Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Technical Note: Marine Biodiversity – Benthic Subtidal and Intertidal Ecology (MBTN_01)

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Glossary

Term	Meaning
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
Maximum Design Scenario (MDS)	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.
Project Design Envelope (PDE)	Also known as the Rochdale Envelope, the PDE concept is routinely utilised in both onshore and offshore planning applications to allow for some flexibility in design options, particularly offshore, and more particularly for foundations and turbine type, where the full details of the project are not known at application submission but where sufficient detail is available to enable all environmental impacts to be appropriately considered during the EIA.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in Volume 1, Chapter 3: Proposed Development Description.

Acronyms and Initialisations

Acronym / Initialisation	Description
CD	Chart Datum
EMP	Environmental Management Plan
Eni	Eni UK Limited
ES	Environmental Statement
FO	Fibre Optic
IEF	Important Ecological Feature
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
MarESA	Marine Evidence Based Sensitivity Assessment
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MPA	Marine Protected Area
NRW	Natural Resources Wales
OP	Offshore Platform
OSPAR	Oslo Paris Convention
PDE	Project Design Envelope
PoA	Point of Ayr
RIAA	Report to Inform Appropriate Assessment
UXO	Unexploded Ordnance

Units

Acronym	Description
kg	Kilogram (mass)
km	Kilometres (distance)
m	Metres (distance)
m^2	Metres squared (area)

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1 MARINE BIODIVERSITY: BENTHIC SUBTIDAL AND INTERTIDAL 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 focused solely on the Benthic Subtidal and Intertidal Ecology. Additional Technical Notes have been produced for Fish and Shellfish 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: Relevant Post-Application Consultation for Benthic Subtidal and Intertidal Ecology

Consultee	Consultation	Where and How Addressed
Natural England	Unexploded Ordnance (UXO) clearance has not been assessed in relation to benthic and intertidal receptors. The disposal of UXOs has the potential to generate significant disturbance/abrasion to the seafloor and benthic habitats and species. The application should provide sufficient information to assess the size and depths of craters within the Environmental Statement (ES) and commit to avoiding sensitive benthic receptors. This is especially important where UXO clearance may affect designated sites or features.	Further information and assessment are presented in **section 1.3**. The information herein does not represent a change to the significance of effect of the assessment of impacts from temporary habitat loss/disturbance to benthic ecology receptors. The assessment conclusions presented within the Application are considered unchanged.
Natural England	The application states that the installation of cable crossings and their protections will account for 58,800 m^2 of long-term subtidal habitat loss. However, from the current cable crossing Maximum Design Scenario (MDS) parameters, it is not clear on where cable crossings will occur or the location of habitat loss. We advise that further information on cable crossings are provided (i.e. specific locations, total area of impact, overlap with Marine Protected Areas (MPAs)) and methodology in line with best practise guidance. The potential interruption of sediment transport and resulting morphological change due to the presence of cable crossings near sensitive receptors and pathways should also be considered in the ES.	The current proposed locations of cable crossings are presented in **Figure 1.2**. Planned cable crossings are located several kilometres from designated sites, and areas of sensitive benthic habitats, such as Annex I sandbanks and reefs. An assessment of the potential for cable crossings and associated protection to result in secondary scour is presented in **section 1.4**. This assessment indicates that impacts from cable crossings would be insufficient to disrupt sediment transport, seabed morphology, or cause secondary scour to develop. As such, no further assessment of this impact on subtidal benthic ecology receptors has been undertaken, and the assessment presented within the Application is considered appropriate.

