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Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Technical Note: Marine Biodiversity – Fish and Shellfish Ecology (MBTN02)

EHE7228B
Liverpool Bay CCS Limited
Version Rev01
July 2024
Offshore ES

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Date
01	First issue	BP	LS		10/07/2024
02	Updates in response to Client Comments	BP	LS		16/07/2024

File Reference

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Glossary

Term	Meaning
Effect	The consequence of an impact
Environmental Impact Assessment	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 assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Impact	A change that is caused by an action
Magnitude	Size, extent, and duration of an impact.
Maximum Design Scenario	The maximum design parameters of each Proposed Development asset (both on and offshore) considered to be a worst case for any given assessment but within the range of the Project Description Envelope.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in Chapter 3: Proposed Development Description.
The Applicant	Liverpool Bay CCS Ltd.

Acronyms and Initialisations

Acronym / Initialisation	Description
CCS	Carbon Capture and Storage
IEF	Important Ecological Feature
MarESA	Marine Evidence Based Sensitivity Assessment
NRW	Natural Resources Wales
PoA	Point of Ayr
PSA	Particle Size Analysis
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SSC	Suspended Sediment Concentration

Units

Acronym	Description
%	Percent
cm	Centimetres (distance)
kg/s	Kilograms per second
km	Kilometres
m	Metres (distance)
mg/l	Milligrams per litre (concentration)
mm	Millimetres (distance)
m^3/m/year	Metres cubed per metre per year

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1 MARINE BIODIVERSITY: FISH AND SHELLFISH ECOLOGY

1.1 Introduction

This Technical Note provides further information, detail, and assessment to the information presented in Volume 2, Chapter 7 of the Environmental Statement (Marine Biodiversity) and should be read alongside it. This Technical Note is focussed solely on the Fish and Shellfish Ecology element of the Marine Biodiversity chapter of the ES. Additional Technical Notes have been produced for Benthic Subtidal and Intertidal Ecology, Marine Mammals and Marine Turtles, and the Report to Inform Appropriate Assessment (RIAA).

1.2 Consultation

Post-application consultation was received on the 13th of May 2024 from Natural England and on the 14th of May 2024 from Natural Resources Wales (NRW). This has been summarised in Table 1.1.

Table 1.1: Post-Application Consultation for Fish and Shellfish Ecology

Consultee	Consultation	Where and How Addressed
NRW	Clarification required for Table 3.3: Sediment Particle Percentage Contributions Used To Determine Herring And Sandeel Spawning Suitability in the ES. The table has the figures transposed for ‘suitable’ and ‘subprime’ areas for herring suitability. NRW (A) seek clarity if the correct terms been used in the text.	Corrected classifications for herring spawning substrate suitability are presented in **section 1.3**, to correct the error in the substrate composition proportions carried through from the Reach *et al.* (2013) source. This correction applies to five stations, with the classification of ‘suitable’ and ‘sub-prime’ amended. No changes apply to any stations which were classed as ‘unsuitable’ habitat for herring spawning. Classifications and interpretation presented for sandeel within Volume 2, Chapter 7 of the Environmental Statement are confirmed to be correct, and no changes apply to the information presented in the Application.
NRW	NRW (A) advise that further evidence is required to support the assessment to the impacts from increases in Suspended Sediment Concentration (SSC) and associated deposition (siltation and turbidity effects) on the Dee Estuary Cockle beds. The suspended sediment plume generated by the trenching activities will extend into the Dee Estuary Special Area of Conservation (SAC) and could potentially impact the Cockle beds. The assessment notes average sedimentation is limited to <100 mm with peak values of 70 mm, however outside the area of project physical work, deposition is limited to levels of <3 mm. NRW (A) seek confirmation of what the sedimentation over the cockle beds is predicted to be as it is unclear from the figures provided in Volume 3, Appendix H: Physical Processes Technical Report. It would also be useful to understand how quickly this sediment is expected to re-suspend. From our interpretation it appears the predicted levels of sediment deposition	An assessment of the effects of SSCs and associated deposition specifically upon the Dee Estuary cockle beds is presented in **section 1.4**. This assessment results in a negligible adverse significance, which is not significant in EIA terms. The Marine Licence application and Environmental Statement (ES) presented two cable route options to negotiate the West Hoyle Spit. The Applicant can confirm that the worst-case route

Consultee	Consultation	Where and How Addressed
	are below the pressure benchmark for the species (5 cm), but confirmation is sought to support the conclusions of the assessment.	option, across the West Hoyle Spit, will no longer be pursued. The alternative option to the east is now the preferred option and will be taken forward to detailed design by our EPC contractor. This means that the worst-case SSCs and subsequent sedimentation associated with the trench excavation, are not predicted to occur within the Dee Estuary SAC and the associated Cockle Beds. This is because the cable will be installed through a simultaneous lay and burial using a trencher of plough pulled behind the cable lay vessel. The installation of the cable from the landfall across the Welsh Channel and around the eastern end of the West Hoyle Spit activity is likely to be completed within a period of between 24-48 hours. Thereby resulting in a much reduced volume and duration of potential suspended sediment.

1.3 Herring Spawning Substrate Suitability

Of the 23 grab samples collected during the Carbon Capture and Storage (CCS) area survey, the Particle Size Analysis (PSA) results indicate that only one sampling station (GS19) is classified as 'sub-prime' (or 'preferred') habitat for herring spawning under the Reach *et al.* (2013) methodology. The remaining 22 sampling stations were classified as 'unsuitable' (Figure 1.1). Similarly, of the 53 grab samples collected within the decommissioning area, 49 were classified as 'unsuitable' and just four were classified as 'suitable' (or 'marginal'; GS38, GS47, GS53, and GS54; Figure 1.1). Overall, 1.31% of all sampling stations were classified as 'sub-prime' spawning habitat, 5.26% as 'suitable', and 93.42% were 'unsuitable'.

This corrects the data presented in the Volume 2, Chapter 7 of the Environmental Statement which carried through the error presented in the Reach *et al.* (2013) source. This correction reflects a change between those stations classified as 'suitable' and 'sub-prime' only (a total of five stations). No changes apply to any stations classified as 'unsuitable'.

