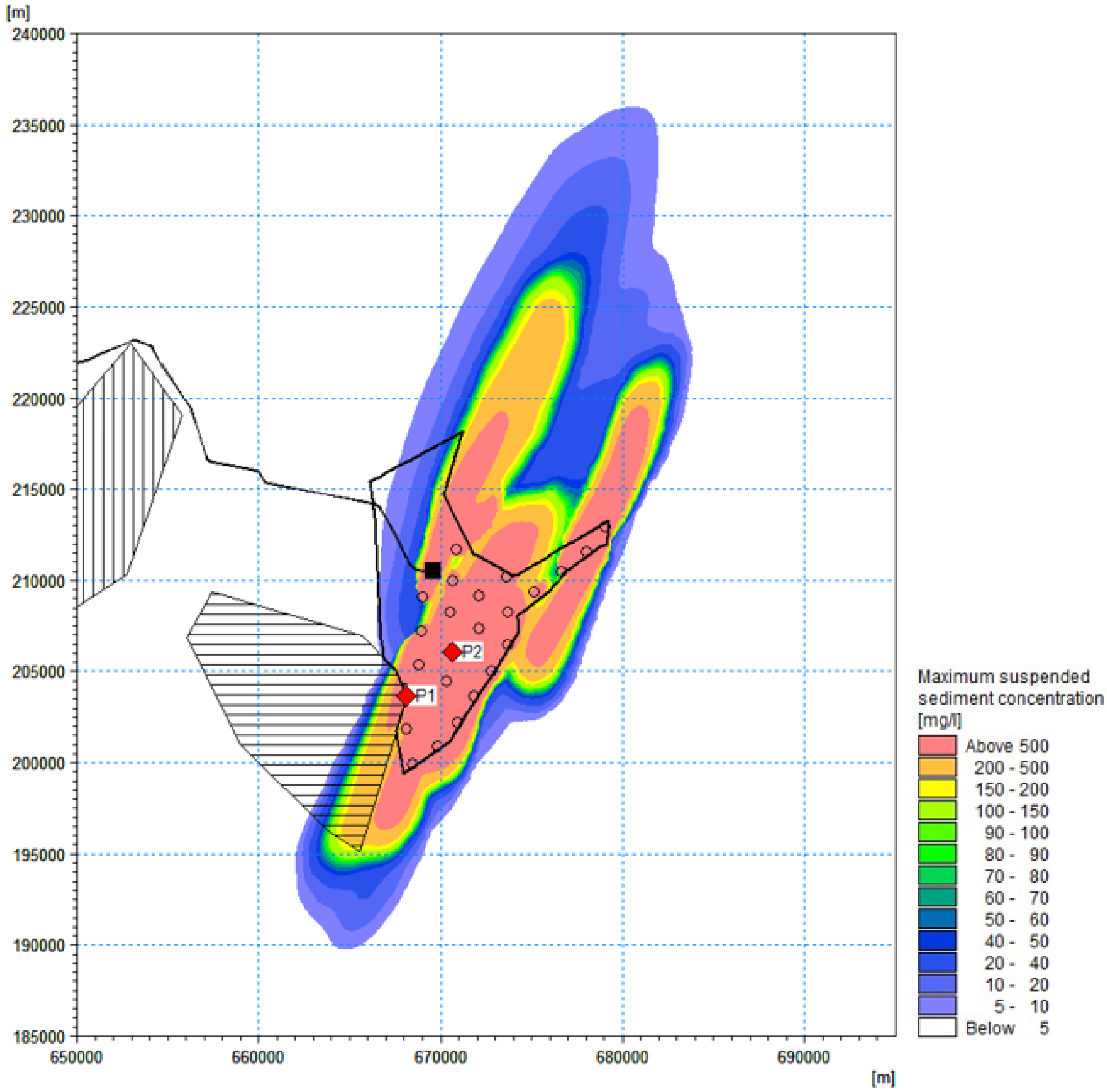


Plate 1 Maximum suspended sediment concentration during seabed preparation operations for larger WTGs layout structures occurring near the seabed (red points = time series extraction points, vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54]**

76. During sand wave and megaripple levelling for array cable installation, the maximum SSC are predicted to reach 16,000mg/l at the closest point of the KKE MCZ, returning to ambient concentrations within c. 1 hour. The area of the Kentish Knock East MCZ that the plumes could overlap with is limited as shown in Plate 2.

