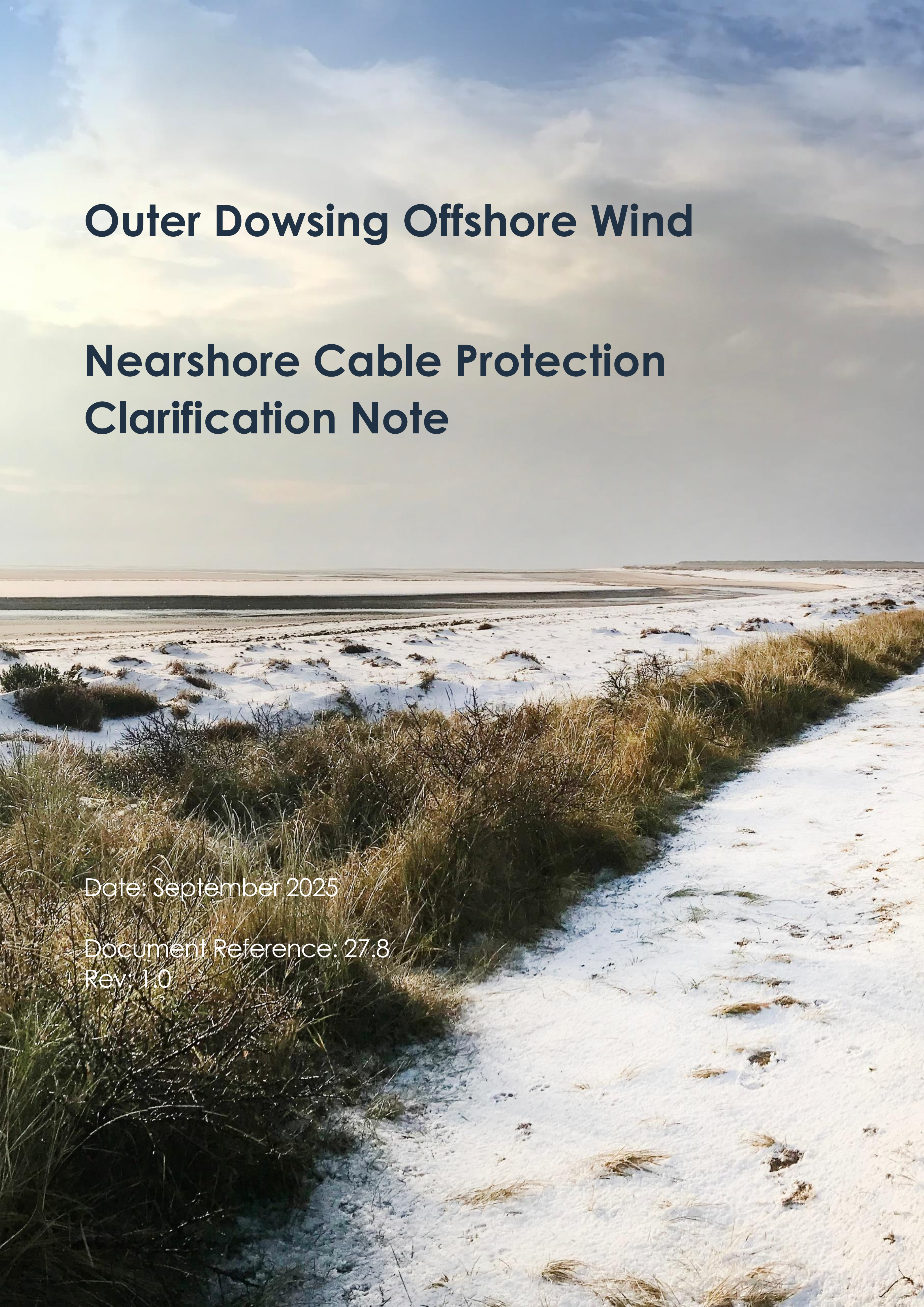

Outer Dowsing Offshore Wind

Nearshore Cable Protection Clarification Note

Date: September 2025

Document Reference: 27.8
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Executive Summary

This note provides further reassurance to Natural England that the Project will not result in Adverse Effects to Integrity to the Wash and North Norfolk Coast (WNNC) SAC—which is located approximately 14.8km south of the Landfall.

In the meeting held on 11 June 2025, Natural England highlighted the following remaining concerns in relation to adverse effects to the WNNC SAC, if nearshore cable protection is required:

- the stability of concrete mattresses during storm events and the potential for the movement of concrete mattresses caused by fishing vessels.
- potential impacts from the concrete mattresses on longshore sediment transport to the WNNC SAC.

Section 3 of this note explains the design attributes of concrete mattresses which ensure resilience during storm events. It also provides details of the types of fishing vessels which operate in proximity to the export cable corridor and explains why they are unlikely to move the concrete mattresses proposed for the Project.