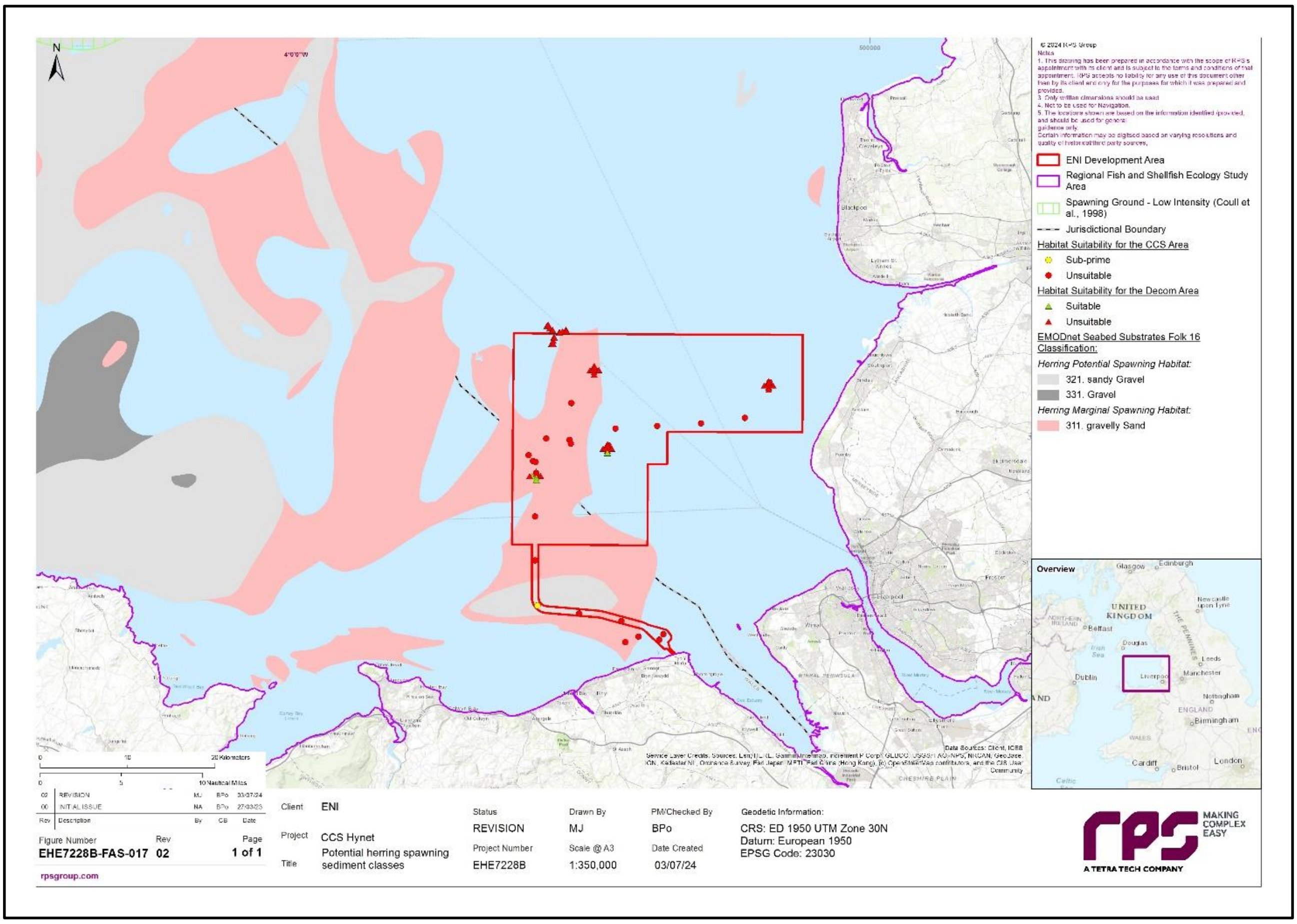

Figure 1.1: Updated Herring Spawning Habitat Suitability Assessment Within The Eni Development Area

1.4 Dee Estuary Cockle Beds

NRW requested further evidence to support the assessment to the impacts from increases in SSCs and associated deposition (siltation and turbidity effects) on the Dee Estuary cockle beds. While the common cockle *Cerastoderma edule* (and therefore the cockle beds within the Dee Estuary) was assessed as an Important Ecological Feature (IEF) in Volume 2, Chapter 7: Marine Biodiversity, further information has been presented in this section, in the form of Magnitude of Impact, Sensitivity of the Receptor, and Significance of Effect for the cockle beds of the Dee Estuary in particular.

1.4.1 Magnitude of Impact

1.4.1.1 Cable Trenching

Based upon the modelling presented in Volume 3: Physical Processes Technical Report, the largest sediment plumes associated the Eni Development Area will be generated by cable installation activities in the construction phase. The largest plume with the potential to extend into the Dee Estuary is associated with cable trenching of the Point of Ayr (PoA) Terminal to Douglas cable (Figure 1.2 and Figure 1.3). During the period with maximum SSCs over the course of the trenching of this cable, the plume may extend into the Dee Estuary (Figure 1.2), however SSCs will remain at background levels (<1 mg/l) across the majority of the Dee Estuary (Figure 1.2).

Average SSC values are greatest in the immediate vicinity of the cable route, particular over the shallow waters of West Hoyle Spit, where SSCs may reach 1,000 mg/l in the shallowest water but are quickly reduced to background levels a short distance from the source (Figure 1.3). Maximum and average sedimentation levels will be greatest at the location of the trenching activity and may be up to 160 mm in depth where the coarser material has settled within close proximity to the source (Figure 1.4 and Figure 1.5). However, within the Dee Estuary, sedimentation will be largely <0.1 mm, with a small area of between 0.1 – 0.5 mm at the Estuary mouth (Figure 1.4 to Figure 1.5). An analysis of sedimentation at slack water one day after the cessation of trenching showed that some of the previously sedimented material has been re-suspended, only to settle again at slack water, and values within the Dee Estuary remained at <0.5 mm (Figure 1.6). Sedimentation levels at the Dee Estuary cockle beds are therefore predicted to be below the Marine Evidence Based Sensitivity Assessment (MarESA) pressure benchmark for common cockle of 5 cm as a result of trenching of the PoA Terminal to Douglas cable.