77. The initial deposition of sediment over a small area of the MCZ (Plate 3) would be between 5cm to 60cm. This sediment will be mobile, driven by the existing physical processes, therefore will be re-distributed by the prevailing waves and tidal currents.

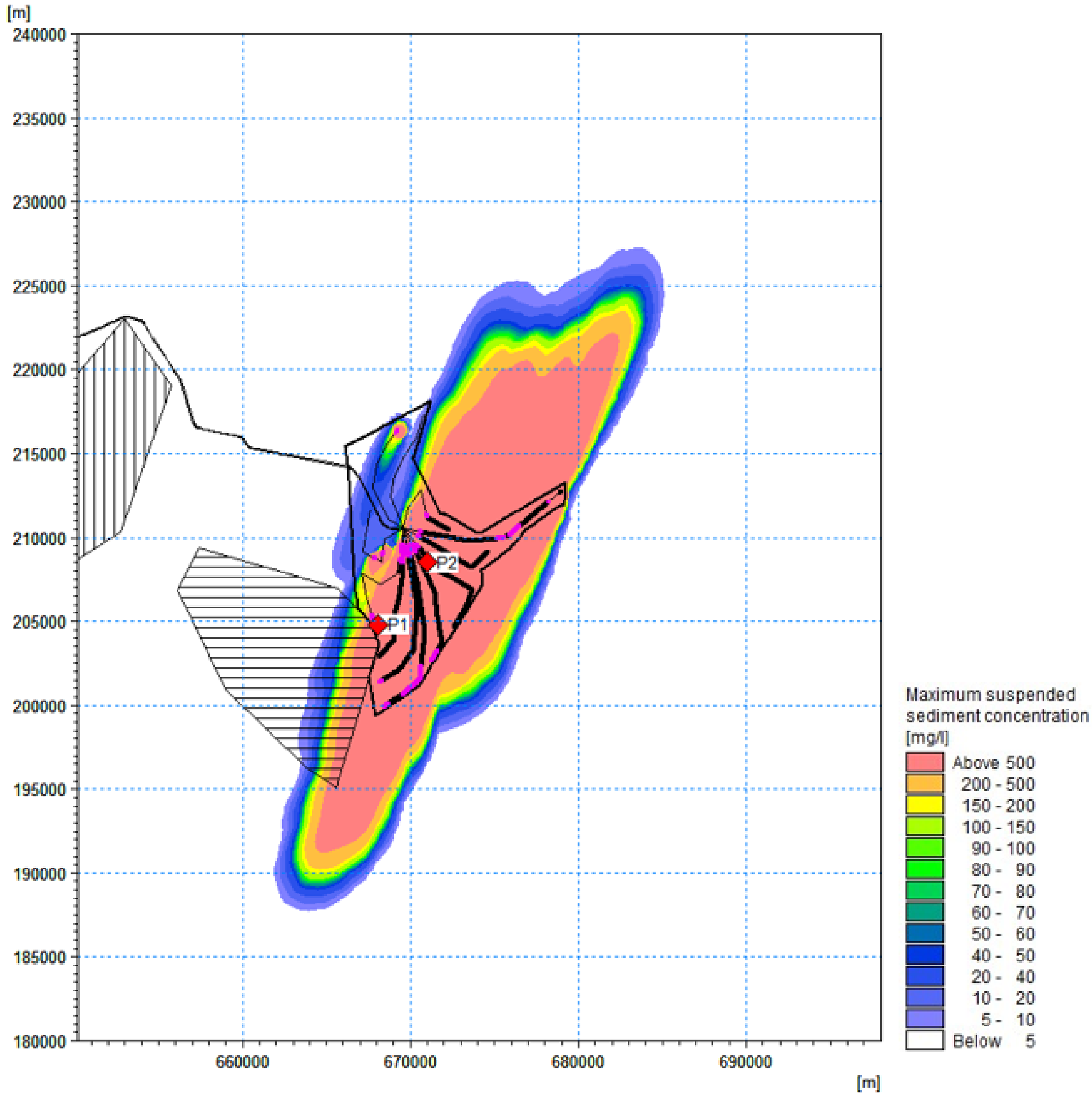


Plate 2 Maximum suspended sediment concentration during array cable levelling operations occurring near the seabed (thick purple line = MR, thick black line = SW, red points = time series extraction points, vertical hashed area = MLS SAC, horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54]**

