# MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

## Marine Conservation Zone (MCZ) Screening and Stage 1 Assessment Report


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# Glossary

| Term | Meaning |
|---|---|
| Advice on Operations | Advice provided by the relevant statutory nature conservation body which identifies pressures associated with a number of the most commonly occurring marine activities and provides a detailed assessment of the feature/sub-feature or supporting habitat sensitivity to these pressures. |
| Applicants | Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL). |
| Attribute | A quality which best describe the site's ecological integrity and which if safeguarded will enable achievement of the Conservation Objectives. Attributes have a target which is either quantified or qualified depending on the available evidence. |
| Biotope | An area uniform in environmental conditions and in its populations of animals and plants for which it is the habitat. |
| Commitment | This term is used interchangeably with mitigation and enhancement measures. The purpose of commitments is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Primary and tertiary commitments are taken into account and embedded within the assessment set out in the ES. |
| Conservation Objective | A statement describing the desired ecological/geological state (the quality) of a feature for which a Marine Conservation Zone (MCZ) is designated. |
| Designated Feature | One of the habitats, species or geodiversity interests that an MCZ is intended to conserve. |
| Development Consent Order | An order made under the Planning Act 2008, as amended, granting development consent. |
| EIA Scoping Report | A report setting out the proposed scope of the Environmental Impact Assessment process. The Transmission Assets Scoping Report was submitted to The Planning Inspectorate (on behalf of the Secretary of State) for the Morgan and Morecambe Offshore Windfarms Transmission Assets in October 2022. |
| Environmental Statement | The document presenting the results of the Environmental Impact Assessment process. |
| Evidence Plan Process | A voluntary consultation process with specialist stakeholders to agree the approach to, and information to support, the EIA and Habitats Regulations Assessment processes for certain topics. |
| Expert Working Group | A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan process. |
| Export cable corridor | The specific corridor of seabed (seaward of Mean High Water Springs and land (landward of Mean High Water Springs) from the Generation Assets to the National Grid Penwortham substation. |
| Favourable Condition | The desired state of a designated feature, which will depend on its current status and the kind of habitat which is being considered. |

| Term | Meaning |
|---|---|
| Generation Assets | The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations. |
| Impact | Change that is caused by an action/proposed development, e.g., land clearing (action) during construction which results in habitat loss (impact). |
| Landfall | The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s). |
| Marine licence | The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities. Section 149A of the Planning Act 2008 allows an applicant for to apply for 'deemed marine licences' in English waters as part of the development consent process. |
| Maximum Design Scenario | The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets. |
| Mean High Water Springs | The height of mean high water during spring tides in a year. |
| Mean Low Water Springs | The height of mean low water during spring tides in a year. |
| Morecambe Offshore Windfarm: Generation Assets | The offshore generation assets and associated activities for the Morecambe Offshore Windfarm. |
| Morecambe Offshore Windfarm: Transmission Assets | The offshore export cables, landfall and onshore infrastructure required to connect the Morecambe Offshore Windfarm to the National Grid. |
| Morecambe OWL | Morecambe Offshore Windfarm Ltd is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd. |
| Morgan and Morecambe Offshore Wind Farms: Transmission Assets | The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.<br>Also referred to in this report as the Transmission Assets, for ease of reading. |
| Morgan Offshore Wind Project: Generation Assets | The offshore generation assets and associated activities for the Morgan Offshore Wind Project. |
| Morgan Offshore Wind Project: Transmission Assets | The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid. |

| Term | Meaning |
|---|---|
| Morgan OWL | Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy investments Ltd. and Energie Baden-Württemberg AG (EnBW). |
| Offshore export cables | The cables which would bring electricity from the Generation Assets to the landfall. |
| Offshore export cable corridor | The corridor within which the offshore export cables will be located. |
| Offshore Permanent Infrastructure Area | The area within the Transmission Assets Offshore Order Limits (up to MLWS) where the permanent offshore electrical infrastructure (i.e. offshore export cables) will be located. |
| Onshore export cables | The cables which would bring electricity from the landfall to the onshore substations. |
| Preliminary Environmental Information Report | A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses. |
| Pressure | The mechanism through which an activity has an effect on any part of the ecosystem. The nature of the pressure is determined by activity type, intensity and distribution. |
| Recoverability | The ability of a receptor to recover following an impact such as temporary habitat disturbance/loss. |
| Resistance | The ability of a receptor to absorb disturbance or stress without changing character. |
| Sensitivity | The likelihood of change when a pressure is applied to a feature (receptor) is a function of the ability of the feature to tolerate or resist change (resistance) and its ability to recover from impact (resilience). |
| Supplementary Advice on Conservation Objectives | Presents information on the attributes which are ecological characteristics or requirements of the designated species and habitats within a site. These attributes have a target which is either quantified or qualified depending on the available evidence, therefore the advice presented describes how to safeguard these attributes to achieve the Conservation Objectives. |
| Target | The target identifies as far as possible the desired state to be achieved for the attribute. In many cases, the attribute targets show if the current objective is to either ‘maintain’ or ‘recover’ the attribute. |
| Planning Inspectorate | The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008. |
| The Secretary of State for Energy Security and Net Zero | The decision maker with regards to the application for development consent for the Transmission Assets. |
| Transmission Assets | See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above). |

| Term | Meaning |
|---|---|
| Transmission Assets Order Limits | The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning |
| Transmission Assets Order Limits: Offshore | The area within which all components of the Transmission Assets seaward of Mean Low Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning.<br>Also referred to in this report as the Offshore Order Limits, for ease of reading. |
| Vulnerability | A measure of the degree of exposure of a receptor to a pressure to which it is sensitive. |