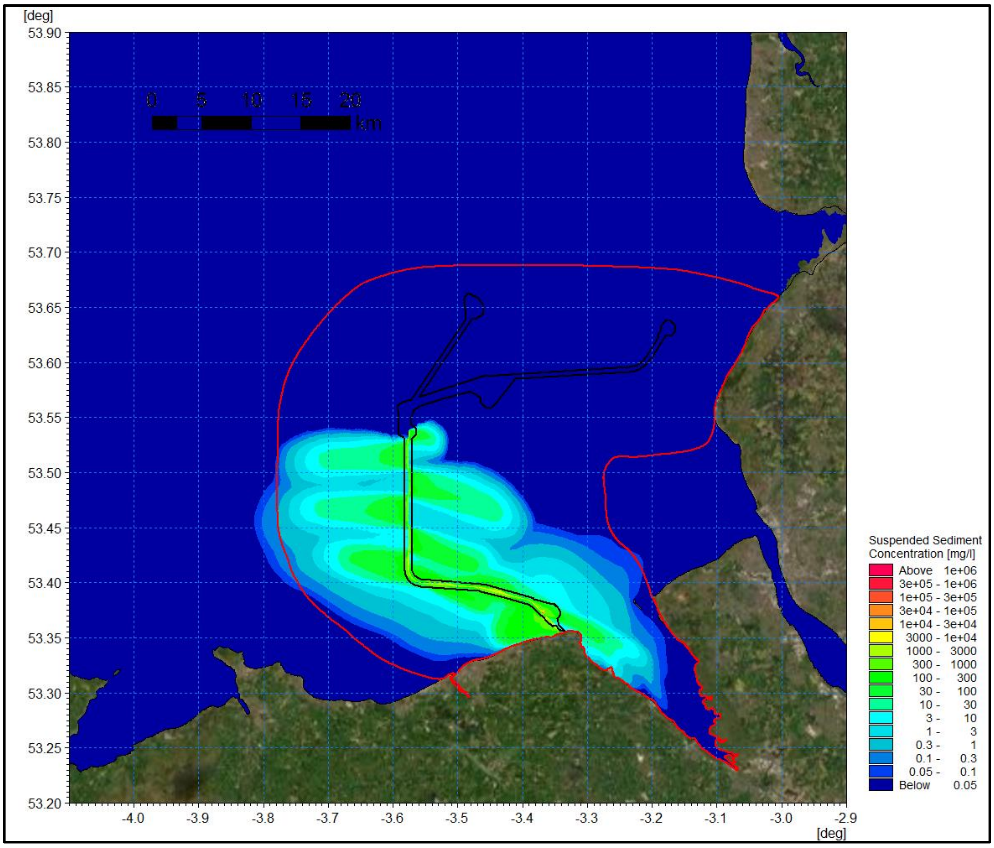

Figure 1.2: Maximum SSCs over the Trenching Phase - PoA to Douglas

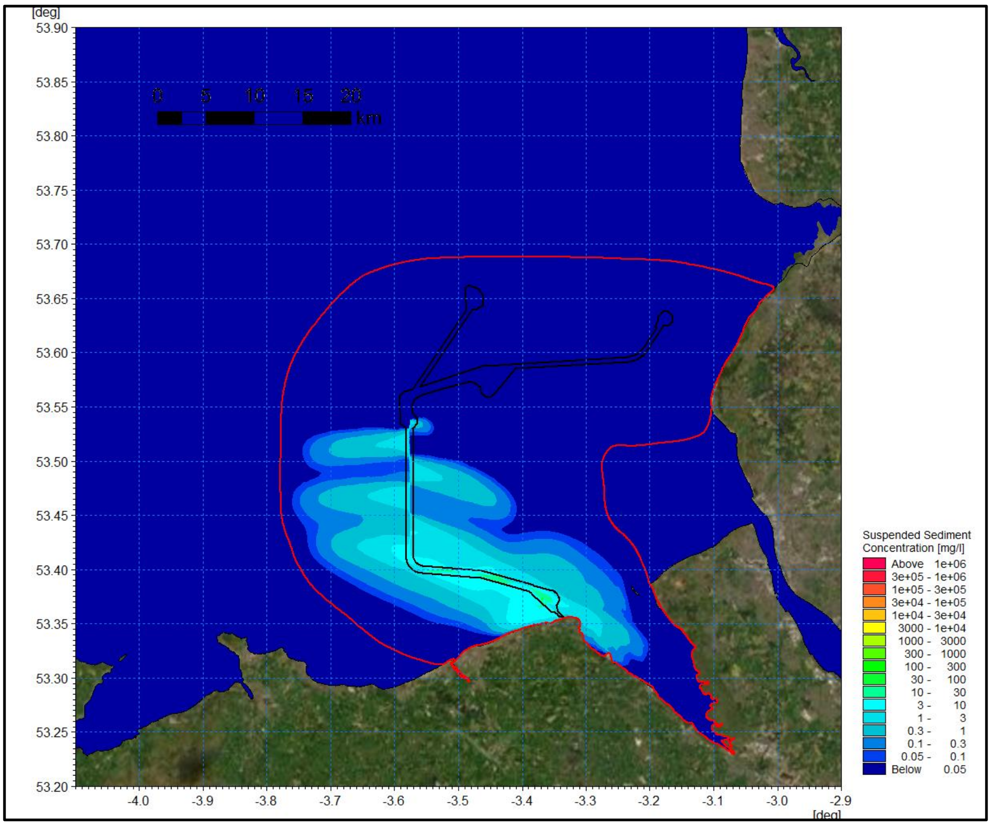

Figure 1.3: Average SSCs over the Trenching Phase - PoA to Douglas

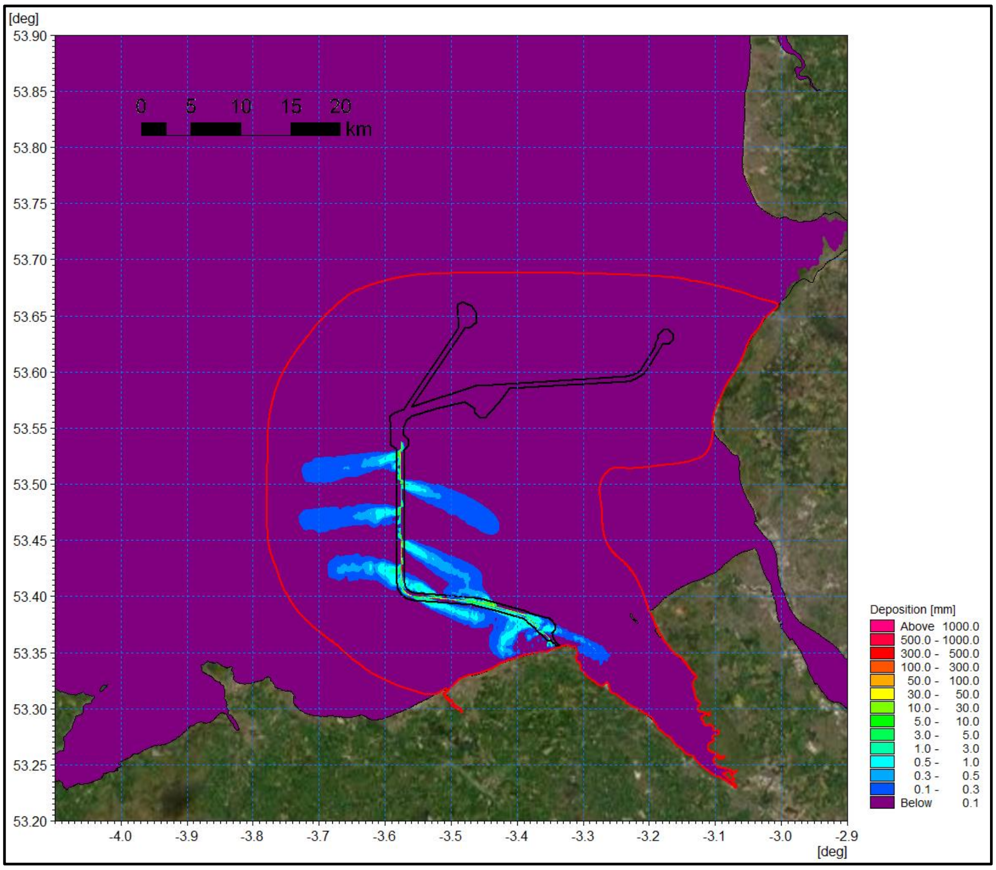

Figure 1.4: Maximum Sedimentation over the Trenching Phase – PoA to Douglas

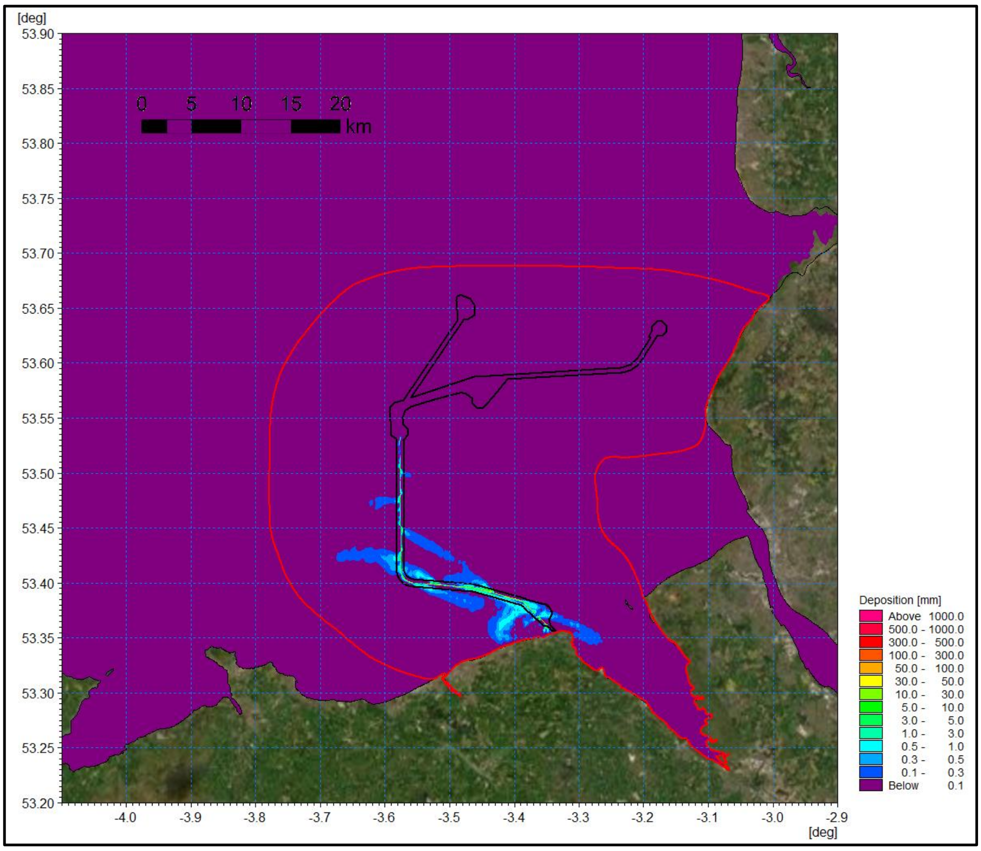

Figure 1.5: Average Sedimentation over the Trenching Phase – PoA to Douglas

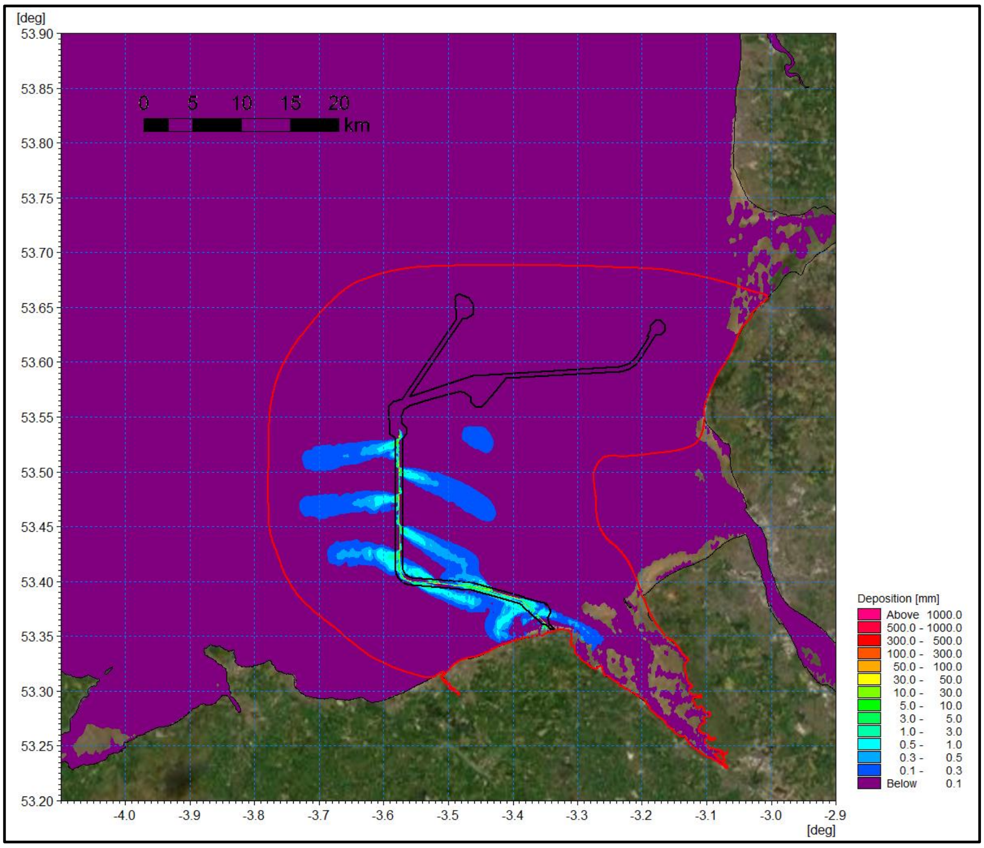

Figure 1.6: Sedimentation One Day After Cessation of Trenching – PoA to Douglas

1.4.1.2 Dredging at West Hoyle Spit

Based upon the modelling detailed in Volume 3: Physical Processes Technical Report, the dredging of a channel through West Hoyle Spit was simulated. The channel was 1 km in length, with a depth of 7 m and a width of 21 m, and was modelled with a rate of release of approximately 295 kg/s uniformly throughout the water column. The operation was modelled to take approximately 14 days to complete over a range of tidal conditions.

As shown in Figure 1.7 and Figure 1.8, SSCs during dredging are concentrated around the dredge path and the coastline at the mouth of the Dee Estuary, with maximum plume extents reaching 25 km southeast to the mouth of the River Dee. Maximum SSC values in excess of 3,000 mg/l occur along the dredging route itself, to a peak of approximately 3,200 mg/l, reflecting the shallow water depths. Concentrations