Section 4 of this note collates information from the Chapter 7 Marine Physical Processes (REP4a-029) and from responses submitted during the Examination to provide evidence that the nearshore cable protection has been appropriately assessed and the conclusion of no Adverse Effect of Integrity on the WNNC SAC is robust. In summary, due to the commitment to installing low relief concrete mattresses which would be no higher than 0.35m (which represents a maximum water depth reduction of 2.3%), the environmental conditions, and the distance to the WNNC SAC, it is expected that bedform transport processes would revert to pre-installation levels in a matter of months and no Adverse Effect on Integrity (AEoI) would occur.

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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AEoI	Adverse Effect on Integrity
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
DCO	Development Consent Order
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
FLO	Fisheries Liaison Officer
GT R4	The Applicant. The special project vehicle created in partnership between Corio Generation (and its affiliates), Gulf Development and TotalEnergies
HDD	Horizontal Directional Drill
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
ODOW	Outer Dowsing Offshore Wind (The Project)
OWF	Offshore Wind Farm
SAC	Special Area of Conservation
SMP	Shoreline Management Plan
UK	United Kingdom
WNNC	Wash and North Norfolk Coast
AEoI	Adverse Effect on Integrity
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
DCO	Development Consent Order
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment

Terminology

Term	Definition
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation (and its affiliates), Total Energies and Gulf Development (GULF)), trading as Outer Dowsing Offshore Wind. The Project is being developed by Corio Generation, TotalEnergies and GULF.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor, in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the

Term	Definition
	assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS)
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
Maximum Design Scenario	The project design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed
Mitigation	Mitigation measures are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Order Limits within which the export cables running from the array to landfall will be situated.
Outer Dowsing Offshore Wind (ODOW)	The Project.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Study Area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.

1 Introduction and Document Purpose

1. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop the Project. The Applicant submitted an application for a DCO ('the Application') for the Project to the Planning Inspectorate in March 2024, which was accepted for Examination in April 2024. The Recommendation Report from the Planning Inspectorate is due to be submitted to the Secretary of State by 10 July 2025.
2. This note has been prepared to provide clarifications to address comments from Natural England on the topic of Marine Physical Processes, specifically with regard to the potential impacts of the nearshore cable protection on the WNNC SAC.
3. At the end of Examination, Natural England's position was that they were unable to rule out an adverse effect on integrity (AEoI) for the Project in combination with other projects and plans. This position arose from Natural England's uncertainties regarding the maximum design parameters for nearshore cable protection, its location relative to MLWS and the stability of the concrete mattresses.
4. Through the post-examination discussions, the Applicant and Natural England have agreed that the maximum design scenario parameters are suitable for the concrete mattresses.
5. This note is to address Natural England's concerns and to provide evidence to enable Natural England to conclude no AEoI for the WNNC SAC.

2 Project Context

6. Full Project details are provided within Environmental Statement (ES) Chapter 3: Project Description (REP5-009). The Applicant has provided a Maximum Design Scenario for the cable protection that may be required. With the exception of cable/pipeline crossing locations, cable burial is expected to be possible throughout the majority of the export cable corridor; this is based on current design assumptions and understanding of ground conditions. However, as a precaution, a maximum design scenariofor cable protection is included within the impact assessment to address any situation where cable burial is not ultimately possible (e.g., due to unexpected hard substrate being encountered during the pre-construction surveys or cable burial).
7. The Applicant has agreed a range of commitments for the design on the Project with stakeholders as mitigation of potential impacts. At application the Applicant had committed to the following:
   - the HDD exit pit being located in the subtidal zone, approximately 500m seaward from MLWS, therefore inherently reducing the need for cable protection in the shallow nearshore; and
   - HDD will be utilised for the landfall drill to avoid interactions with surface features by installing ducts under the intertidal area to exit pits which will be located a minimum of 500m offshore from MLWS. The HDD will be of sufficient depth to have no effect on the beach.
8. Throughout Examination Natural England raised concerns regarding cable protection in the nearshore. In response to this Applicant committed to the use of low profile cable protection in the nearshore zone at Deadline 4.
9. Following the introduction of this commitment, Natural England requested clarification of the Maximum Design Scenario (MDS) of the nearshore cable protection. This was provided by the Applicant directly to to Natural England on the 25 March 2025 and then submitted into Examination at Deadline 6 (response 2 in Table 2.21 of REP6-110).
10. The parameters consist of:
    - Nearshore cable protection beyond the subtidal HDD exit pit (located at least 500m seaward of MLWS in 1.5 to 2m water depth) to the Depth of Closure (7.1m water depth) will not exceed 0.35m in height
    - Maximum Length = 2,076m
    - Maximum Area = 12,456m^2
    - Maximum Volume = 4,359m^3
11. In a meeting post-examination between the Applicant and Natural England on 11 June 2025, Natural England confirmed they were satisfied with the parameters. The Applicant therefore considers this issue regarding the MDS of the nearshore cable protection resolved.