# Acronyms

| Acronym | Meaning |
|---|---|
| AL | Action Level |
| AoO | Advice on Operation |
| CBRA | Cable Burial Risk Assessment |
| CEA | Cumulative Effects Assessment |
| Cefas | The Centre for Environment Fisheries and Aquaculture Science |
| CMS | Construction Method Statement |
| CSIP | Cable Specification and Installation Plan |
| DCO | Development Consent Order |
| DDV | Drop Down Video |
| EIA | Environmental Impact Assessment |
| EMF | Electromagnetic Fields |
| EMP | Environmental Management Plan |
| EnBW | Energie Baden-Württemberg |
| EPP | Evidence Plan Process |
| ES | Environmental Statement |
| EWG | Expert Working Group |
| HDD | Horizontal Directional Drilling |
| HNDR | Holistic Network Design Review |
| HVAC | High Voltage Alternate Current |
| HVDC | High Voltage Direct Current |
| IEF | Important Ecological Feature |
| IMO | International Maritime Organisation |
| INIS | Invasive Non-indigenous Species |

| Acronym | Meaning |
| --- | --- |
| INNS | Invasive Non-native Species |
| JNCC | Joint Nature Conservation Committee |
| MarESA | Marine Evidence based Sensitivity Assessment |
| MCA | Maritime and Coastguard Agency |
| MCZ | Marine Conservation Zone |
| MDS | Maximum Design Scenario |
| MEEB | Measures of Equivalent Environmental Benefits |
| MHWS | Mean High Water Spring |
| MLWS | Mean Low Water Spring |
| MMO | Marine Management Organisation |
| MMMP | Marine Mammal Mitigation Protocol |
| MPA | Marine Protected Area |
| NBN | National Biodiversity Network |
| NRW | Natural Resources Wales |
| OIPMP | Offshore In-Principal Management Plan |
| OSP | Offshore Substation Platform |
| OSPAR | Oslo and Paris Conventions |
| OTNR | Offshore Transmission Network Review |
| PAH | Polycyclic Aromatic Hydrocarbons |
| PCB | Polychlorinated Biphenyls |
| PDE | Project Design Envelope |
| PEIR | Preliminary Environmental Impact Report |
| PEL | Probable Effect Level |
| SAC | Special Area of Conservation |
| SACO | Supplementary Advice on Conservation Objectives |
| SNCB | Statutory Nature Conservation Bodies |
| SSC | Suspended Sediment Concentration |
| TEL | Threshold Effect Level |
| TJB | Transition Joint Bay |
| UK | United Kingdom |
| UXO | Unexploded Ordnance |
| ZOI | Zone of Influence |

# Units

| Unit | Description |
|---|---|
| cm | Centimetre |
| dB | Decibel |
| GW | Gigawatts |
| Hz | Hertz |
| kg | Kilograms |
| km | Kilometres |
| $km^2$ | Kilometres squared |
| kV | Kilovolts |
| m | Metres |
| $m^2$ | Metres squared |
| $m^3$ | Metres cubed |
| $m^3$/d/m | Cubic metres transported per day per metre width of transport path (i.e. perpendicular to direction of transport) |
| mg | Milligram |
| mg/g | Milligram per gram |
| mg/l | Milligram per litre |
| mm | millimetres |
| m/s | Metres per second |
| mT | Militesla |
| MW | Megawatts |
| nm | Nautical miles |
| µT | Microtesla |
| V/m | Volts per metre |
| % | Percentage |
| °C | Degrees Celsius |

# 1 Marine Conservation Zone (MCZ) Screening and Stage 1 Assessment

## 1.1 Introduction

### 1.1.1 Overview of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets

1.1.1.1 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp Alternative Energy Investments Ltd. (bp) and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project. The Morgan Offshore Wind Project is a proposed wind farm in the east Irish Sea.

1.1.1.2 Morecambe Offshore Windfarm Ltd (Morecambe OWL), a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd, is developing the Morecambe Offshore Windfarm, also located in the east Irish Sea. Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm were scoped into the 'Pathways to 2030' workstream under the Offshore Transmission Network Review (OTNR). The OTNR aims to consider, simplify, and wherever possible facilitate a collaborative approach to offshore wind projects connecting to the National Grid.

1.1.1.3 Under the OTNR, the National Grid Electricity System Operator is responsible for assessing options to improve the coordination of offshore wind generation connections and transmission networks and has undertaken a Holistic Network Design Review (HNDR). A key output of the HNDR process was the recommendation that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively to develop proposals for their respective offshore wind farms to the National Grid electricity transmission network at Penwortham in Lancashire.

1.1.1.4 Following a direction by the Secretary of State under section 35 of the Planning Act 2008 (as amended), Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Ltd are jointly seeking a single development consent for their electrically separate transmission assets comprising aligned offshore export cable corridors to landfall and aligned onshore export cable corridors to separate onshore substations (including associated temporary and permanent infrastructure) and onward connection to the National Grid electricity transmission network at the point of interconnection at Penwortham, Lancashire.

1.1.1.5 This report provides the MCZ screening and stage 1 assessment for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as 'the Transmission Assets').

### 1.1.2 Purpose of the report

1.1.2.1 This MCZ screening and stage 1 assessment report has been prepared in support of the Development Consent Order (DCO) application for the

Transmission Assets Section 126 of the Marine and Coastal Access Act 2009 places specific duties on the regulating authority (i.e. the Secretary of State for Energy Security and Net Zero in relation to the DCO application) when determining applications for consent that require the authority to consider the potential impact of a project on MCZs.

1.1.2.2 This MCZ screening and stage 1 assessment report is intended to inform the assessment required to be undertaken by the regulating authority when considering whether the potential impacts of the Transmission Assets will give rise to a significant risk of hindering the conservation objectives of any MCZ.

1.1.2.3 This document is informed by guidance published by the Marine Management Organisation (MMO) (2013) on how these assessments should be undertaken and by advice from the Statutory Nature Conservation Bodies (SNCBs) during consultation in the pre-application phase. The MCZ screening and stage 1 assessment has been undertaken based on the Transmission Assets maximum design envelope as detailed within Volume 1, Chapter 3: Project description of the Environmental Statement (ES) (document reference F1.3).

1.1.2.4 This MCZ screening and stage 1 assessment report should be read alongside the following chapters and technical reports of the ES, all of which have been drawn upon and referred to throughout this document.

- Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1).
- Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2).
- Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1).
- Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4).
- Volume 2, Chapter 5: Offshore ornithology of the ES (document reference F2.5).

### 1.1.3 Structure of the report

1.1.3.1 The structure of this MCZ screening and stage 1 assessment report is as follows.

- **Section 1.1** – Introduction.
- **Section 1.2** – Legislative framework.
- **Section 1.3** – MCZ screening and stage 1 assessment methodology.
- **Section 1.4** – Consultation.
- **Section 1.5** – Project description.
- **Section 1.6** – MCZ screening.