are seen to be generally greater inshore where water depths are shallower. Along the western coast of the Dee Estuary maximum values can fall within the range of 3,000 mg/l to 10,000 mg/l, however in most areas fall below 30 mg/l (Figure 1.7). Average SSCs within the Dee Estuary are largely <3 mg/l (Figure 1.8).

SSCs on the final day of dredging (day 14) on both an ebb and a flood tide are presented in Figure 1.9 and Figure 1.10. These figures show that SSCs are largely < 0.05 mg/l throughout most of the Dee Estuary, with some elevated SSCs of up to 3 – 10 mg/l in the northwest corner. This highlights the short-term nature of this impact on the Dee Estuary.

The maximum and average sedimentation values presented in Figure 1.11 and Figure 1.12 show deposition of < 0.1 mm throughout the majority of the Dee Estuary, and between 0.1 – 3 mm in the northwest corner. Average sedimentation values outside of the dredge path are generally limited to < 50 mm, and < 10 mm outside of the area of development area and at negligible levels into the mouth of the Dee Estuary (< 50 mm). Sedimentation one day after the cessation of dredging activity further demonstrates that deposited material is focused in close proximity to the dredge path (Figure 1.13). Sedimentation levels at the Dee Estuary cockle beds are therefore predicted to be below the MarESA pressure benchmark for common cockle of 5cm as a result of dredging at West Hoyle Spit.