3 Concrete Mattress Stability

3.1 Dynamic Environment and Storm Events

12. At Deadline 4 the Applicant committed to the use of the low-profile concrete mattresses within the nearshore to address Natural England's concerns of height of cable protection. In the Risk and Issues Log (REP5-171) and Deadline 5 response (REP5-163) Natural England welcomed the commitment but raised concerns regarding the stability of the concrete mattresses and 'advise that further evidence is presented by the Applicant that concrete mattresses will not be moved in this dynamic environment and/or by fishing activities'.
13. The Applicant at Deadline 6 (Table 2-13, REP6-110) provided explanations and evidence to show engineering confidence in the stability of the concrete mattresses in the dynamic environment. The Applicant explained that a typical concrete mattress weighs approximately 9.5–10 tonnes and is constructed with a brick pattern to provide optimal flexibility, enabling it to conform to the seabed and the cable. Additionally, a concrete mattress is specifically designed for installation and lifting using specialized tools, with a primary focus on ensuring stability. The design of the mattresses is that they are heavy and very low profile—designed to stay in place and not move. They are built to settle into the seabed and therefore are resistant to being dislodged or lifted. If cable protection is required, it is highly unlikely concrete mattresses would become dislodged during storm events.
14. As noted in the Handbook of Scour and Cable Protection Methods (Deltares, 2023) a 'key feature of concrete block mattresses is their ability to withstand wave conditions in excess of the threshold for block uplift' and that 'enhanced stability is provided by the connection between the adjacent blocks'.
15. The standard design for concrete mattresses is shown in Figure 1 and Figure 2.