Consultee	Consultation	Where and How Addressed
NRW	Offshore cable crossings will be required at up to 32 crossings. NRW (A) acknowledge the design of the cable crossing protection will have tapered profiles to reduce the impacts upon physical processes and seabed morphology and that it is not expected that impacts from cable crossings would be sufficient to disrupt offshore bank morphological processes, experience significant secondary scour or destabilise coastal features. Whilst this might be the case at deeper depths, NRW (A) are concerned cable crossings in shallower waters could potentially lead to secondary physical impacts such as scour, indirectly impacting benthic habitats. It is unclear at present where the proposed cable crossings are located and whether any of these are in shallow waters that could result in the impacts described above.	The proposed locations of cable crossings are presented in **Figure 1.2**Figure 1.2. These are the locations for the cable crossings shown in the plans, cross-sections, and general arrangement drawings submitted with the Marine Licence application to describe Activity 02. An assessment of the potential for cable crossings and associated protection to result in secondary scour is presented in **section 1.41.4**. This assessment indicates that impacts from cable crossings would be insufficient to disrupt sediment transport, seabed morphology, or cause secondary scour to develop. As such, no further assessment of this impact on subtidal benthic ecology receptors has been undertaken, and the assessment presented within the Application is considered appropriate.
NRW	Clarification sought and further assessment required (Major). There appear to be inconsistencies in the amount of submarine power cables that will be installed: • Volume 2, Chapter 7: Marine Biodiversity notes 126.04 km of subsea power cables will be installed. • Volume 2, chapter 6: Physical Processes notes under the MDS the installation via trenching of two separate cable lengths of 33,990 m. This would equate to 67.98 km. • Section 3, Proposed Development Description of the ES Volume 1, chapters 1 to 5: Introductory Chapters notes 35,000 m of offshore power and Fibre Optic (FO) cables (35 km each) would be installed. It also notes that additional cable will be required for inter-platform cabling. NRW (A) seek clarification on what the correct amount of subsea power cable that will be installed is. We are concerned the worst-case scenario might not have been assessed in the ES. Within the ES, Volume 1, Chapter 3 there are also inconsistencies in the reported amount of external protection that will be used. Section 3.3.6 Pipelines notes PL1030 may also require some external protection in the form of concrete mattresses over approximately 400 m of its length. However, Table 3.3: Design Envelope reports a different number.	The Maximum Design Scenarios (MDS) and referenced chapters have been reviewed against the Project Design Envelope (PDE), with the findings presented in **section 1.5**. The Applicant would like to reassure NRW that there are no inconsistencies in the reported lengths of cables. **ES Chapter 3** describes that there are five proposed electrical cables in total: • From Point of Ayr to Douglas, there are the 2 x cables in parallel from PoA to Douglas OP each of which is 33,990m in length. That makes 67.98km (67,980m). (We acknowledge that this has on occasion been rounded to 70km). • From Douglas OP to Hamilton North satellite platform, 32.34km. • From Douglas OP to Hamilton Main satellite platforms, 14.89km. • From Douglas OP to each of the satellite platforms, 32.34km, 14.89km, and 10.87km respectively. This equals a total linear distance for all five cables of 126.04km, as also stated in **Chapter 7: Marine Biodiversity**. NRW will appreciate that because there are five separate cables across the whole project area that there are slightly different MDS for different impacts, hence why the MDS is set out within a table in each individual topic chapter. For example, in Chapter 6: Physical Processes the assessment addresses the impacts on physical processes, for example from the generation of sediment when installing the cables. The MDS for this impact therefore relates to the SSC generated by installation of each cable separately. This is because the cables are installed sequentially at different times and in different geographical locations. The results of our SSC modelling show that the SSC concentrations generated from one cable would have returned to background levels before installation of the next cable. The modelling also shows that any overlap the geographical extents of elevated SSC would be in proximity to the New Douglas platform, albeit at a different time.

Consultee	Consultation	Where and How Addressed
	NRW (A) seek clarification and consistency on the length of external protection to be used.	However, for the impacts on benthic habitat, presented in Chapter 7: Marine Biodiversity, the assessment addresses the total area of seabed affected by each cable individually, and in total; hence the MDS referring to the total length of cables. In summary, minor discrepancies are apparent, due to the degree of rounding applied, and the application of specific MDS' for topics and impacts. It is important to note that the MDS will not be consistent between topics and impacts and project description presented within Volume 1, Chapter 3, due to the need for ensuring the most appropriate scenario is assessed, representing the MDS for that particular impact and the relevant receptors. The MDS' presented within the Environmental Statement are considered to represent the worst case scenario for each topic and impact, and no further action is proposed by the Applicant. Regarding the external protection on PL1030, this is not an inconsistency. The mattresses will not be laid end to end; they will overlap. This is why 660m of concrete mattresses will only cover approximately 400m of pipework. Please see the drawings that accompanied the Marine Licence application (*New Douglas pipeline spools approach drawings-105600BSDN84152_CDFE03_03*). Therefore, the MDS for 'long-term subtidal habitat loss' for the Marine Biodiversity assessment presented in Volume 2, Chapter 7 includes an area of 2,800 m^2 associated with concrete mattresses at PL1030. This area of 2,800 m^2 was calculated my multiplying 400 m (the length of the concrete mattressing) by 7 m (the width for cable crossing protection). Concrete mattresses over PL1030 are therefore already incorporated in the MDS and assessment presented in ES Volume 2, Chapter 7: Marine Biodiversity. No further action is proposed by the Applicant.
NRW	Further evidence is required to support the conclusion that impacts to the Annex I Mudflat and Sandflat feature from trenching in West Hoyle Bank will be minor and that the habitat will recover in the short-medium term. No timeframe of expected recoverability is provided other than noting the habitat is highly recoverable due to natural and mitigated infilling.	Further evidence and justification is presented in **section 1.61.6**.
NRW	NRW (A) disagree construction in the intertidal will be limited. There will be significant movement of machinery (e.g. cable trencher) required for the cable laying installation during the construction phase. Furthermore, Chapter 3, Proposed development description, Section 3.4.5, notes smaller boats and barges will be required to control the movement of the cables on to the beach and that a jacking barge will likely be set up in the intertidal area. Further machinery might be required in the intertidal during the operational and maintenance phase (i.e. for cable reburial). NRW (A) therefore advise potential impacts to intertidal Important	The Marine Licence application and Environmental Statement (ES) presented two cable route options to negotiate the West Hoyle Spit. The worst-case option presented within the ES, was a route that crossed the West Hoyle Spit following a parallel alignment to the existing Point of Ayr (PoA) to Douglas platform natural gas pipeline (PL1030), as shown in the ES at Figure 3.16. This option would require the excavation of a trench across the West Hoyle Spit to facilitate passage of the cable lay vessel. An alternative route further to the east, via a tidal channel through the spit, was also presented in the ES at Figure 3.17. The worst-case route would have required the positioning of the cable lay vessel to the north of the West Hoyle Spit and for the supporting vessels to help bring the cable to the jack-up cable tensioner vessel close to the MLWS mark. From there, the cable would be pulled along the rollers set out on