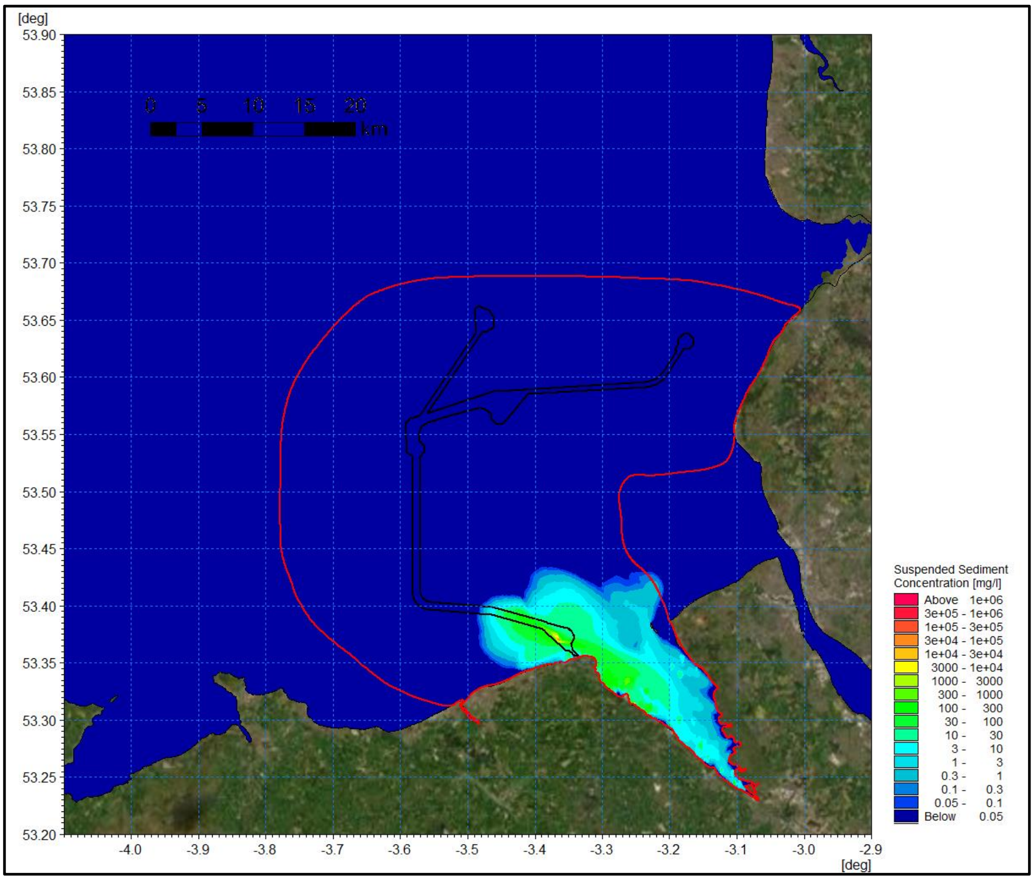

Figure 1.7: Maximum SSCs over the Dredging Phase – West Hoyle Spit

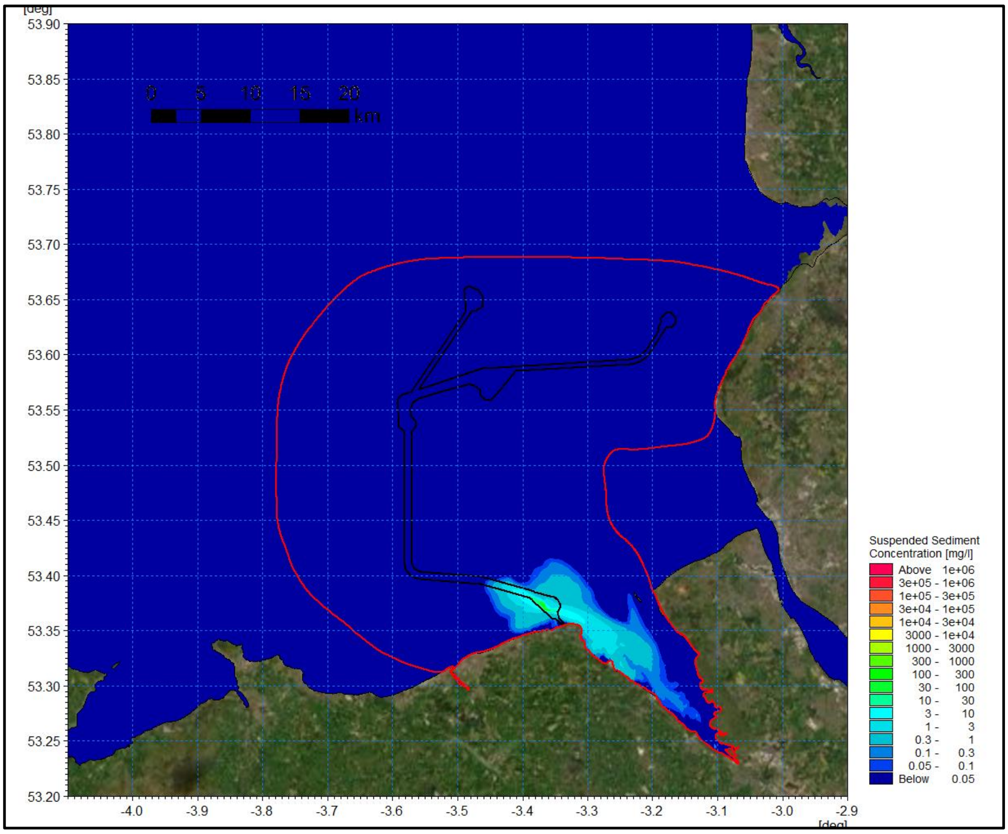

Figure 1.8: Average SSCs over the Dredging Phase – West Hoyle Spit

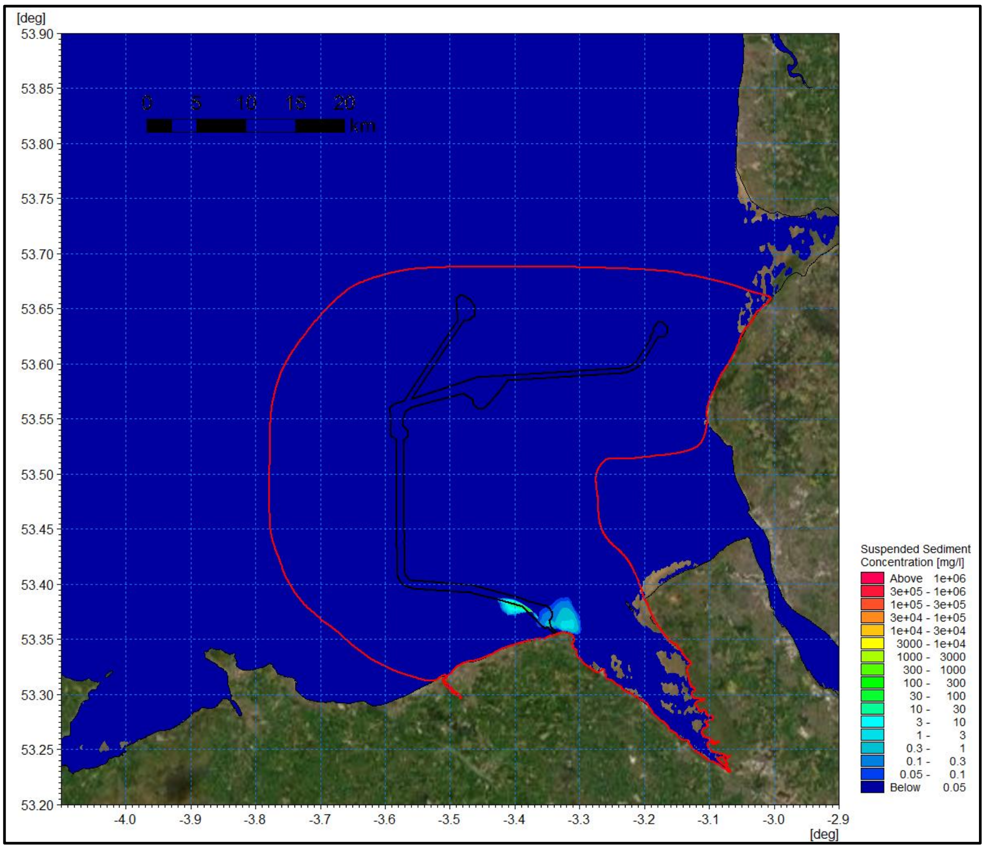

Figure 1.9: SSCs on the Final Day under an Ebb Tide – West Hoyle Spit

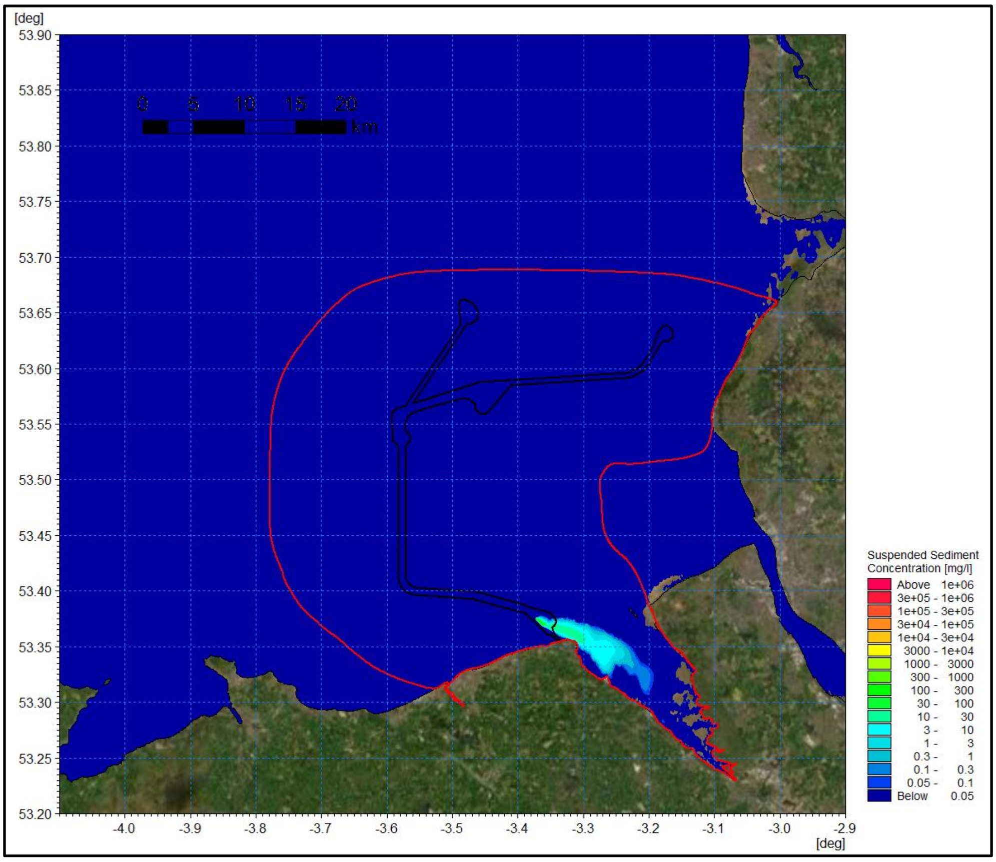

Figure 1.10: SSCs on the Final Day under a Flood Tide – West Hoyle Spit

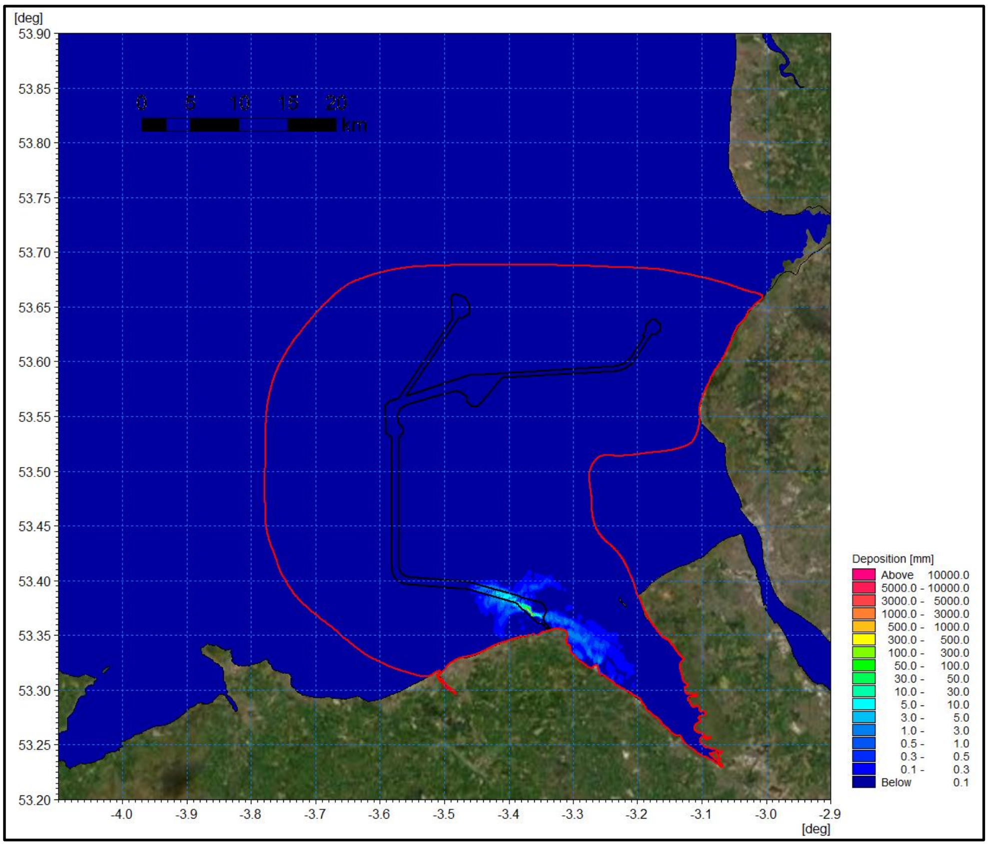

Figure 1.11: Maximum Sedimentation over the Dredging Phase – West Hoyle Spit

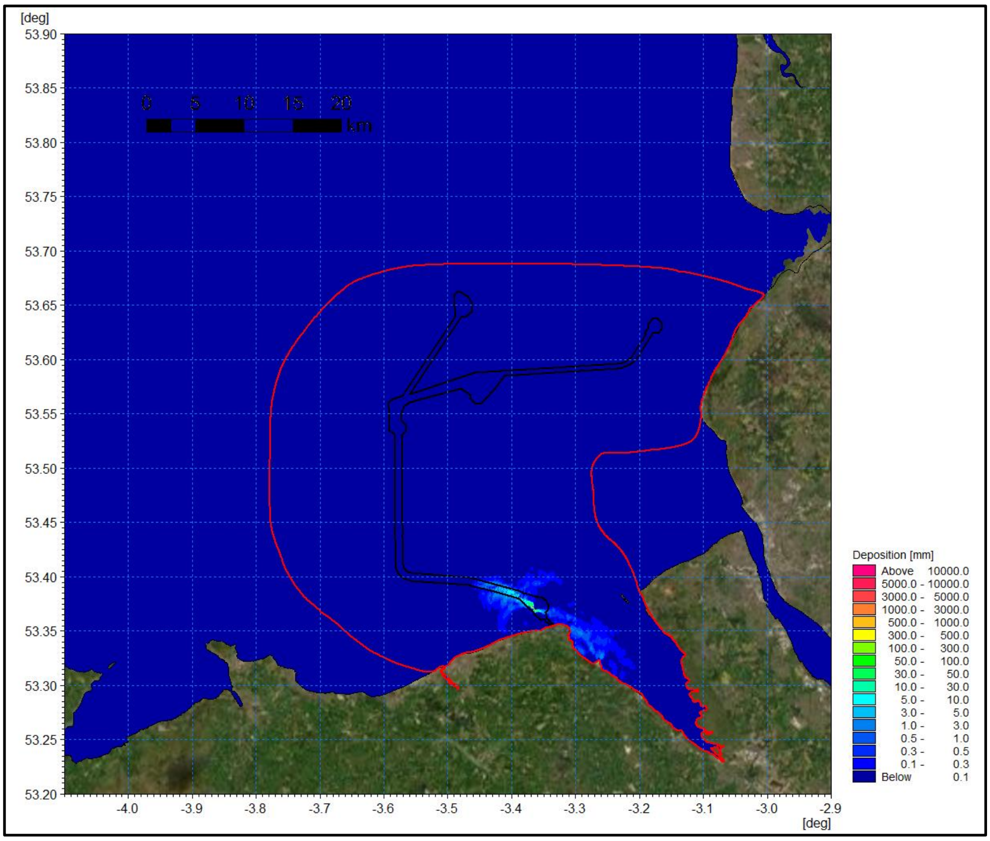

Figure 1.12: Average Sedimentation over the Dredging Phase – West Hoyle Spit

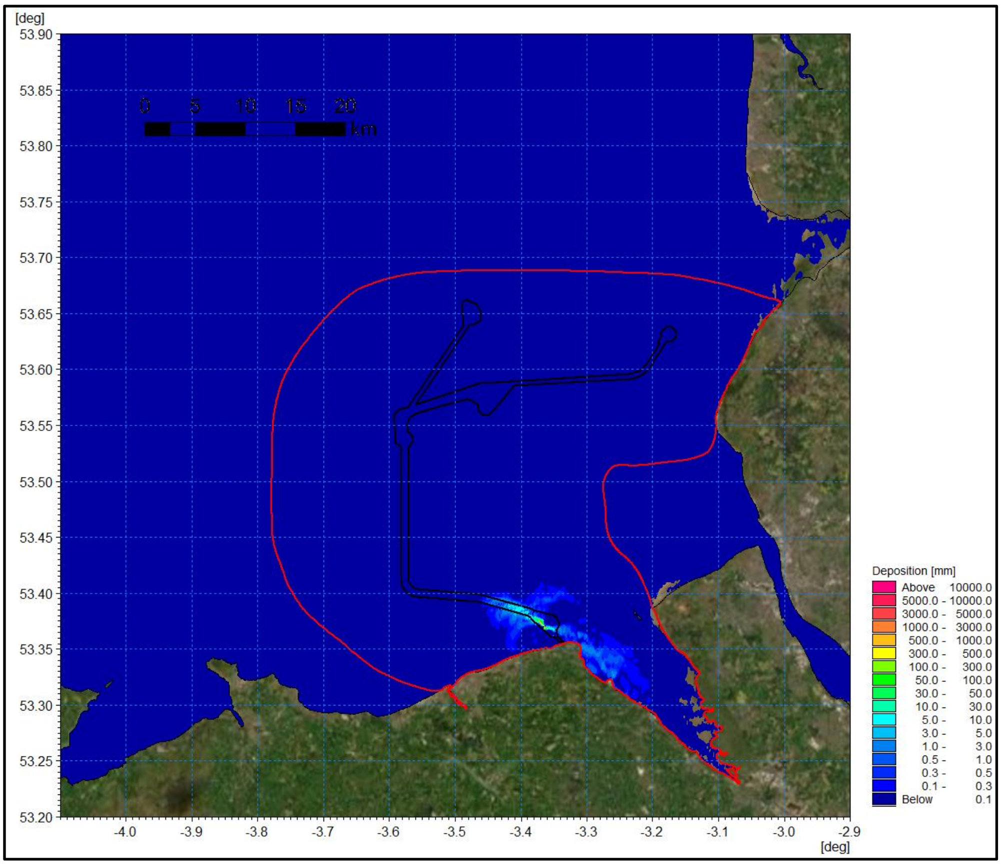

Figure 1.13: Sedimentation One Day After Cessation Of Dredging – West Hoyle Spit

1.4.1.3 Overall Magnitude of Impact

Overall, the information presented in sections 1.4.1.1 and 1.4.1.2 highlights that the spatial distribution of sedimentation thicknesses of greater than 5 cm as a result of cable trenching between the PoA Terminal and Douglas, and dredging at West Hoyle Spit is not predicted to enter the Dee Estuary, and will therefore not overlap with the Dee Estuary cockle beds. As such the impact is predicted