- **Section 1.7** – Fylde MCZ.
- **Section 1.8** – MCZ stage 1 assessment – Fylde MCZ.
- **Section 1.9** – Cumulative assessment.
- **Section 1.10** – Conclusion.

## 1.2 Legislative framework

1.2.1.1 In English territorial (i.e. within 12 nm) and offshore waters, MCZs are designated under the Marine Coastal and Access Act 2009 and, together with other international and national designations, contribute to an ecologically coherent network of Marine Protected Areas (MPAs). MPAs are defined geographical areas of the marine environment established and managed to achieve long-term nature conservation and sustainable use. There are several types of MPA in the UK, which in combination are intended to form an 'ecologically coherent and well-managed network as a contribution to the effective conservation and sustainable use of the UK's marine environment. They include MCZs, Nature Conservation Marine Protected Areas, Special Areas of Conservation (SACs), Special Protection Areas, English Highly Protected Marine Areas, Sites of Special Scientific Interest / Areas of Special Scientific Interest and Ramsar sires.

1.2.1.2 Section 126 of the Marine and Coastal Access Act 2009 places specific duties on regulatory bodies relating to MCZs and marine licence decision making. This is because section 126 applies where:

- *(a) A public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and*
- *(b)The act is capable of affecting (other than insignificantly) -*
  - *(i) The protected features of an MCZ and/or*
  - *(ii) Any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.*

1.2.1.3 The authority must not grant authorisation for the doing of the act unless the Applicants seeking the authorisation satisfies the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the MCZ.

1.2.1.4 The SNCBs have responsibility under the Marine and Coastal Access Act 2009 to give advice on how to identify the activities that are capable of affecting the designated features and the processes which they are dependent upon.

1.2.1.5 If the Applicants seeking the authorisation are not able to satisfy the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the MCZ, that Applicants must satisfy the authority that:

- there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives;
- the benefit to the public of proceeding with the act clearly outweighs the risk of damage to the environment that will be created by proceeding with it; and
- the person seeking the authorisation will undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the MCZ.

## 1.3 MCZ screening and stage 1 assessment methodology

### 1.3.1 Overview

1.3.1.1 This MCZ screening and stage 1 assessment has been informed by guidance published by the MMO which describes how MCZ screening and stage 1 assessments could be undertaken in the context of marine licensing decisions (MMO, 2013). These MMO guidelines recommend a staged approach to the assessment, with three sequential stages:

i. screening;

ii. stage 1 assessment; and

iii. stage 2 assessment.

1.3.1.2 These stages are shown in **Figure 1.1** and are described in detail in **sections 1.3.2** to **1.3.4**.

1.3.1.3 In the absence of published Planning Inspectorate guidance or advice on MCZ screening and stage 1 assessments for DCO applications, the MMO (2013) guidance is considered appropriate to inform the assessment for the Transmission Assets.

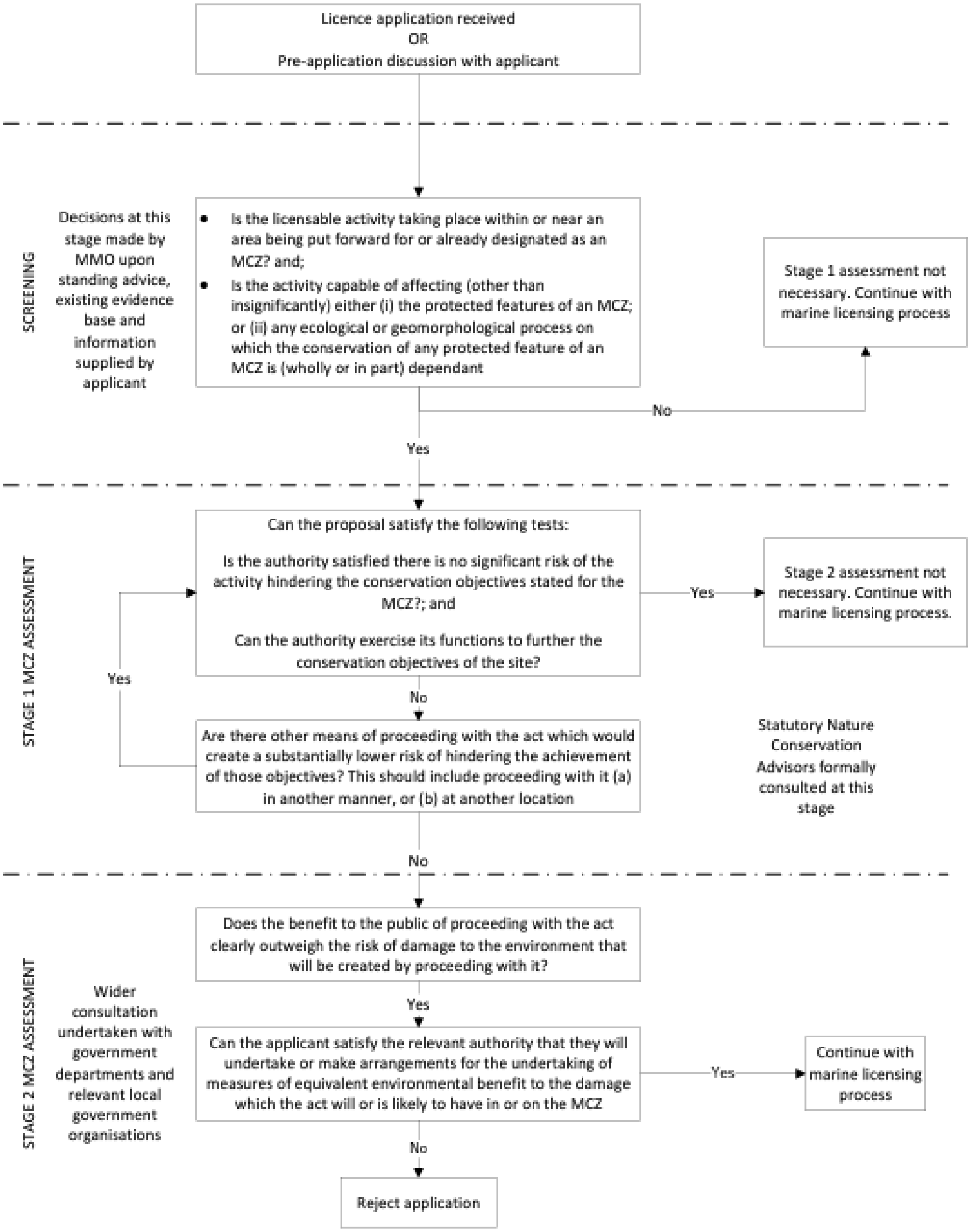


**Figure 1.1: Summary of the MCZ assessment process to be used by the MMO in marine licence decision making (MMO, 2013)**