Consultee	Consultation	Where and How Addressed
	Ecological Features (IEFs) from the introduction of Invasive Non-Native Species (INNS) should be assessed in the ES. NRW (A) also note under Table 7.37 Sensitivity of the benthic subtidal and intertidal ecology IEFs to introduction or spread of INNS some subtidal IEFs have not been assessed for this potential impact pathway due to “insufficient evidence”. The *Opheothrix fragilis* and/or *Opheothrix nigra* brittlestar beds on sublittoral mixed sediment IEF has a medium sensitivity to the introduction or spread of INNS according to the Marine Evidence Based Sensitivity Assessment (MarESA). We advise this table is revised and MarESA is used to assign the relevant sensitivities to this pressure to the different IEFs (including to intertidal IEFs).	the beach, which control the lateral movement of the cable, by a backhoe excavator, as described in the ES Chapter 3, and the supporting drawings and illustrated in Figure 3.15. Once pulled ashore, the cable would be buried using either a plough or cable trencher, both of which have a similar footprint to the plough shown in ES figure 3.18, cut a similar width trench, and simultaneously bury of the cable. See also **Figure 1.1** below. **The Applicant can confirm that the worst-case route 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, and will involve a single cable, instead of the two previously proposed. The preferred option therefore avoids the excavation of the trench across the West Hoyle Spit, and therefore the impact on the benthic habitat at the West Hoyle Spit that provides prey species for breeding Tern and Red-Throated Diver. This also means that the worst-case suspended sediment concentrations and subsequent sedimentation associated with the trench excavation, are not predicted to occur within the Dee Estuary SAC/SPA/SSSI and the associated Cockle Beds. Furthermore, the preferred option will now be installed utilising a simultaneous cable lay and burial. This is achieved by the cable lay vessel beaching on the intertidal area at Talacre Beach, instead of the cable tensioner. The cable will then be pulled directly from the vessel along the rollers and through the HDD conduit. Once the cable is attached on the shoreward side of the dunes, the cable lay vessel will then perform a simultaneous lay and burial of the cable by pulling the trencher or plough behind it as it lays the cable. This means that there will need to be only a single passage of the cable lay vessel from the landfall to the New Douglas platform. This is instead of the previously proposed four that would have been required to first lay the cables from New Douglas to the landfall, and then the two passages to then bury the cables. This reduces the disturbance from the cable lay vessel. Further information and an assessment of the impact of INNS to subtidal and intertidal benthic ecology receptors is presented in **section 1.71.7**. Whilst the MarESA pressure sensitivities for relevant subtidal IEFs have been updated in line with updates to MarESA in November 2023, the assessment conclusions remain consistent with those presented in the Application, with a minor adverse significance of effect predicted which is not significant in EIA terms. This significance also applies to intertidal benthic ecology receptors.

Figure 1.1: Typical Plant And Equipment For Cable Installation Across Inter-Tidal Similar To Cable Historically Installed Between Prestatyn And Rhyl.

1.3 UXO Clearance

UXO clearance during site preparation activities could result in the formation of craters, and therefore contribute to the impact of temporary habitat loss and/or disturbance. Information on potential crater dimensions is challenging to predict for the Proposed Development at this stage, and there is limited information on this impact available in published per-reviewed literature. However, two recent studies assessed seabed disturbance from UXO clearance in the North Sea (Ordtek, 2018; Royal Haskoning DHV, 2022). These modelling studies suggested that craters of up to 21 m in diameter could be created from UXO detonation, giving an area of approximately 346 m^2 per crater (Ordtek, 2018; Royal Haskoning DHV, 2022). The maximum UXO size within the Eni Development Area is predicted to be 907 kg, however there is currently no available estimate on the number of UXOs with the potential to require clearance. In line with that presented within Volume 2, Chapter 7 of the Environmental Statement for sand wave clearance and cable installation, it is expected that any potential craters will erode and infill overtime, and displaced material will re-join the natural sedimentary regime, remaining within the sediment cell.