to be of local spatial extent, short term duration, intermittent, and of high reversibility. It is predicted that this impact will affect the cockle beds of the Dee Estuary directly. The magnitude of impact to the Dee Estuary Cockle beds is therefore considered to be low.

1.4.2 Sensitivity of the Receptor

As detailed in Volume 2, Chapter 7: Marine Biodiversity, many shellfish species have a high tolerance to increases in SSCs and are reported to be insensitive to increases in turbidity (Wilber and Clarke, 2001). This includes the common cockle, which has been assessed in the Marine Evidence Based Sensitivity Assessment (MarESA) as having low sensitivity to smothering and not sensitive to increases in SSCs and turbidity (Tyler-Walters, 2007). This is because the species naturally inhabits sedimentary and turbid environments and is therefore considered to be tolerant to these impacts (Navarro and Widdows, 1997, Tyler-Walters, 2007). The common cockle also has intermediate tolerance to smothering of up to 5 cm of deposited sediment, with a high recovery rate, and thus an overall low sensitivity to smothering and siltation effects associated with increased SSCs and associated deposition (Tyler-Walters, 2007). For example, in laboratory and field conditions, individuals have been observed to burrow quickly to the surface if smothered by 2 to 5 cm of sediment (Jackson and James, 1979, Richardson *et al.*, 1993). As per the modelling presented in Volume 3: Physical Processes Technical Report and outlined above in sections 1.4.1.1 and 1.4.1.2, cable trenching activities and dredging at West Hoyle Spit are not expected to result in sedimentation levels exceeding the MarESA pressure benchmark for common cockle of 5 cm of deposited sediment.

There are currently nine distinct common cockle beds are present within the Dee Estuary, which have been subject to previous closures and are managed under the Dee Estuary Cockle Fishery Order (2008) Management Plan (NRW, 2024; Figure 1.14). The Welsh Government are also currently working on a new Cockle Fisheries Management (Wales) Order, which will come into place later in 2024, however specifics are not currently available (Welsh Government, 2024). The Dee Estuary itself is a naturally turbid system; therefore any increases in turbidity from anthropogenic actions typically fall within the natural range that the Estuary communities (such as cockle beds) generally experience (Natural England and NRW, 2010).