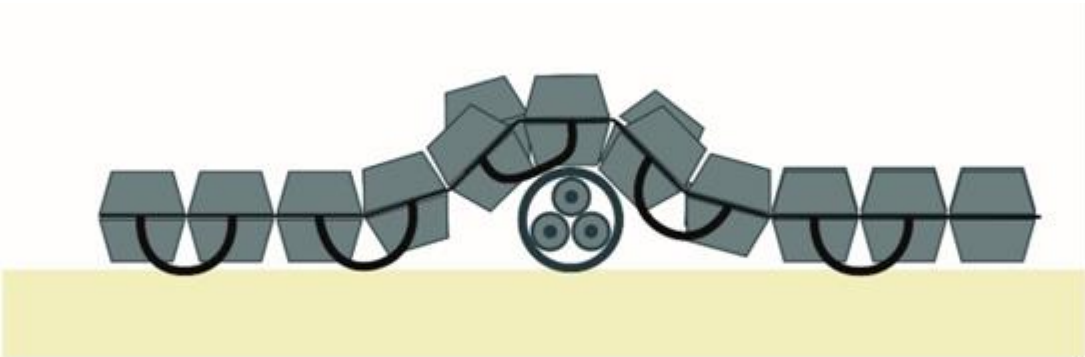

Figure 1 Cable Protection, Concrete Mattress Cross Section

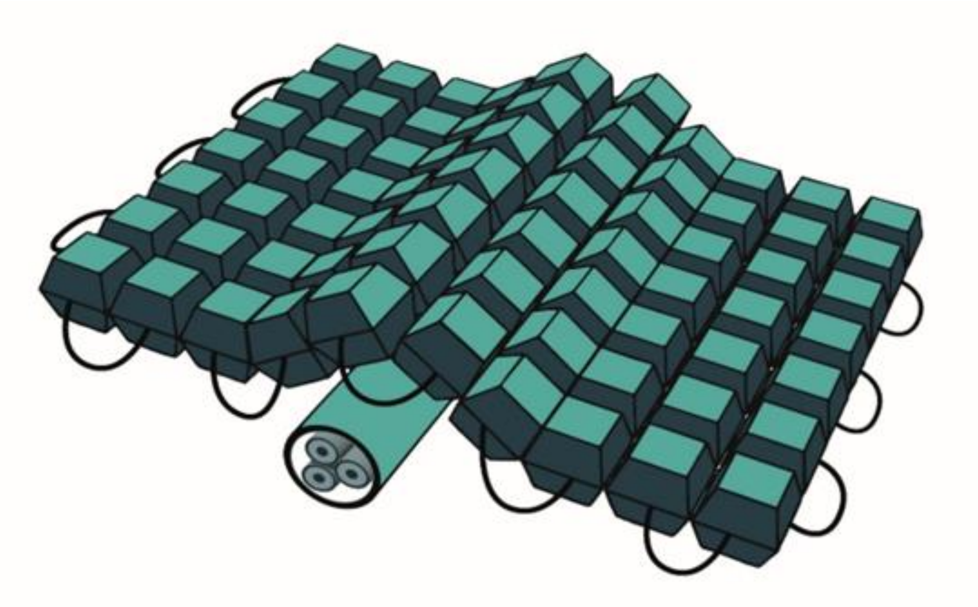

Figure 2 Cable Protection, Concrete Mattress 3D

3.2 Fishing Activities

16. The Environmental Statement Commercial Fisheries Assessment (Chapter 14 Commercial Fisheries REP5-027 and Appendix 14.1 Commercial Fisheries Baseline Technical Report APP-170) identifies that only brown shrimp (*Crangon crangon)* trawlers operate within the nearshore area around the Offshore ECC.
17. As set out in Appendix 14.1 Commercial Fisheries Baseline Technical Report (Tables 14.5-14.7 APP-170), the vessels for brown shrimp operating in proximity to the Offshore ECC are 'light' trawlers:
    - these are typically 7 -18m in length, compared with 25m to 45m for flat fish beam trawlers;
    - have low horsepower engines (50hp to 300hp) compared to flat fish beam trawlers (500hp to 2,000hp); and
    - operate at lower speeds (1 to 3 knots) compared with flat fish beam trawlers (3.5 to 8 knots).
18. For comparison, Rigid Inflatable Boats (RIBs) used for leisure, diving, and rescue purposes range from 2.5 to 10m in length with 10hp to 400hp engines.
19. As such, light trawlers are unlikely to dislodge a concrete mattress weighing 9.5-10 tonnes and the Applicant is not aware of any situations where this has occurred. Additionally, fishing vessel activity is relatively low in the area around the Offshore ECC (see Figure 3 below), with greater densities of fishing vessels observed approximately 10km to the south of the Offshore ECC in the Wash.

20. One of the key design features of the concrete mattresses is the binding between the blocks of the concrete mattresses, this forms an additional stabilisation measure that remedial rock placement does not have. In the event of contact with an anchor or fishing gear, the blocks will be bound together to ensure the affected blocks are anchored in place.
21. Under Condition 7(10), Schedule 11 of the DCO, the Applicant also has to provide the location of cable protection to be included on nautical charts, a notice to mariners will also be issued at least 14 days prior to commencement of any licenced activities[1], so Fishers will be aware of the locations and able to divert and avoid if necessary.
22. Overall, due to the low numbers of smaller trawling vessels operating in proximity to locations where cable protection may be placed in the nearshore area, the risk of cable protection being moved by fishing vessels is considered to be low.