Within Volume 2, Chapter 7 of the Environmental Statement, up to 1.91 km^2 of temporary habitat loss and/or disturbance represented the MDS for this impact. Therefore, the potential for multiple craters with an area of up to 346 m^2 from UXO clearance does not represent a significant additional source of habitat loss and/or disturbance. The footprint of temporary habitat loss and/or disturbance is considered low (up to 0.32% of the total Eni Development Area), and the magnitude of impact was assessed as negligible to low for all IEFs.

Where possible, micrositing around UXO will be undertaken, particularly in the intertidal zone and around sensitive benthic habitats, further avoiding the potential for impact associated with UXO clearance. Where clearance is unavoidable, low order techniques will be applied preferentially, which are expected to result in a smaller footprint of impact, although it is acknowledged that in unforeseen circumstances high order techniques may be required.

Based on the summary presented herein, consideration of UXO clearance does not result in any change to the significance of effect for the assessment presented in the Application for temporary habitat loss/disturbance to subtidal and intertidal benthic ecology (Volume 2, Chapter 7: Marine Biodiversity).

1.4 Locations of the Cable Crossings

As stated in the MDS within Volume 2, Chapter 7: Marine Biodiversity, cable crossings and their protection will account for up to 58,800 m^2 of long-term subtidal habitat loss. The proposed locations of cable crossings are presented in **Figure 1.2**. These are the locations for the cable crossings shown in the plans, cross-sections, and general arrangement drawings submitted with the Marine Licence application to describe Activity 02. The design information and mapsFigure 1.2 demonstrate that although the cable crossings are located within the Liverpool Bay SPA, they are multiple kilometres from any areas of sensitive benthic habitats, such as Annex I sandbanks and reefs.

Natural England and NRW also requested that the potential interruption of sediment transport and resulting morphological change due to the presence of the cable crossings should be considered. The worst-case MDS presented with tin the ES showed that in total up to 32 cable crossings may be required, 10 of which relate to the PoA to Douglas OP Cable, eight for the Douglas to Hamilton Inter-OP cable, eight for the Douglas to Hamilton North Inter-OP cable, and six for the Douglas to Lennox Inter-OP cable. Depending on the heights of such cable crossings, and the water depth, there can be potential for changes to tide, wave and sediment transport processes due to a changed seabed morphology through altered bed levels. In this case however cable crossings will be up to a maximum height of up to 0.8 m, with widths of 7 m and tapered profiles to reduce the impacts to sediment transport and seabed morphology. The cable crossings will be required in a range of depths from approximately 5.8 to 30.3 m Chart Datum (CD).

Where practicable, the cable crossing requirements will be compliant with the Maritime and Coastguard Agency (MCA) navigation guidance which includes that there will be no more than a 5% reduction in water depth (referenced to CD) at any point along the cable route (MCA, 2021). To exemplify the limited extent of changes to sediment transport and seabed morphology due to the presence of cable protection and altered seabed morphology are expected to be, potential changes to the wave climate may be considered. Although wave climate did not form part of the modelling presented in Volume 2: Physical Processes Technical Report, studies undertaken within the vicinity of the Eni Development Area can be drawn upon. The physical processes modelling for the Mona Offshore Wind Project indicated that where the cable protection height was less than 15% of the water depth there was no change in wave climate (Mona Offshore Wind Ltd, 2024a; Mona Offshore Wind Ltd, 2024b). In compliance with the MCA navigation guidelines discussed above, the maximum height of the shallowest cable crossing would be restricted to 5% of the water depth and therefore is likely to exhibit no change in wave climate, however, given the majority of cable crossings fall within waters deeper than 25 m (CD), water depths will be changed by less than 5%. With most of the crossings falling in waters of 25 m (CD), which equates to 28 m mid tide, the introduction of 0.8 m height cable crossings represents less than a 3% change in water depth and therefore likely < 3% change to tidal currents. This change is 25% of that exhibited in the natural variation between peak spring and peak neap tidal flows.

Therefore, due to the small scale of the cable crossings, the distance of cable crossings from sensitive features and designated sites, designed in mitigation measures such as tapered profiles, and compliance with the MCA navigational guidance, it is not expected that impacts from cable crossings would be sufficient to disrupt sediment transport, seabed morphology, or cause secondary scour to develop. As such, no further assessment is required with regards to impacts of secondary scour resulting from cable protection at cable crossings on subtidal benthic ecology receptors.