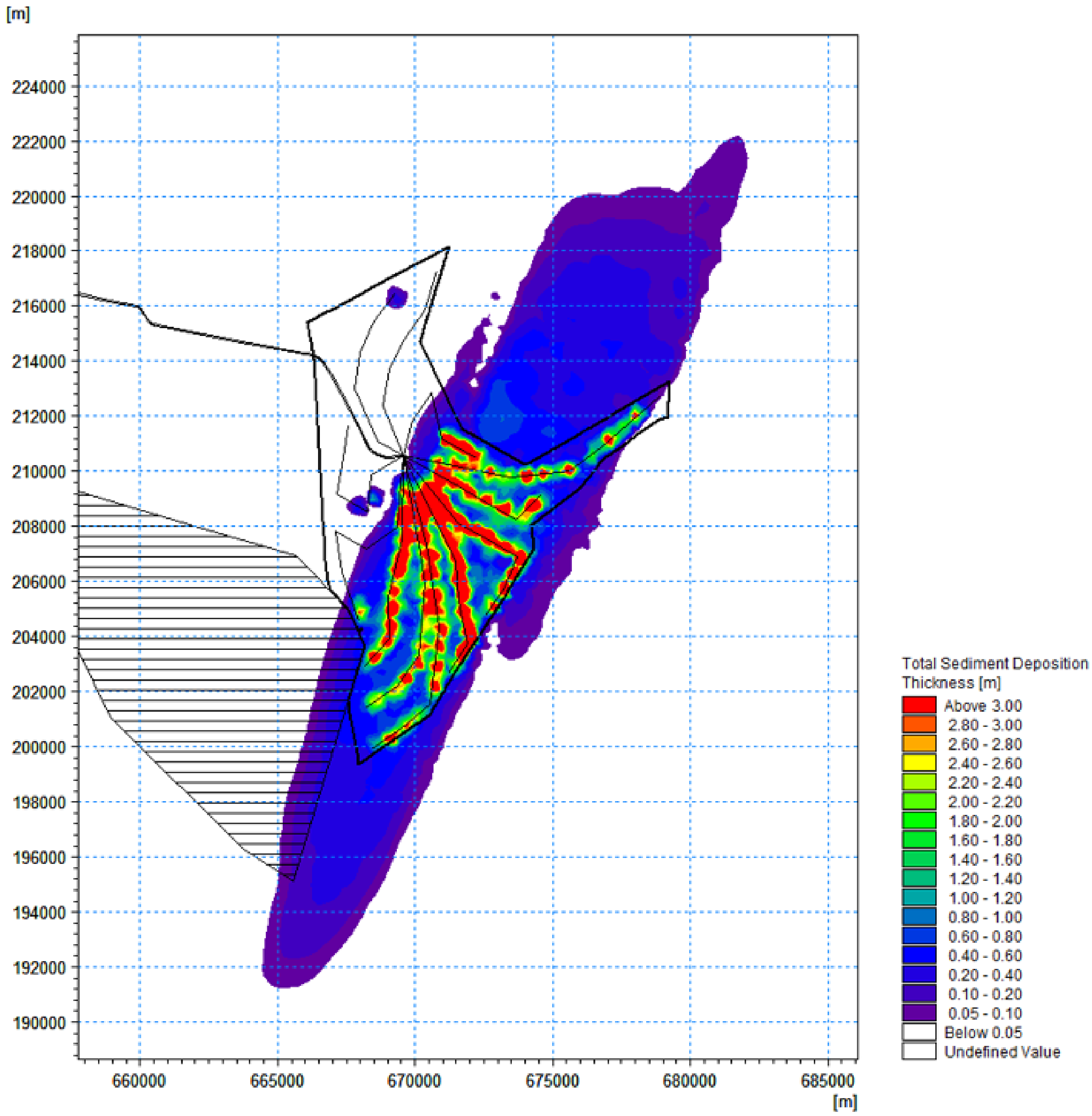


Plate 3 Total sediment deposition thickness during array cable levelling operations (horizontal hashed area = KKE MCZ) (Source: Hydrodynamic and Dispersion Modelling Report **[Document Reference 9.54]**

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

79. The array area is adjacent to the following broadscale marine habitat features:

- Subtidal coarse sediment;
- Subtidal mixed sediments; and

- Subtidal sand.