### 1.3.2 Screening

1.3.2.1 According to the MMO (2013) guidance, all marine licence applications must be screened to determine, in the first instance, whether section 126 of the Marine and Coastal Access Act 2009 applies. Section 126 applies if it is determined through the course of screening that:

- the licensable activity is taking place within or near an area being put forward or already designated as an MCZ; and
- the activity is capable of affecting (other than insignificantly):
  - (i) the protected features of an MCZ; and/or
  - (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

1.3.2.2 The MMO (2013) guidance recommends the use of a risk based approach to determine the "nearness" of an activity to MCZs, including applying an appropriate buffer zone to the MCZ protected features under consideration as well as a consideration of risks for activities at greater distances from protected features of the MCZ(s).

1.3.2.3 In determining "insignificance", the MMO (2013) guidance states that consideration should be given to the likelihood of an activity causing an effect, the magnitude of the effect should it occur, and the potential risk any such effect may cause to either the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

1.3.2.4 A preliminary MCZ screening exercise was undertaken for the Transmission Assets in the Morgan and Morecambe Offshore Wind Farms: Transmission Assets Scoping Report (Morgan Offshore Wind Ltd and Morecambe Offshore Windfarm Ltd., 2022) which considered the following criteria.

- MCZs with physical overlap with the Transmission Assets.
- MCZs within the Zone of Influence (ZOI) for individual topics.
  - Benthic ZOI comprising a buffer of one mean spring tidal excursion from the Transmission Assets Order Limits: Offshore (hereafter referred to as Offshore Order Limits) to capture indirect effects such as those from increased suspended sediment concentrations (SSC) and associated deposition.
  - Fish and shellfish ZOI encompassing the benthic ZOI as well as MCZs in close proximity which could be impacted by underwater sound arising from the Transmission Assets. This study area has been selected to account for the spatial and temporal variability of fish and shellfish populations, including fish migration.

1.3.2.5 The preliminary MCZ screening exercise presented in the Transmission Assets Environmental Impact Assessment (EIA) Scoping Report concluded that the Transmission Assets may have the potential to affect the interest features of the following sites and therefore they were taken forward for inclusion in the MCZ screening:

- Fylde MCZ (subtidal sand and subtidal mud).
- West of Copeland MCZ (subtidal coarse sediment, subtidal sand and subtidal mixed sediments).
- West of Walney MCZ (subtidal sand, subtidal mud and sea-pen and burrowing megafauna communities).
- Ribble Estuary MCZ (Smelt *Osmerus eperlanus*).
- Wyre Lune MCZ (Smelt *Osmerus eperlanus*).

1.3.2.6 Following the preliminary screening undertaken in the Morgan and Morecambe Offshore Wind Farms: Transmission Assets Scoping Report (Morgan Offshore Wind Ltd and Morecambe Offshore Windfarm, 2022), more detailed information presented within the offshore chapters of the ES has been reviewed. This has been undertaken to further validate the screening buffers for benthic and fish features of MCZs and also to fully define the screening buffer for other highly mobile species (i.e. marine mammals and birds). This more detailed review has also been undertaken to confirm whether the Transmission Assets are capable of significantly affecting the protected features of those sites within the screening buffers, or any ecological or geomorphological processes on which the conservation objectives of those features may depend. This included a review of outputs from Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1), Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2), Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4) and Volume 2, Chapter 5: Offshore ornithology of the ES (document reference F2.5) to identify potential far field effects (e.g. increases in SSC, underwater sound and displacement), and changes to the tidal and wave regime due to the construction, operation and maintenance and decommissioning of the Transmission Assets.

1.3.2.7 Where robust evidence is available from the ES to further justify screening out MCZs, this evidence has been referenced and justification presented within **section 1.6** below.

### 1.3.3 Stage 1 assessment methodology

1.3.3.1 For MCZs identified through the screening stage, the Stage 1 assessment considers whether the condition in section 126(6) of the Marine and Coastal Access Act 2009 can be met. The decision-maker must be satisfied there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ. The MMO (2013) guidelines state that the information supplied by the

Applicants will be used in the determination of the licence application[1], in consultation with advice from the SNCBs and any other relevant information. If the condition in section 126(6) of the Marine and Coastal Access Act 2009 cannot be met, the Stage 1 assessment also considers whether the condition in section 126(7)(a) can be met. In doing so the decision maker must determine whether:

- there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ. This should include proceeding with it (a) in another manner, or (b) at another location.

1.3.3.2 In undertaking a Stage 1 assessment, the decision-maker must formally consult with SNCBs for a period of 28 days (under sections 126(2) and (3) of the Marine and Coastal Access Act 2009) unless the SNCB notifies the decision-maker that it need not wait, or the decision-maker determines that there is an urgent need to grant authorisation (in accordance with section 126(4) of the Marine and Coastal Access Act 2009).

1.3.3.3 In the Stage 1 assessment, the conservation objectives for the MCZ features must be considered. While conservation objectives for individual MCZs or certain features are often site-specific, the conservation objective defined for the features of an MCZ can be either (JNCC and Natural England, 2011):

- to maintain a feature in favourable condition if it is already in favourable condition; or
- to bring a feature into favourable condition if it is not already in favourable condition.

1.3.3.4 Within the Stage 1 assessment, the MMO (2013) guidance advises that "hinder" would be any act that could, either alone or in combination:

- in the case of a conservation objective of “maintain”, increase the likelihood that the current status of a feature would go downwards (e.g. from favourable to degraded) either immediately or in the future (i.e. they would be placed on a downward trend); or
- in the case of a conservation objective of “recover”, decrease the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. they would be placed on a flat or downward trend).