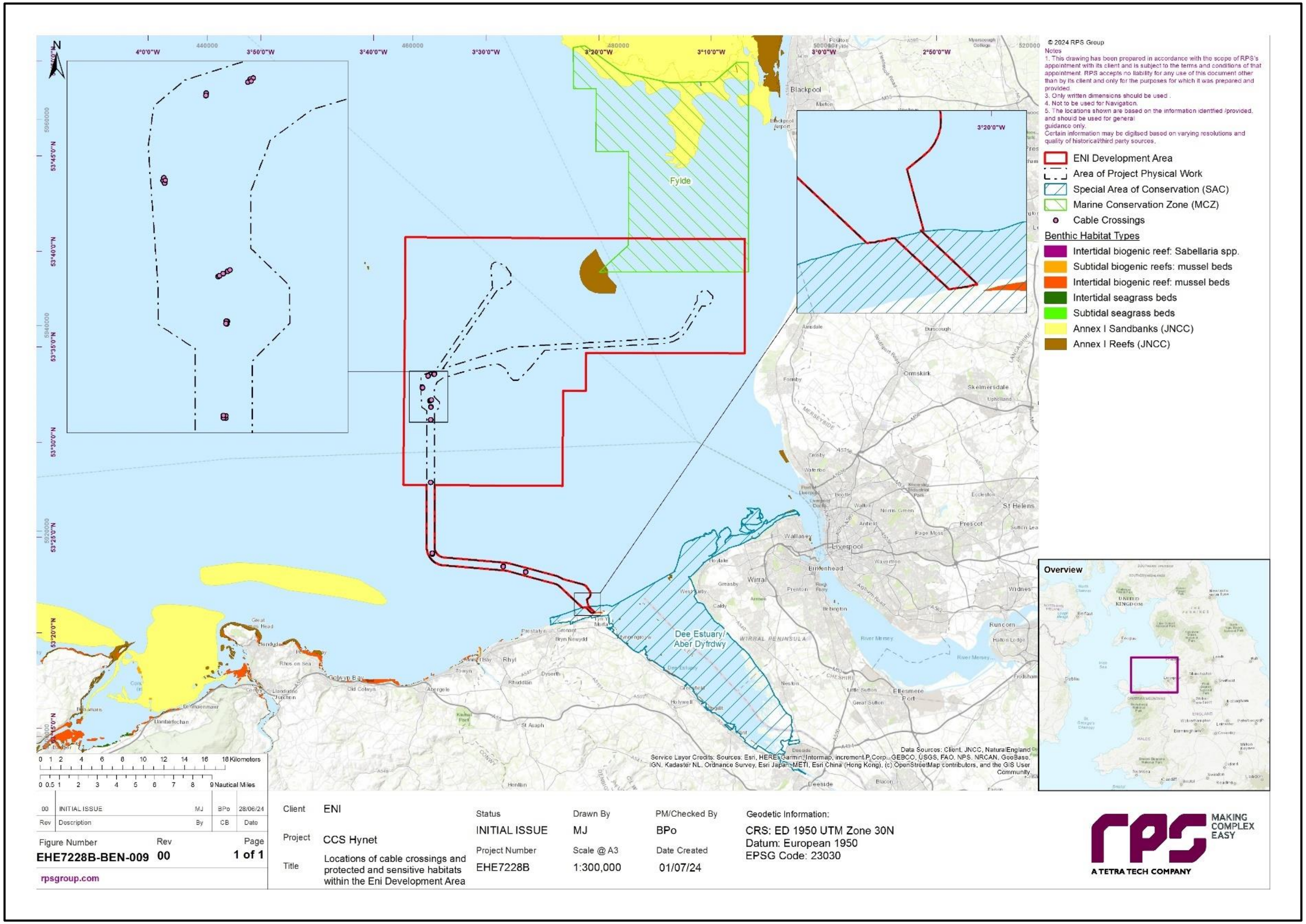

Figure 1.2: Location of Cable Crossings within the Eni Development Area

1.5 Total Length of Cables to be Installed

NRW raised concern about inconsistencies across Environmental Statement chapters regarding the length of subsea power cables to be installed. The Applicant would like to reassure NRW that there are no inconsistencies in the reported lengths of cables.

NRW will appreciate that because there are five separate cables across the whole project area that there are slightly different MDS for different impacts, hence why the MDS is set out within a table in each individual topic chapter.

It is important to note that the MDS applied to each impact and topic are specific to those impacts and topics and may also differ to the project description presented within Volume 1, Chapter 3: Proposed Development Description. This ensures that for each impact assessed under each topic the most appropriate scenario is assessed (i.e. the scenario with the potential for generating the maximum effect to the relevant receptors).

Within Volume 2, Chapter 7: Marine Biodiversity, the MDS considered up to 126.04 km of subsea power cables to be installed over the construction phase.

- 10.87 km between the Douglas Offshore Platform (OP) and the Hamilton Main OP;
- 14.89 km between Douglas OP and the Hamilton North OP;
- 32.34 km between Douglas OP and the Lennox Inter-OP; and
- 67.94 km between the PoA Terminal and Douglas OP (two cables, of 33.99 km and 33.95 km each).