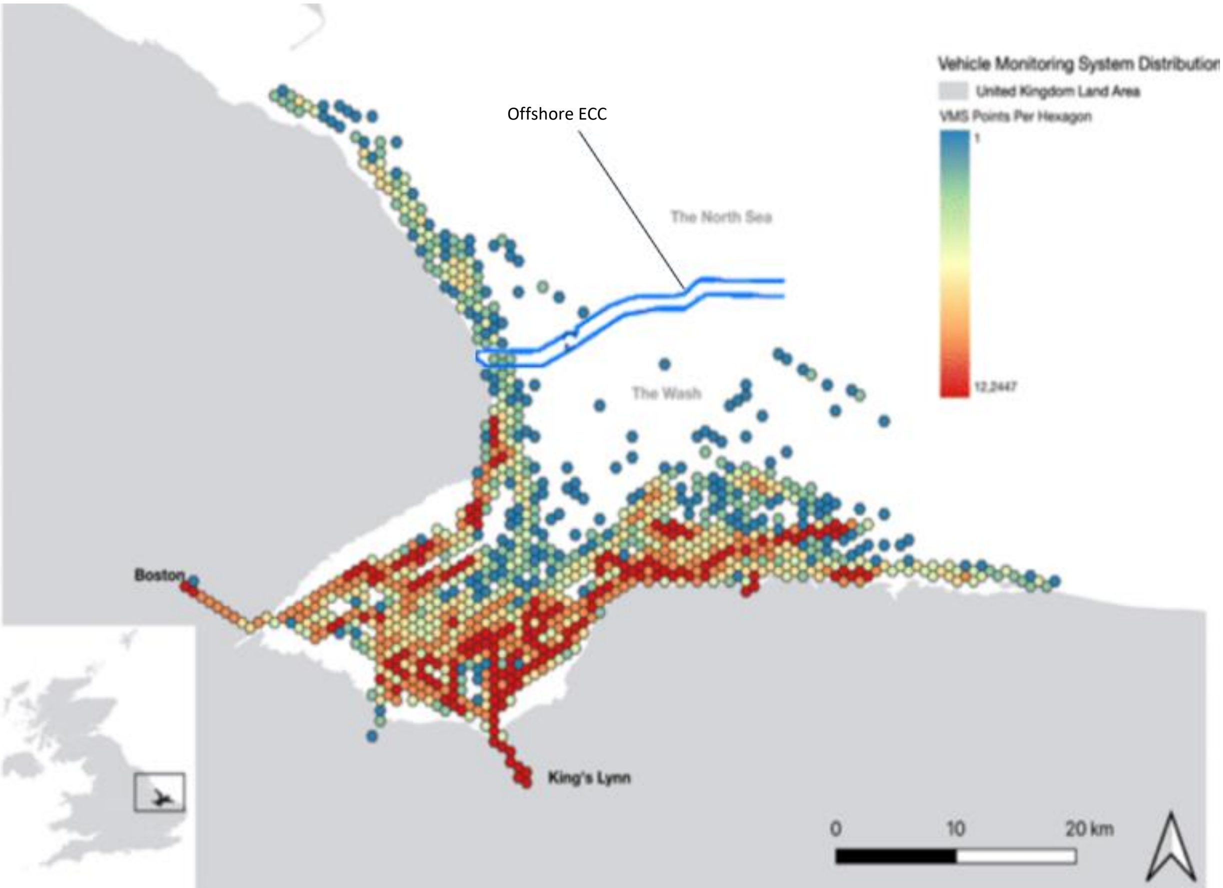

Figure 3: Map of Vessel System Monitoring data showing fishing efforts from 2018-2021 in hexagonal heat-map with cooler colours (blue, green) representing lower point density and warmer colours (red, orange) representing higher point density (Matthews, 2022)

[1] In accordance with dML condition 7 (8) of Schedules 10, 11, 12, 14, 15 and 16 of the DCO.

3.2.1 Fisheries Liaison Officer Statement

23. The Project's Fisheries Liaison Officer (FLO) has engaged with local fishers from 2021 and has strong knowledge and insight into the fishing activities in the area. The FLO was consulted on any potential trawling activity in June 2025 and explained that, whilst there is always potential for trawling activities, they are not likely within the nearshore area of the Offshore ECC. The FLO confirmed they are not aware of any vessels trawling up the nearshore area of the Lincolnshire Coast.
24. The FLO also explained that skippers in the area logged in their plotters the exact position of any the soft ground best suited for shrimp and also logged any obstructions (fasteners) they have encountered in the past and will steer clear. The Wash is also the home port of the fishers, and they tend to keep the efforts closer to the port to reduce fuel costs.
25. The FLO added further that the shrimp gear uses a light beam trawl using a small mesh net and it is not very robust, and therefore likely to tear if it came fast. Likewise, the "beam" would have "shoes" at either end, a bit like a ski or sledge, which lifts the beam about a foot from the seabed and can ride over low lying obstructions and keeping the beam out of the mud. As such, it is highly unlikely trawling will occur in the nearshore area of the ECC, and therefore highly unlikely that trawling would lead to concrete mattresses being removed.

4 Nearshore Cable Protection Impact Assessment

4.1 Impact Assessment for Sediment Transport

26. As presented in Chapter 7 Marine Physical Processes (REP4a-142), the dominant direction of longshore sediment transport along the Lincolnshire Coast (including at i) is towards the south and predominately under the control of the wave regime (HR Wallingford *et al*., 2002; Environment Agency, 2011). Whilst interpretated longshore drift rates for the wider coast at Landfall are shown to be in the range 100,000m^3/year to 300,000m^3/year (HR Wallingford *et al*., 2002), values specific to Anderby Creek (at the northern extent of Landfall) for 50m cross-shore intervals from the seawall[2] are shown in Table 1 (extracted from Table 7.15 in Chapter 7 Marine Physical Processes (REP4a-142)).

Table 1: Estimated longshore sediment transport rates at Anderby Creek (HR Wallingford et al., 2002).

Distance from seawall (m)	Spring tide cumulative longshore transport rate (10^6m^3/year) (-ve southwards)	Neap tide cumulative longshore transport rate (10^6m^3/year) (-ve southwards)
0	0.00	0.00
50	-0.07	0.00
100	-0.10	-0.23
150	-0.22	-0.41
200	-0.28	-0.56
250	-0.35	-0.76
300	-0.46	-0.98
350	-0.55	-1.13
400	-0.62	-1.24
450	-0.98	-1.48

27. When considering the impacts of the nearshore cable protection upon longshore sediment transport, the following facts become important:

- Nearshore cable protection is to be placed no closer than 500m seaward of MLWS, which represents the subtidal HDD exit pit location, as secured in the Outline Cable Specification and Installation Plan (REP6-062).
- Nearshore cable protection seaward located from 830m to 900m[3] beyond the 'seawall' will not exceed 0.35m in height, as secured in the Outline Cable Specification and Installation Plan (REP6-062).