80. The impact of temporary increases in SSC and subsequent deposition has been defined using the following pressures identified by Natural England's AoO (Natural England, 2025c) for the Kentish Knock MCZ (Table 8.2 of the MCZ Assessment Report **[APP-237]**):

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

81. The following sections assesses the impact of temporary increases in SSC and subsequent deposition during construction against the attributes and targets of each protected feature as provided by Natural England's AoO.

3.3.3.1.1.1. Physical attributes

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

- Structure: sediment composition and distribution; and
- Supporting processes: water quality – turbidity (habitat).

83. As described above, the impact of suspended sediment and deposition on the KKE MCZ will be temporary and over a small area. Therefore, there will be a negligible impact magnitude on the physical attributes and targets of the KKE MCZ features as discussed in the Hydrodynamic and Sediment Dispersion Modelling Results Interpretation **[Document Reference 9.56]**.

3.3.3.1.1.2. Biological attributes

84. Natural England's AoO (Natural England, 2025c) states that the biotopes found within KKE MCZ have low sensitivity or are not sensitive to the pressures associated with temporary increases in SSC and subsequent deposition.

3.3.3.1.1.3. Summary

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

3.3.3.2. Potential Impacts during operation

3.3.3.2.1. Effects on bedload sediment transport

86. Indirect effects on bedload sediment transport may occur as a result of the presence of foundations.

87. Modifications to the wave regime due to the presence of foundation structures during the operational phase and associated effects on the bedload sediment transport regime are assessed in ES Chapter 8 Marine Geology, Oceanography and Physical Processes of the North Falls ES **[APP-022]** informed by wave

modelling which concludes that no significant effect on the wave regime is anticipated.

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

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

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

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

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

91. Natural England's AoO states that subtidal coarse sediment and subtidal mixed sediments are not sensitive to effects on bedload sediment transport. It does state that subtidal sand is sensitive. However, out of the ten named biotopes, only one is considered to have medium sensitivity (Natural England, 2025c).

3.3.3.2.1.1. Summary

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

3.3.3.3. Potential Impacts during decommissioning

93. As discussed in Section 3.3.2.3, the final decommissioning details will be finalised nearer to the end of the lifetime of the Project to ensure it is in line with the most recent guidance, policy and legislation.

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

95. Effects on the features of the KKE MCZ would be no greater than, and are expected to be less than, those of the construction phase for all effects (Section 3.3.3.1).

96. Based on the relevant pressures, receptor sensitivity, and the assessment of impacts against the attributes of affected KKE MCZ features it can be concluded

that the conservation objectives of maintaining subtidal sands and recovering subtidal coarse sediment and mixed sediment to favourable condition will not be hindered by any of the effects related to the decommissioning of North Falls.

3.3.4 Cumulative effects assessment

97. As the conclusions of the effects on the KKE MCZ as a result of North Falls alone have not changed, the CEA remains as assessed in Section 8.3 in the MCZA Report **[APP-237]**.

4. References

Natural England (2025a). Margate and Long Sands SAC - H1110 Sandbanks which are slightly covered by sea water all the time; Subfeature Assessments. Available at: https://designatedsites.naturalengland.org.uk/MarineCondition/SubFeature.aspx?featureGuid=cbc43fb1-2919-e611-9771-000d3a2004ef&SiteCode=UK0030371
Natural England (2025b). Margate and Long Sands SAC, Advice on Operations. Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030371&SiteName=margate+and+long&SiteNameDisplay=Margate+and+Long+Sands+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0
Natural England (2025c). Kentish Knock East MCZ, Advice on Operations. Available at: https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UKMCZ0080&SiteName=kentish&SiteNameDisplay=Kentish+Knock+East+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0

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