NRW noted that in Volume 2, Chapter 6: Physical Processes, a total value of 67.98 km (two cables from the PoA Terminal and the Douglas OP rounded to 33.99 km each) was presented. In the assessment presented in Volume 2, Chapter 6: Physical Processes the subsea cables between the Douglas OP and the other OPs were not considered relevant to their assessment and were therefore not included within the MDS, hence the difference in total length of cable presented when compared to Volume 2, Chapter 7: Marine Biodiversity.

In Volume 1, Chapter 3: Proposed Development Description, the lengths for the two cables between the PoA Terminal and the Douglas OP were rounded to 35 km each, thus a total of 70 km as opposed to the 67.94 km from Marine Biodiversity and 67.98 km from Physical Processes. Further, approximate lengths for the inter-platform cables were also provided as rounded numbers, opposed to the specific values within the Proposed Development Description. As a result, there are minor discrepancies between the cable lengths presented in these three chapters, which are summarised in Table 1.2. These are not considered to affect the assessment presented within the Application.

Table 1.2: Cable Lengths Presented Across Technical Chapters and the Proposed Development Description

Cable	Cable Length Presented		
	Proposed Development Description	**Physical Processes**	**Marine Biodiversity and PDE**
Two Cables from PoA Terminal to Douglas OP	35 km each (=70 km)	33.95 km each (=67.98 km)	33.95 and 33.99 km (=67.94 km)
Inter-platform cable from Douglas OP to Hamilton Main OP	Approximately 15 km	Not included in assessment	10.87 km
Inter-platform cable from Douglas OP to Hamilton North OP	Approximately 12 km		14.89 km
Inter-platform cable from Douglas OP to Lennox OP	Approximately 35 km		32.34 km
Total Length	**132 km**	**67.98 km**	**126.04 km**

Within Volume 2, Chapter 7: Marine Biodiversity, the area of temporary habitat loss and disturbance resulting from cable installation was calculated by multiplying the total length of cable with the trench width required for installation (15 m). Based on the total cable length of 126.04 km used, this resulted in a total area of 1.89 km^2, (0.31% of the Eni Development Area), which was used throughout the assessment. Using the rounded up and approximated values provided in Volume 1, Chapter 3: Proposed Development Description (132 km), the total area of temporary habitat loss and disturbance would be 1.98 km^2 (0.33% of the Eni Development Area).

Therefore, although there is a minor discrepancy between the values of cable lengths presented in the Volume 2, Chapter 7: Marine Biodiversity and the approximated values within Volume 1, Chapter 3: Proposed Development Description, the slightly higher cable length within Volume 1, Chapter 3 of 132 km does not represent significant additional temporary habitat loss than that assessed in Volume 2, Chapter 7, and the value presented within the latter is considered more accurate, as is fully aligned with the Proposed Development Description. No further action is considered required.

1.6 Further Detail on Mudflats and Sandflat Habitats regarding Trenching at West Hoyle Spit

NRW requested further evidence to support the conclusion that impacts to the 'mudflats and sandflats not covered by seawater at low tide' IEF from trenching in West Hoyle Spit will be minor and that the habitat will recover in the short to medium term. Within Volume 2, Chapter 7: Marine Biodiversity, recoverability was regarded as high due to natural deposition and mitigated infilling from the cable trenching machine.

Elliott *et al.* (1998) provide a detailed overview of the sensitivity characteristics of intertidal sandflats and mudflats and note that the greatest threats to biotopes in these habitats are through large-scale loss and/or removal. No large-scale loss or removal of habitat will occur due to cable trenching around West Hoyle Spit, nor for cable installation in the intertidal zone itself, due to natural and mitigated backfilling. The overview of the sensitivities of intertidal mudflats and sandflats by Elliott *et al.* (1998) is broadly consistent with the reported sensitivities to the defined MarESA pressures presented as part of the assessment of temporary habitat loss and/or disturbance within Volume 2, Chapter 7: Marine Biodiversity (see Table 1.3, from Volume 2, Chapter 7).