[2] Assumed to be the vegetated dune bank, based upon Environment Agency (2011) and satellite imagery data.
[3] MLWS is located between 330m and 400m from the 'seawall'. The HDD exit pit is to be located at least 500m seaward of MLWS.

- The longshore transport rates shown up to 450m are presented in Table 1, noting that longshore transport will continue beyond this distance to HDD exit pit (830m to 900m) and beyond to the Depth of Closure.
- Landfall is located within Shoreline Management Plan (SMP) Unit (O) (Viking Gas Terminal to southern end of Skegness (Environment Agency, 2024). SMP Units are defined based upon '*analysis of coastal processes and the character of the shoreline*' (Environment Agency, 2024). In Unit O, there will be no change from the present management over the short and medium term (up to 2055), with a consideration of management options to be undertaken for up to 2105. The inclusion of the southern SMP Unit boundary at Skegness indicates a change of coastal processes and shoreline character to the south from Seacroft to Gibraltar Point (Unit P).
- Water depths from 500m beyond MLWS to the Depth of Closure range from 1.5m to 7.1m. The placement of 0.35m high concrete mattresses within the agreed cross-shore extent represents a water depth reduction of between 2.3% and 0.49%, respectively. This in turn presents a minimal barrier to the passage of waves and thus any wave-induced sediment transport (Five Estuaries, 2024).

28. The physical laws of sediment dynamics are such that, in areas of active bedload sediment transport, including that shoreward of the Depth of Closure, any seabed protrusion, such as concrete mattresses, may interrupt the transport. However, although the protection presents an obstruction to the bedload transport, sediment will first accumulate on the northern[4] side of the mattress up to its height (0.35m). With continued transport, the accumulation would persist until a 'ramp' is formed. The angle of this ramp will depend on the sediment properties (e.g., grain size, cohesiveness) and the flow (tides; waves) conditions. Bedload processes will continue to transport sediment over the ramp and past the mattresses. Therefore, the gross patterns of bedload transport across the cable protection would continue—as noted by Mariani *et al*., (2010)'*every coastal structure that interrupts the natural littoral drift will eventually be filled to capacity and sand will start bypassing*'.
29. Given the inherent variability of the (i) forcing hydrodynamic conditions (tidal flows; high-frequency, low-energy events; low-frequency, high-energy events) alongside that of (ii) sediment supply, resulting from up-drift supplies (as indicated in Table 1) and beach nourishment activities, it is not possible to provide an exact quantification of the time period over which this would occur (da Silva, GV. *et al*., 2019). However, due to the low relief of the concrete mattresses upon the seabed relative to the depth of water (paragraph 17), if cable protection is required, alongside the active sediment supply, it could be reasonably expected that bedform transport processes would revert to pre-installation levels over the order of months.

[4] as the dominant sediment transport direction is to the south.

4.2 Wash and North Norfolk Coast SAC

30. Further consideration is afforded with direct reference to Natural England's concerns raised regarding the nearshore cable protection specifically impacting sediment transport to the WNNC SAC, located circa 14.8km[5] to the south of Landfall in the adjacent SMP Unit P. It is reasonable to conclude that the small-scale (localised; 6m wide; 2,076m long[6]; at least 500m seaward of MLWS) presence of the concrete mattresses, when considered relative to the regional sediment transport pathways responsible for the form and function of the SAC, would not result in an AEoI.
31. An overview of the regional sediment pathways which are important when considering the evolution and behaviour of the WNNC SAC, as presented as Figure 7.12 of Chapter 7 Marine Physical Processes (APP-093), is based upon a data-driven analysis by Kenyon and Cooper (2005) (Figure 4) and has now been supported by a numerical model-driven analysis (Figure 5) within the Atlas of UK Renewable Energy Resources (ABPmer, 2025). As shown in both figures, sediment transport to the WNNC SAC is multi-faceted and not solely dependent upon longshore sediment transport along the Lincolnshire coast. Further, the potential for sediment transport, as shown in to be 'high to very high' across the entirety of the mouth of The Wash

[5] Distance from Landfall along the coast to the SAC boundary.
[6] This value is the total length in aggregate, whereas in reality this protection would be present in discrete sections.