1.3.3.5 The MMO (2013) guidance states that when considering whether an activity can hinder the conservation objectives of a site, consideration should be given to direct impacts (e.g. habitat disturbance/loss within the immediate footprint of a feature) of an activity upon a feature as well as any applicable indirect impacts (e.g. increases in SSC and sediment

[1] The Applicants intend to submit an application for a single DCO for the Transmission Assets. In addition to development consent, a marine licence is required before carrying out any licensable marine activity under the Marine and Coastal Access Act 2009. Marine licences can be deemed under the DCO for licensable activities in English waters.

deposition which have not occurred within the immediate footprint of a feature but the residual effects extend to the feature). Such an indirect impact could include the changing effectiveness of a management measure put in place to further the conservation objectives.

1.3.3.6 The Applicants should also be able to demonstrate, for the purposes of the condition in section 126(7)(a) of the Marine and Coastal Access Act 2009, that any "other means" of proceeding reduces the risk such that the act no longer has a significant risk of hindering the conservation objectives of the site.

### Assessment of risk to conservation objectives

1.3.3.7 Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1) and Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) have presented assessments of the impacts of the Transmission Assets on the physical and ecological marine environment respectively. The approach to determining the significance of effects is a two-stage process that involves defining the magnitude of the impact and the sensitivity of the receptor. These definitions have also been referred to within the Stage 1 Assessment of this report, with the term 'effect' to express the consequence of an impact. This is expressed as the 'significance of effect' and is determined by considering the magnitude of the impact alongside the importance, or sensitivity, of the receptor or resource, in accordance with defined significance criteria.

1.3.3.8 Additionally, consideration has also been given to the following guidelines, particularly with respect to effects on benthic ecology.

- Guidelines for Ecological Impact Assessment in the United Kingdom (UK) and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2022).
- Offshore Wind Farms. Guidance note for EIA in respect of the Food and Environmental Protection Act 1985 (FEPA) and the Coast Protection Act 1949 (CPA) requirements (Cefas *et al*., 2004).
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).
- Marine Evidence-based Sensitivity Assessment – A Guide (Tyler-Walters *et al*., 2018).
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012).
- Nature Conservation Considerations and Environmental Best Practice for Subsea Cables for English Inshore and UK Offshore Waters (Natural England and the Joint Nature Conservation Committee (JNCC), 2022).

1.3.3.9 According to these guidelines and the Design Manual for Roads and Bridges (Highways England *et al*., 2020), the significance of effect on a defined receptor is defined by both the magnitude of the impact and the sensitivity of the receptor.

1.3.3.10 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) presents significance levels according to EIA/Ecological Impact Assessment methodologies and the conclusions regarding the significance of the effect on designated MCZs are presented in this report for information purposes only. Whilst this MCZ Screening and Stage 1 assessment draws on the information presented in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2), in contrast to the ES, the Stage 1 assessment of this report considers specifically whether there is a risk that the Transmission Assets could hinder the achievement of the conservation objectives for the relevant MCZ. This includes assessing the risks in the context of the conservation status of each of the individual MCZ protected features and to the specific management approach which applies to each of the protected features, where these have been made available.

1.3.3.11 These conservation objectives and management approaches are detailed in **section 1.7** for the sites and the protected features which have been considered in the Stage 1 assessment. The Supplementary Advice tables present attributes which are characteristics of the designated protected species and habitats within a site. The attributes are considered by Natural England to be those which best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the conservation objectives (Natural England, 2023a). The attributes have a target which is either quantitative or qualitative, depending on the available evidence and the target identifies, as far as possible, the desired state to be achieved for the attribute.

1.3.3.12 For the purposes of the Stage 1 assessment, the attributes have been broadly categorised as either physical or ecological. This has been undertaken to provide a clear assessment of the relevant pressures and sensitivities for both the underlying structures and physical processes of a habitat as well as the ecological communities which inhabit the features. The Stage 1 assessment considers each of the attributes for all protected features of the relevant MCZs (where available), where there is a clear impact-receptor pathway, to help determine whether there is a significant risk to the conservation objectives of the MCZ. This draws on information presented within the relevant chapters of the ES (see **paragraph 1.1.2.4**). When considering ecological attributes, the sensitivities of the species and communities (often represented by biotopes) associated with the MCZ features have been defined according to the relevant Advice on Operation (AoO) for MCZs in relation to activities involving the installation, operation and decommissioning of power cables. This advice provides a sensitivity range and pressure description for each of the designated site features. Best available evidence following environmental impact or experimental manipulation in the field and evidence from the offshore wind industry and analogous activities such as those associated with cable installation and operations, aggregate extraction and oil and gas industries has also been drawn upon. Where applicable, the Marine Evidence based Sensitivity Assessment (MarESA) has also been drawn upon to support the assessments of sensitivity, including evidence of sensitivity to particular activities and benchmarks for the relevant pressures considered for each attribute. The assessments of sensitivity consider:

- intolerance or resistance, which is the likelihood of damage due to a pressure; and
- recoverability or resilience, which is the rate of (or time taken for) recovery once the pressure has abated or been removed. Recoverability is the ability of a habitat to return to the state before the activity or event which caused change. It is dependent on its ability to recover or recruit subject to the extent of disturbance/damage incurred. Full recovery does not necessarily mean that every component species has returned to its prior condition, abundance or extent but that the relevant functional components are present and the habitat is structurally and functionally recognisable as the initial habitat of interest.

1.3.3.13 Where sensitivity levels have been presented within the Stage 1 assessment of this document, these are the definitions according to the relevant AoO and the MarESA (Tyler-Walters *et al*., 2018) and not according to the definitions used to inform the EIA in Volume 2, Chapter 2: Benthic Subtidal and Intertidal Ecology of the ES (document reference F2.2), the latter also considering the importance (e.g. conservation, commercial or ecological) of the receptors.

1.3.3.14 Following consideration of the relevant impacts of the Transmission Assets on attributes and targets of the individual MCZ features, conclusions are presented as to the potential risks of the activities associated with the Transmission Assets hindering achievement of conservation objectives for the sites and consequently whether the conditions in section 126(6) of the Marine and Coastal Access Act 2009 can be met (i.e. that there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ).