Table 1.3: Sensitivity of the Representative Biotopes Identified as part of the Mudflats and Sandflats Not Covered by Seawater at Low Tide IEF to Temporary Habitat Loss and/or Disturbance

Representative Biotopes Identified	Sensitivity to Defined MarESA Pressure				Overall Sensitivity (based on the sensitivity matrix in Volume 2: Chapter 7)
	Habitat structure changes – removal of substratum	Abrasion / disturbance of the surface of the substratum or seabed	Penetration or disturbance of the substratum subsurface	Smothering and siltation rate changes (heavy)	
Mudflats and sandflats not covered by seawater at low tide					
Talitrids on the upper shore and strand-line (LS.Lsa.St.Tal)	Medium	Low	Low	Medium	Medium
Macoma balthica and *Arenicola marina* in littoral muddy sand (LS.Lsa.MuSa.MacAre)	Medium	Medium	High	Medium	Medium
Barren or amphipod dominated mobile sand shores (LS.Lsa.MoSa)	Medium	Not sensitive	Not sensitive	Not sensitive	Medium

Representative Biotopes Identified	Sensitivity to Defined MarESA Pressure				Overall Sensitivity (based on the sensitivity matrix in Volume 2: Chapter 7)
	Habitat structure changes – removal of substratum	Abrasion / disturbance of the surface of the substratum or seabed	Penetration or disturbance of the substratum subsurface	Smothering and siltation rate changes (heavy)	
Polychaete / bivalve dominated muddy sand shores (LS.Lsa.MuSa)	Medium	Low	Not assessed in MarESA for this biotope	Low	Medium

In the Oslo Paris Convention (OSPAR) 2023 status assessment on intertidal mudflat habitats, these habitats were noted to have natural resilience and the ability to recover well from isolated physical and chemical disturbance (OSPAR Assessment Portal, 2024). In Volume 2, Chapter 7: Marine Biodiversity, the MDS for this impact represented minimal isolated physical disturbance to the West Hoyle Spit (up to 21,000 m^2) over a period of up to three weeks. This supports the prediction of the impact to be of short term duration, within intermittent operations, and of high reversibility.

Notwithstanding the above, the Applicant can confirm that the worst-case route 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. The preferred option avoids the excavation of the trench across the spit, and therefore the impact on the benthic habitat at the West Hoyle Spit that provides prey species for breeding Tern and Red-Throated Diver. This also means that the worst-case suspended sediment concentrations and subsequent sedimentation associated with the trench excavation, are not predicted to occur within the Dee Estuary SAC/SPA/SSSI and the associated Cockle Beds.

1.7 Risk of Introduction and Spread of INNS in the Intertidal Zone

NRW requested that risk of introduction and spread of INNS impacting intertidal IEFs (Mudflats and sandflats not covered by seawater at low tide, and the Dee Estuary SAC IEF, as a proxy) is assessed with respect to the construction works in the intertidal and shallow subtidal zone. NRW also requested that the sensitivity table for the subtidal habitats and species IEFs presented within Volume 2, Chapter 7: Marine Biodiversity is updated with revisions to MarESA that occurred after the time of writing.

1.7.1 Magnitude of Impact

1.7.1.1 All Phases

While there will be no above ground infrastructure installed within the intertidal zone that could potentially be colonised by INNS, there will be some movement of machinery during all phases of development, mainly in the construction phase. During construction, up to 1,200 m of subsea power cables will be installed in the intertidal zone via trenching or ploughing techniques (or a combination of both). In total, up to 24 days are anticipated for all onshore cable preparation works, including works in the intertidal zone. This therefore represents a short-term and intermittent temporal window for introduction and spread of INNS to occur from machinery and vessels associated with intertidal cable installation.

In the operation and maintenance phase, the only vessel and machinery use will be for cable repair, as required and is therefore a highly intermittent and short-term impact. Decommissioning activities will be of an equal or lesser extent than those within the construction phase, and therefore also represent a short-term and intermittent impact.

The majority of the vessels and machinery used in the intertidal zone are anticipated to be of relatively local origin, when compared to the large volume of vessels using the area as part of the existing baseline, undertaking long range shipping. Therefore, the introduction of species from outside the region as a result of vessels and machinery in the intertidal zone is unlikely. Some of the INNS already in the region however are known to spread as fouling on ships hulls (such as the compass sea squirt *Asterocarpa humilis*) which could provide a route for introduction into the Eni Development Area. Although, with no hard substrate installed in the intertidal zone, there would be no potential for colonisation as a result (Tillin *et al.*, 2020).

As set out in Volume 2, Chapter 7: Marine Biodiversity, an INNS Management Plan will be implemented as part of the embedded Environmental Management Plan (EMP), which will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable. The INNS Management Plan will apply to all subtidal and intertidal operations during all project phases. Strict implementation of the INNS Management Plan is considered to reduce the potential for introduction and spread of INNS with both the subtidal and intertidal zones. Furthermore, vessels will be required to comply with the International Maritime Organisation (IMO) ballast water management guidelines. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

Overall, for the 'mudflats and sandflats not covered by seawater at low tide' IEF, the impact is predicted to be of local spatial extent, short term duration, intermittent (in terms of exposure to potential invasions), and of low reversibility. It is predicted that the impact will affect the receptor directly. Therefore, the magnitude of impact is considered to be low.

The magnitude of impact presented within the Application for subtidal benthic ecology receptors is not subject to update within this Technical Note and remains as low.