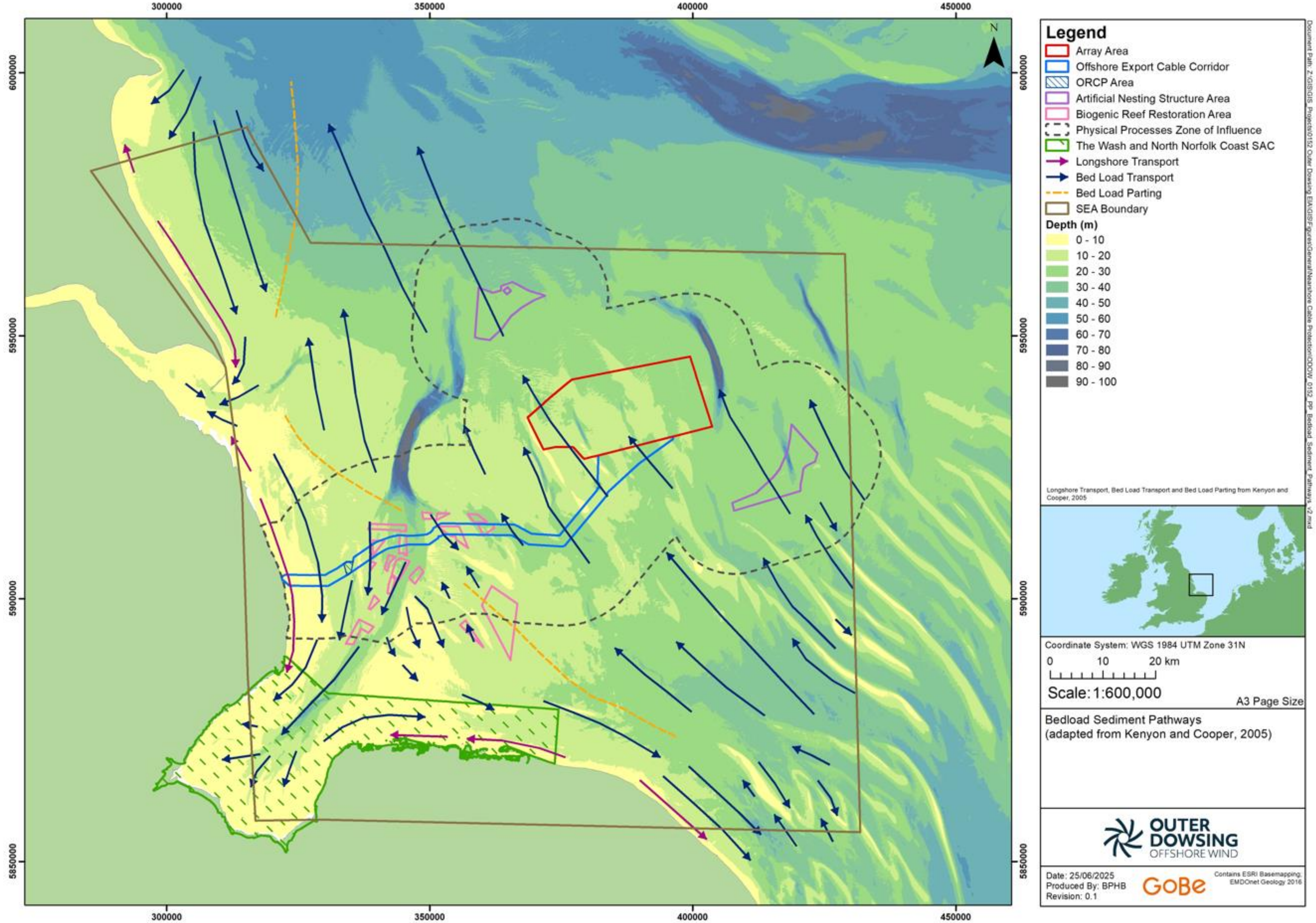

Figure 4: Regional sediment transport pathways of relevance to the Wash and Norfolk SAC, derived from data-driven analysis (Kenyon and Cooper, 2005)