1.3.3.15 If it cannot be concluded that there is no significant risk of an activity hindering the achievement of the conservation objectives for an MCZ and that mitigation or consideration of alternative means of proceeding, would not create a substantially lower risk of hindering the achievement of the conservation objectives, then a Stage 2 assessment would be required (see **section 1.3.4**).

### 1.3.4 Stage 2 assessment methodology

1.3.4.1 The Stage 2 assessment, if required, considers whether the conditions in sections 126(7)(b) and (c) of the Marine and Coastal Access Act 2009 can be met. The MMO (2013) guidance advises that the decision maker should use information supplied by the Applicants, advice from the SNCBs and any other relevant information to determine whether:

- the benefit to the public of proceeding with the act clearly outweigh the risk of damage to the environment that will be created by proceeding with it; and, if so, then whether;

- the Applicants can satisfy the MMO that they will undertake or make arrangements for the undertaking of Measures of Equivalent Environmental Benefit (MEEB) to the damage which the act will or is likely to have in or on the MCZ.

1.3.4.2 The above determinations should be addressed in sequence, that is, if the public benefit test is not "passed" then a consideration of MEEB would not be made as the application would be rejected (MMO, 2013).

1.3.4.3 In determining "public benefit", the decision maker should consider benefits at a national, regional or local level.

1.3.4.4 The MMO (2013) guidance suggests that the types of compensatory measures that might be considered under the Habitats Directive (Council Directive 92/43/EEC) may also be appropriate when determining MEEB, although consideration will not be confined to those measures.

## 1.4 Consultation

### 1.4.1 Scoping

1.4.1.1 On the 28 October 2022, the Applicants submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

1.4.1.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 8 December 2022.

### 1.4.2 Evidence plan process

1.4.2.1 Following scoping, consultation and engagement with interested parties specific to the MCZ screening and stage 1 assessment has continued. An Evidence Plan Process (EPP) was developed for the Transmission Assets, seeking to ensure engagement with the relevant aspects of the EIA process throughout the pre-application phase. The development and monitoring of the Evidence Plan and its subsequent progress was undertaken by the EPP Steering Group. The Steering Group comprises the Planning Inspectorate, the Applicants, the Marine Management Organisation (MMO), Natural England, Historic England, the Environment Agency and the Local Planning Authorities as the key regulatory and bodies.

1.4.2.2 As part of the EPP, Expert Working Groups (EWGs) were set up to discuss and agree topic specific matters with relevant stakeholders.

1.4.2.3 A benthic ecology, fish and shellfish and physical processes EWG was established with the SNCBs which includes representatives from the MMO, The Centre for Environment Fisheries and Aquaculture Science (Cefas), the Environment Agency, Natural England, The North West Wildlife Trust, JNCC and the North Western Inshore Fisheries and

Conservation Authority. Discussion to date regarding the MCZ screening and stage 1 assessment has focussed on providing consultees with information on the benthic subtidal surveys within the Transmission Assets which overlap with relevant MCZs, the proposed approach to the assessment and the outputs of the assessments.

### 1.4.3 Section 42 responses

1.4.3.1 The preliminary findings of the EIA process were published in the Preliminary Environmental Information Report (PEIR) in October 2023. The PEIR was prepared to provide the basis for formal consultation under the Planning Act 2008. This included consultation with statutory bodies under section 42 of the Planning Act 2008.

### 1.4.4 Summary of consultation responses received

1.4.4.1 A summary of the key items raised specific to the MCZ screening and stage 1 assessment is presented in **Table 1.1**, together with how these have been considered in the production of this report. It should however be noted that formal responses are provided for **all** consultation responses received and can be accessed in the Consultation Report (document reference E1).

## Table 1.1: Summary of key consultation comments raised during consultation activities undertaken for the Transmission Assets relevant to the MCZ screening and stage 1 assessment