1.7.2 Sensitivity of the Receptor

In November 2023, the MarESA for two of the subtidal representative biotopes was updated, with changes reflected in Table 1.4. At the time of writing Volume 2, Chapter 7: Marine Biodiversity, the MarESA for these biotopes did not provide an assessment for sensitivity to the INNS pressure due to insufficient evidence. While these two representative biotopes have now been updated, the overall sensitivity for the subtidal habitats and species IEFs remains high, as outlined within Volume 2, Chapter 7: Marine Biodiversity, under a precautionary basis. Therefore, no changes will apply to the conclusions presented in Volume 2, Chapter 7: Marine Biodiversity for the subtidal habitats and species IEFs within the Application.

The representative biotopes for the 'mudflats and sandflats not covered by seawater at low tide' IEF have also been incorporated into Table 1.4. Three of the biotopes within this IEF, presented in Table 1.4, were assessed as not sensitive to the INNS pressure in the MarESA, while 'polychaete/bivalve-dominated muddy sand shores' was assessed as having high sensitivity. As a precautionary measure, the sensitivity of the 'mudflats and sandflats not covered by seawater at low tide' IEF is considered to be high. It should be noted that this is highly precautionary as three out of the four representative biotopes have negligible sensitivity to the pressure of introduction and spread of INNS.

Table 1.4: Updated Sensitivity Table for the Subtidal and Intertidal IEFs to the Increased Risk of Introduction and Spread of INNS

IEF	Representative Biotopes Identified	Sensitivity to Defined MarESA Pressure Introduction or Spread of INNS	Overall Sensitivity (based on the sensitivity matrix in Volume 2: Chapter 7)
Subtidal Habitats and Species			
Subtidal Sands and Gravels	*Mediomastsus fragilis, Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel (SS.SCS.CCS.MedLumVen)	High	High

IEF	Representative Biotopes Identified	Sensitivity to Defined MarESA Pressure Introduction or Spread of INNS	Overall Sensitivity (based on the sensitivity matrix in Volume 2: Chapter 7)
	Nephtys cirrosa and *Bathyporeia* spp. in infralittoral sand (SS.SSa.IFiSa.NcirBat)	Not sensitive	Negligible
Mud Habitats in Deep Water	*Amphiura filiformis, Kurtiella bidentata* and *Abra nitida* in circalittoral sandy mud (SS.SMu.CSaMu.AfilKurAnit)	Updated to 'not sensitive' as MarESA updated in November 2023, after the time of writing Volume 2, Chapter 7: Marine Biodiversity	Negligible
Subtidal Mixed Muddy Sediment	*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment (SS.SMx.CMx.OphMx)	Updated to 'medium' as MarESA updated in November 2023, after the time of writing Volume 2, Chapter 7: Marine Biodiversity	Medium
Ross Worm *S. spinulosa*	-	Not assessed, due to insufficient evidence	Not available, due to insufficient evidence
Intertidal Habitats and Species			
Mudflats and sandflats not covered by seawater at low tide	Talitrids on the upper shore and strand-line (LS.Lsa.St.Tal)	Not sensitive	Negligible
	Macoma balthica and *Arenicola marina* in littoral muddy sand (LS.LSa.MuSa.MacAre)	Not sensitive	Negligible
	Barren or amphipod-dominated mobile sand shores (LS.LSa.MoSa)	Not sensitive	Negligible
	Polychaete/bivalve-dominated muddy sand shores (LS.LSa.MuSa)	High	High

1.7.3 Significance of Effect

1.7.3.1 All Phases

Overall, for the 'mudflats and sandflats not covered by seawater at low tide' IEF, the magnitude of impact is deemed to be low, and the sensitivity of the receptor is precautionarily considered to be high. This results in a minor or moderate adverse significance of effect. The effect will be of **minor adverse** significance (which is **not significant** in EIA terms) due to the lack of hard structures introduced in the intertidal zone that could be colonised by INNS, the isolated and short-term nature of vessel and machinery usage in the intertidal zone across all project phases, and the precautionary high sensitivity of the receptor. Furthermore, embedded measures have been adopted to minimise the effects of introduction or spread of INNS, such as an INNS Management Plan and compliance with the IMO ballast water guidelines. Lastly, a Biosecurity Method Statement will be implemented throughout the construction of the Proposed Development incorporating the requirements set out in the NRW Biosecurity Plan template. The Biosecurity Method Statement will detail the locations and extent of any INNS identified, alongside appropriate measures to control and prevent spread or propagation of INNS. For example, the Biosecurity Method Statement will identify the vessel owners and skippers, require that the vessel logbook is up to date and the vessel has conformed to best practice under ballast water and hull fouling guidance. Recommendations for the treatment and removal of INNS will also be identified. The Biosecurity Method Statement will also provide the information to satisfy the requirements of ENV_03 in the Welsh National Marine Plan.

1.8 References

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