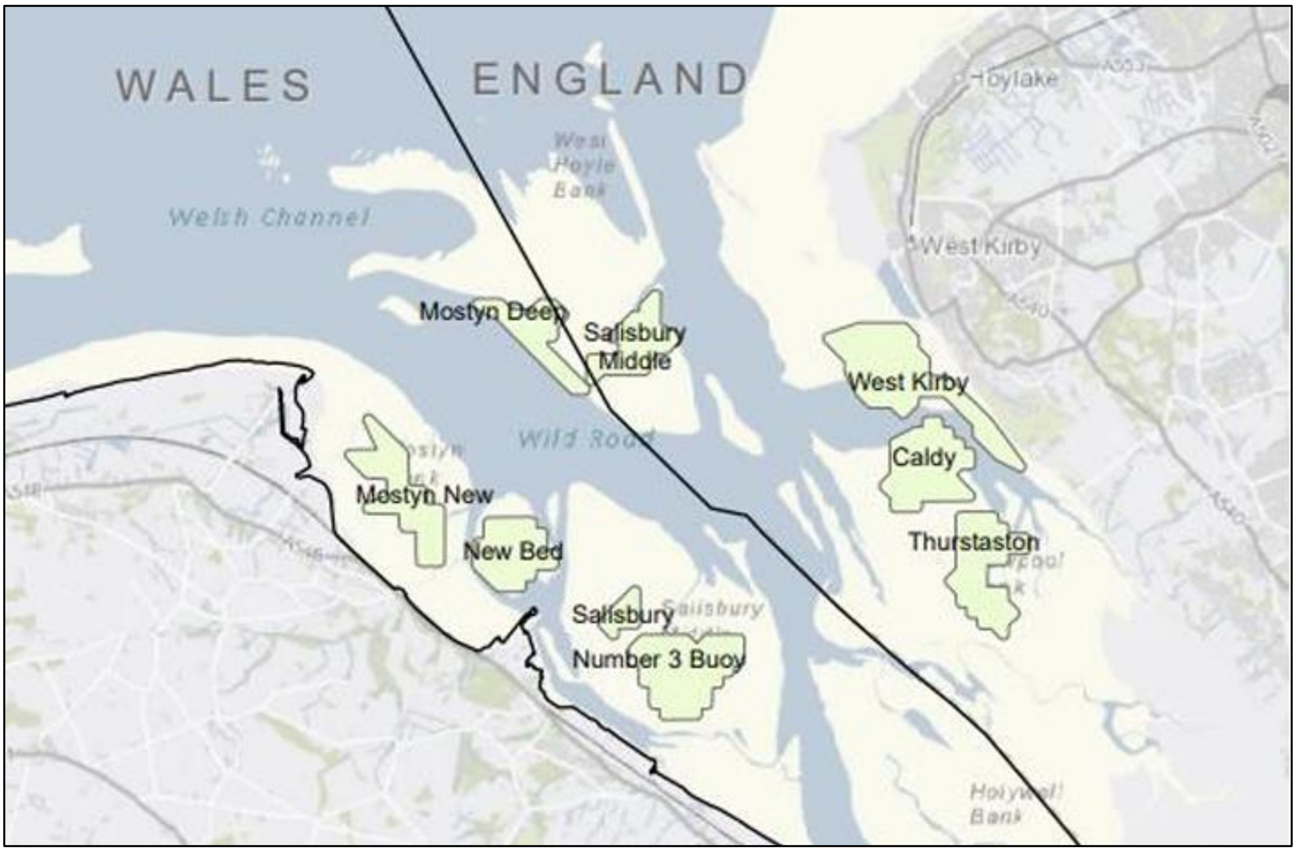

Figure 1.14: Cockle Beds within the Dee Estuary, along with the English-Welsh Median Line (Source: North Western Inshore Fisheries and Conservation Authorities (NWIFCA (2024))

The tidal flow into the Dee Estuary is flood dominant, which implies stronger flood tide currents and net sediment movements into the Estuary, especially in the shallow intertidal areas (such as cockle beds), and residual currents ensure landward transport of sand and silt into the Dee Estuary from Liverpool Bay (Bolaños and Souza, 2010; Halcrow Group Ltd, 2013; Moore *et al.*, 2009). In addition, the Dee Estuary is a major sink for both mud and sand (Halcrow Group Ltd, 2013). Average yearly sediment transport (in m^3/m/year) is illustrated in Figure 1.15 (Halcrow Group Ltd, 2013). These data indicate that the sediment transport rates are highest within the Dee Estuary itself (and thus within the area in which the nine cockle beds are located; see Figure 1.14).

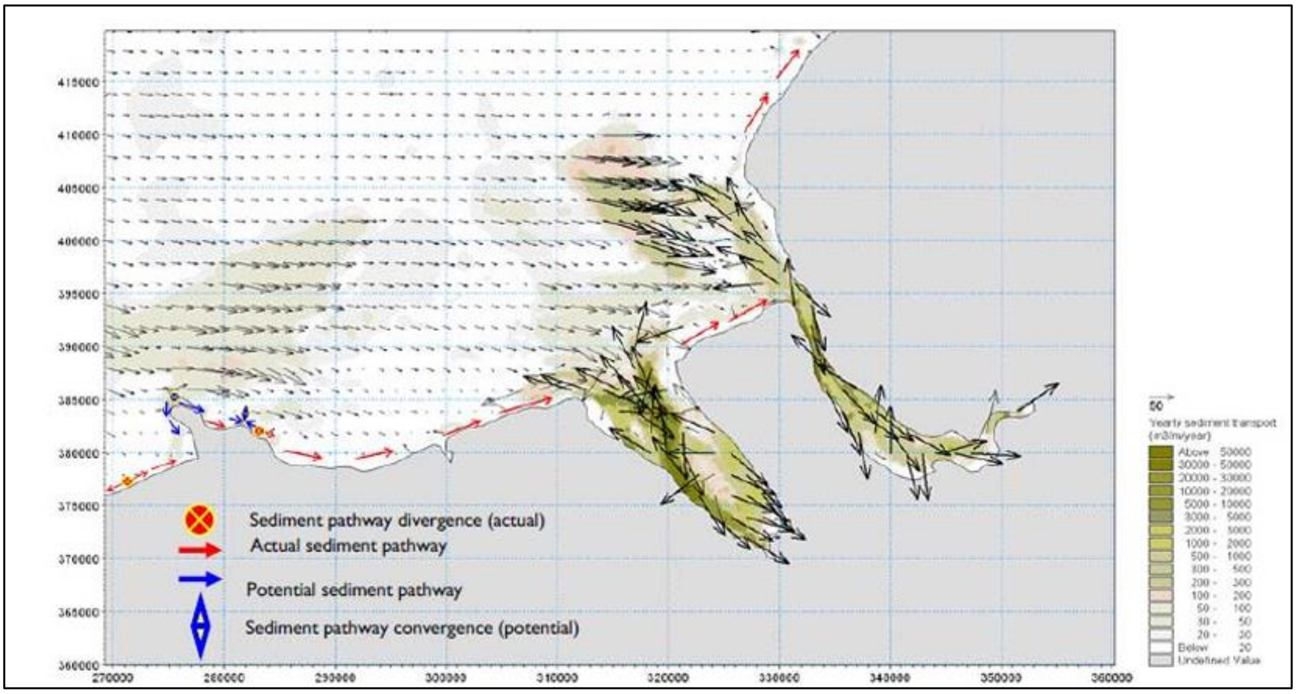

Figure 1.15: Sediment Transport within the Dee Estuary (Source: Halcrow Group Ltd, 2013)

Given the low sensitivity of common cockle to increased SSCs, turbidity, and smothering (Tyler-Walters, 2007), it is unlikely that this impact will affect the cockle beds of the Dee Estuary. This is further evidenced by the high baseline sediment transport rates and turbidity of the Dee Estuary, and the likely habituation of the cockle beds to increased SSCs and associated deposition. Overall, the cockle beds of the Dee Estuary are deemed to be of low vulnerability, high recoverability, and regional importance. The sensitivity is therefore considered to be low.

1.4.3 Significance of Effect

Overall, the magnitude of the impact is deemed to be low, and the sensitivity of the Dee Estuary cockle beds is considered low. This gives rise to an impact significance of negligible or minor adverse. Based upon the results of the modelling within Volume 3: Physical Processes Technical Report, indicating that sedimentation levels within the Dee Estuary are not predicted to reach or exceed the MarESA pressure benchmark of 5 cm of sedimentation thickness, the effect is considered to be of **negligible adverse** significance, which is **not significant** in EIA terms.

1.5 References

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