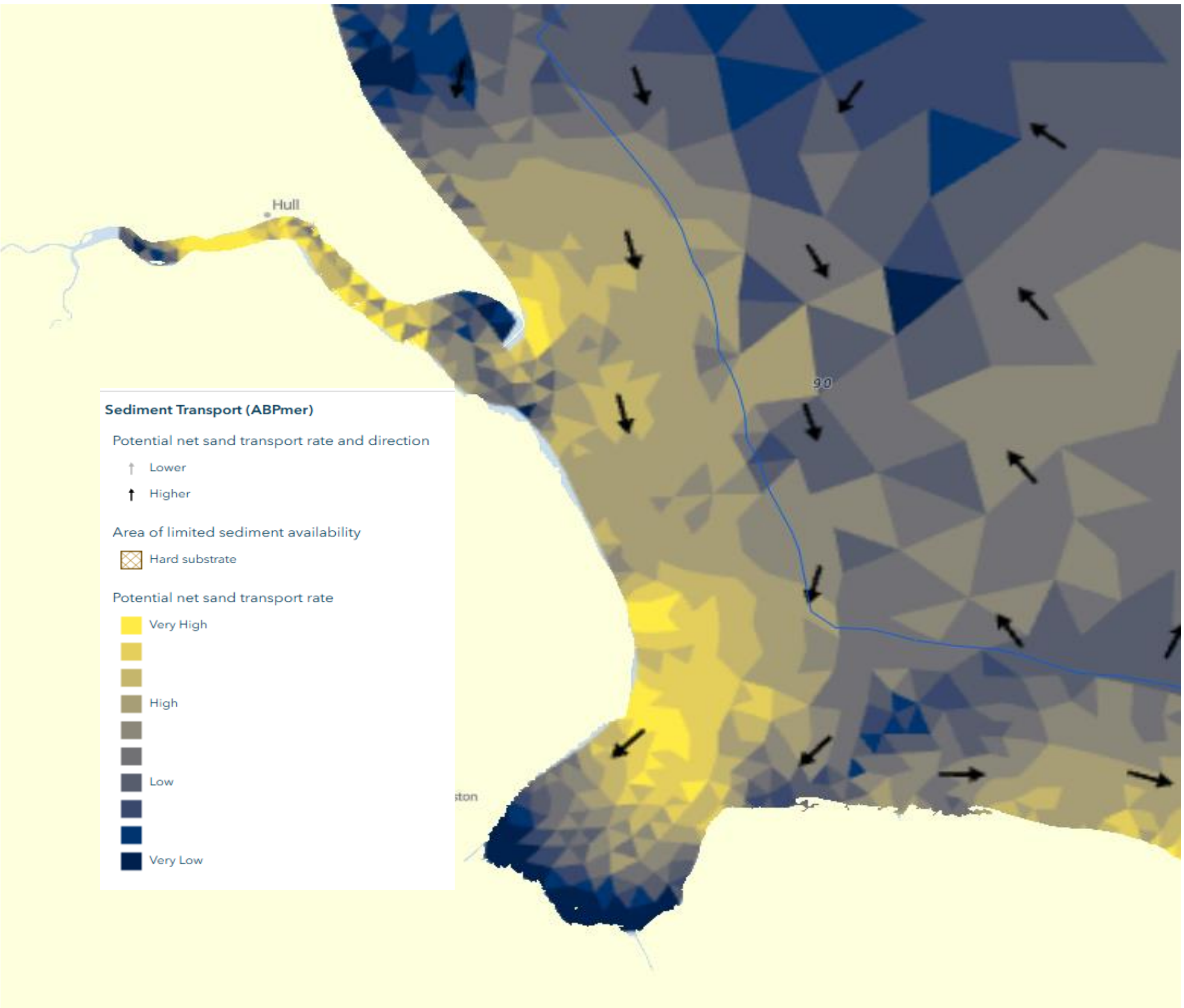

Figure 5: Regional sediment transport pathways of relevance to the Wash and Norfolk SAC, derived from numerical model-driven analysis (ABPmer, 2025)

32. Consideration of the potential impacts of nearshore cable protection can also be undertaken from landfall and nearshore cable protection for the Triton Knoll OWF. As shown in Figure 6 , there is no distinct regional change in adjacent or downdrift shoreline form following the installation of the Triton Knoll offshore HDD exit pit in circa 7m water depth. Noting that as presented in Chapter 7 Marine Physical Processes (REP4a-142), the cross-shore profile along the Lincolnshire coastline is continually evolving as a result of, for example, natural variations in hydrodynamic forcing and the placement of beach nourishment material (see Figure 6)

Figure 6: Aerial imagery for the period 2018 to present, at the location and downdrift of, the installed Triton Knoll landfall.

5 Conclusions

33. The Applicant considers that no AEoI upon the WNNC SAC would occur resulting from the placement of the nearshore concrete mattresses due to the following:

- the mattresses represent a localised, small-scale interruption to sediment transport when considered alongside regional sediment transport pathways, important to the form and function of the WNNC SAC;
- landfall is located within SMP Unit O which has distinctly different coastal processes and shoreline character to that of Unit P, within which the WNNC SAC is located;
- following concerns raised by Natural England, the Applicant removed the option of using a combination of rock protection or cable mattresses (with a maximum design scenario of 1.5m in height), by committing to only using low profile (no higher than 0.35m) concrete mattresses in the nearshore area (if cable protection is required). This commitment amounts to a 76% reduction from the original maximum design scenario;
- the low-relief of the mattresses (0.35m) represents a reduction in water depth of up to 2.3%. As such, it is likely that sediment transmission (Hanson and Kraus, 2011) will resume over the obstacle over the order of months; and
- the presence of the mattresses, if installed, will be from 500m from MLWS and thus potential blockage effects would represent a very small proportion of the cross-shore area.

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