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
|---|---|---|---|
| December 2022 | MMO - Scoping Opinion | The MMO noted that relevant protected benthic species and habitats have been identified and included in the Scoping Report and several conservation designations have been included for consideration. The MMO also highlighted that Fylde MCZ lies, almost wholly, within the Transmission Assets scoping boundary at the nearshore end of the export cable corridor. | To address this concern an MCZ screening and stage 1 assessment has been undertaken, considering the Fylde MCZ, which is presented within this report (see **section 1.6** and **section 1.8**) to determine if the Transmission Assets will negatively impact upon the ability of the site to meet its conservation objectives. |
| | | The MMO highlighted that the export cable route would bisect the Fylde MCZ and the Ribble and Alt Estuaries Ramsar designated sites. The MMO recommends options for compensatory measures are discussed with the relevant SNCBs to agree. | To address this concern an MCZ screening and stage 1 assessment has been undertaken, considering the Fylde MCZ, which is presented within this report (see **section 1.6** and **section 1.8**) to determine if the Transmission Assets will negatively impact upon the ability of the site to meet its conservation objectives. The impact on the Ribble and Alt Estuaries Ramsar is considered in Volume 3, Chapter 3: Onshore ecology and nature conservation of the ES (document reference F3.3) and in the Information to Support and Appropriate Assessment (document references: E3, E2.3). The Ribble Estuary MCZ however has been included in the MCZ screening (**section 1.6**). |
| | Natural England – Scoping Opinion | Natural England recommended that the ES should include a full assessment of the direct and indirect effects of the development on the relevant MCZs and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects. | An MCZ screening has been presented in this report is to identify which MCZs might be impacted by the Transmission Assets (**section 1.3.2**) and then to assess if relevant activities may affect the ability of the site to reach its conservation objectives as part of the stage 1 assessment (**section 1.8**). This assessment has considered measures adopted as part of the Transmission Assets (commitments). In addition, each of the features of the relevant MCZs screened into the assessment have been assessed within Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2). The mitigation hierarchy (**section 1.8.1**) |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | | has also been followed to reduce and mitigate effects where possible. Also, the project design parameters have been reduced through project refinement post-PEIR. |
| | | Natural England also recommended that the ES should consider including information on the impacts of this development on MCZ interest features, to inform the assessment of impacts on habitats and species of principle importance for this location. | In addition to the stage 1 assessment presented within this MCZ screening and stage 1 assessment report (**section 1.8**), each of the features of the relevant MCZs screened into the assessment have been assessed individually within Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2). The MCZs have also been assessed in Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1). |
| March 2023 | Natural England, MMO, Environment Agency and Cefas – 01 benthic ecology, fish and shellfish and physical processes EWG | The Applicants presented an overview of the sampling undertaken in the Fylde MCZ as part of the Transmission Assets site-specific surveys and an overview of the proposed assessment methodology. No specific comments were raised by the SNCBs at this meeting. | No comments were raised in regard to the site-specific surveys and proposed assessment methodology therefore the assessment of effects (**section 1.8**) have been prepared in line with the approach presented at the EWG. |
| July 2023 | Natural England, MMO, Environment Agency, Cumbria Wildlife Trust and Cefas – 02 benthic | The Applicants presented the results of the MCZ screening which concluded that only the Fylde MCZ would be taken forward for a stage 1 assessment.<br>The Applicants presented the baseline for the Fylde MCZ based on desktop data and site-specific survey data. The Applicants also provided a summary of the preliminary assessments of the impact of the Transmission Assets on the Fylde MCZ regarding temporary habitat disturbance/loss and long term habitat loss in the project alone assessment and the cumulative assessment, including an | No comments were raised regarding the conclusions of the MCZ screening, the baseline data or the preliminary outputs of the stage 1 project alone and cumulative assessment, therefore the stage 1 assessment Transmission Assets alone assessment (**section 1.8**) and cumulative assessment (**section 1.9**) have been prepared in line with the approach presented at the EWG. |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | ecology, fish and shellfish and physical processes EWG | outline of the parameters used to determine the assumptions applied in these assessments. | |
| November 2023 | Environment Agency (National Infrastructure Team) - Section 42 Response | The Environment Agency highlighted that the Cable Specification and Installation Plan(s) (CSIP) should include measures to limit the extent of cable protection and sandwave clearance within the Fylde MCZ and should be informed through the undertaking of survey works pre-construction. | The Outline Offshore CSIP (CoT45; see **Table 1.14**) (document reference J15) includes details of cable burial depths, cable protection, cable monitoring, and a cable layout plan which ensures safe navigation is not compromised including consideration of under keel clearance. No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point on the offshore export cable corridor route without prior written approval from the Maritime and Coastguard Agency (MCA) (CoT45, **Table 1.14).** Full details of the design envelope is presented in Volume 1, Chapter 3: Project description of the ES (document reference F1.3). Additionally, the Outline Offshore CSIP includes measures to limit the extent of cable protection to 3% of the offshore export cable route within the Fylde MCZ and sandwave clearance up to 5% of the offshore export cable route within the Fylde MCZ (CoT47, see **Table 1.14**). These commitments are intended to minimise impacts to the Fylde MCZ and are therefore considered throughout this assessment. |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | MMO – Section 42 Response | The MMO noted that it had been identified that construction activities will occur within the Fylde MCZ and that there may be potential impacts from construction activities within one tidal excursion from the West of Walney MCZ. In addition to this they noted there may be a localised physical change from predominantly soft sediment to hard substrate should cable protection be required along the export cable route.<br><br>The MMO defers to and supports the statutory advice provided by the relevant SNCBs regarding the potential impacts to the protected features of the identified nature conservation areas that may occur because of the Transmission Assets. | The impact of the Transmission Assets on the West of Walney MCZ has been considered in the MCZ screening (**section 1.6**). Given the distance of this MCZ from the Transmission Assets, the West of Walney MCZ will not be significantly affected by the Transmission Assets and so are not taken forward for consideration in the MCZ Stage 1 assessment.<br><br>The impact of cable protection on the sedimentary habitats of the Fylde MCZ has been considered in **section 1.8.5**. |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
|---|---|---|---|
| | Natural England - Section 42 Responses | Natural England advised that where possible, the avoid, reduce, mitigate hierarchy should be employed to reduce environmental impacts.<br>Natural England advised that if the level of interaction with Fylde MCZ cannot be avoided, the next stage of the mitigation hierarchy would be for the project to minimise the amount of cable protection within the designated site. The final parameters for cable protection should be outlined in this assessment. Further exploration of cable protection requirements is needed within Fylde MCZ, as well as development of design and installation measures that will increase the likelihood of successful burial.<br>However, Natural England acknowledged there is a likelihood of needing cable protection within Fylde MCZ and they therefore advised that the developer should explore options for a Stage 2 MCZ assessment including an in-principle MEEB Plan. | The mitigation hierarchy has been considered throughout this MCZ stage 1 assessment. The MCZ stage 1 assessment for the final application has been updated since PEIR to make this clearer. **Table 1.13** has been included to ensure this it is clear where each stage of the hierarchy has been applied in the development of this MCZ stage 1 assessment.<br>As noted by Natural England part of the minimise stage of the mitigation hierarchy has involved refining the cable protection parameters to ensure the minimum amount of long term habitat loss within the Fylde MCZ. The refined cable protection parameters are presented in **Table 1.18**.<br>The Applicants' position remains, as concluded in **section 1.10** that there will be no significant risks to the achievement of the conservation objectives of the Fylde MCZ and a Stage 2 assessment is not required. |
| | | Natural England advised that the developer's Cable Burial Risk Assessment (CBRA) is provided and secured appropriately with the Application and includes information in line with Natural England's Best Practice Guidance Phase III, namely:<br>• method(s) to be used;<br>• overlap with MPA(s);<br>• Habitats impacted;<br>• presence of sensitive species and habitats;<br>• total number of events (for the lifetime of the cable);<br>• frequency (worst case scenario);<br>• duration of each event (worst case scenario);<br>• total area of impact per event (worst case scenario); and | As outlined in **Table 1.14** (CoT45), an Outline Offshore CSIP, which includes an Outline CBRA has been developed as part of the application (document reference J14). Detailed CSIP(s) and CBRA(s) will be developed in accordance with the Outline Offshore CSIP and Outline CBRA. |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | • impacts from sediment plumes, if applicable. | |
| | | Natural England advised that the submitted ES should include a commitment to remove cable protection from the MCZ as part of the decommissioning plan. | The Applicants have committed to ensuring that all external cable protection used within the Fylde MCZ will be designed to be removable on decommissioning (CoT108; **Table 1.14**). The requirement for removal of cable protection from the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). |
| | | While Natural England supported the use of sandwave levelling as a form of mitigation measure to reduce the likelihood of using cable protection they noted that the area impacted by sandwave clearance within Fylde MCZ is exceptionally large areas when compared to other offshore windfarm projects. Natural England recommend the use of best practice methods to reduce the area impacted by disposal of sandwave clearance materials. Natural England advised that site-specific geophysical survey data should be used to refine the maximum design scenario (MDS). Natural England advised full consideration should also be given to relocation of any disposal material and impacts that may have. | A number of project design refinements have been made between the PEIR and final application (full details in Volume 1, Chapter 3: Project description of the ES (document reference F1.3). These refinements have significantly reduced the requirements for sandwave clearance (and associated temporary habitat disturbance) within the Fylde MCZ. The MDS for sandwave clearance in the Fylde MCZ has reduced from 60% to 5% for the Morgan export cables and from 30% to 5% for the Morecambe export cables (as outlined in commitment CoT47, **Table 1.14**). It should also be noted that sandwave clearance is an important tool to facilitate the successful burial of cables and to minimise the requirements for external cable protection.<br>As outlined in **Table 1.14,** the Outline Offshore CSIP includes measures to ensure material arising from sandwave clearance will be deposited in close proximity to the works and within the licenced disposal area applied (CoT116, **Table 1.14**). Therefore, material arising from sandwave clearance in the Fylde MCZ will be deposited within the Fylde MCZ. Further detail is included in the Outline Offshore CSIP (document reference J15). |
| | | Natural England advised that the removal of large boulders along the cable corridor could represent a significant alteration to the | Any boulders identified as likely to impact installation will need to be moved to the side (i.e. side cast), away from the |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | composition of the seabed. Therefore Natural England recommended that the dredging and disposal site characterisation includes an analysis of geophysical data to establish with a better degree or certainty the areas where boulder and sandwave clearance would be necessary. | immediate location of the cable infrastructure. There are two key methods of clearing boulders, boulder plough and boulder grab (Volume 1, Chapter 3: Project description of the ES (document reference 1.3). Where a high density of boulders is seen, the expectation is that a plough will be required to clear the cable installation corridor. Where medium and low densities of boulders are present, a subsea grab is expected to be employed. In the event that boulder clearance is required, it will occur within the footprint of other site preparation activities and all boulders would remain in the vicinity (i.e. sidecast only) of the area they were cleared from. There would, therefore, be no significant alteration to the composition of the seabed in the MCZ. |
| | | Natural England highlighted that the extent and location of sediment disturbance (area, volume) should be provided for affected MPAs/features (e.g. Fylde MCZ). Natural England also queried how the sediment would be retained within designated sites to ensure that the subtidal mud and sand will fully recover i.e., have the same structure and function. | A number of project design) refinements, as detailed in have been made between the PEIR and final application. These refinements have significantly reduced the requirements for sandwave clearance (and associated temporary habitat disturbance) within the Fylde MCZ. The MDS for sandwave clearance in the Fylde MCZ has reduced from 60% to 5% for the Morgan export cables and from 30% to 5% for the Morecambe export cables (as outlined in commitment CoT47, **Table 1.14**). It should also be noted that sandwave clearance is an important tool to facilitate the successful burial of cables and to minimise the requirements for external cable protection.<br>As outlined in **Table 1.14,** the Outline Offshore CSIP includes measures to ensure material arising from sandwave clearance will be deposited in close proximity to the works and within the licenced disposal area applied for. Material arising from sandwave clearance in the Fylde MCZ will therefore be deposited within the Fylde MCZ |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | | (CoT116, **Table 1.14**). Further detail is included in the Outline Offshore CSIP (document reference J15). |
| | | Natural England noted that the parameters for cable crossings have not been defined in this assessment. Natural England acknowledged that the developer needs to confirm crossings with the asset owner. However, when this information is known, natural England request it be added to the MDS parameters. | The parameters regarding cable protection for cable crossings in the Fylde MCZ have been added to the long-term habitat loss impact MDS (**Table 1.18**). The MDS for this impact allows for one cable crossing within the Fylde MCZ (for all four Morgan export cables). To ensure a precautionary approach, the assessment assumes that the cable protection for the cable crossing could occur wholly in either the subtidal sand or subtidal mud feature (**section 1.8.5**). There are no cable crossings associated with the Morecambe export cables within the Fylde MCZ. |
| | | Natural England noted that Volume 2, Chapter 1: Physical Processes of the PEIR states in areas with relatively low levels of sediment transport and areas with higher fine sediment content (e.g. muddy sands and sandy muds) trenches were observed, although these were relatively shallow features.<br><br>Natural England highlighted this as a further option to mitigate impacts, suggesting to micro- siting the cable route into areas which are most likely to recover i.e. avoiding areas with higher fine sediment content within Fylde MCZ. | This comment refers to text in **section 1.8.2** regarding a review of the effects of cable installation on subtidal sediments (RPS, 2019). This review indicated that, based on evidence from other projects, remnant trenches would naturally infill following cable installation depending on the rate of sedimentation in the area (RPS, 2019). Given the east-west split of sediment classification within the Fylde MCZ (**Figure 1.6**), with fine sand and mud regions lying parallel to the coast, the potential for micro-siting to avoid finer seabed material within the cable corridor is limited.<br><br>There will be one cable crossing (for all four Morgan export cables) within the boundary of the Fylde MCZ. No cable crossings are required in the Fylde MCZ for the Morecambe export cables. A precautionary approach has been adopted for the assessment which assumes that the cable protection material for the cable crossing could occur wholly within either the subtidal sand or the subtidal mud features. A full assessment of the potential impacts to each feature is presented in the Transmission Assets alone assessment (**section 1.8**). |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | Natural England flagged that this assessment stated that the MDS for long term habitat loss within Fylde MCZ equates to 159,580 m$^2$ of total long term habitat loss within the Fylde MCZ. Natural England advised that this is a significant level of long-term habitat loss within Fylde MCZ. They also disagreed that the magnitude of the impact is low. The direct habitat loss of features of the MCZ due to cable/scour protection within the site constitutes a lasting impact over the lifetime of the project which is potentially irreversible.<br>Therefore Natural England concluded that the proposal has a significant risk of hindering the objectives of the MCZ. | The MDS for long term habitat loss has been refined post-PEIR reducing the total value from 156,580 m$^2$ (0.06% of the total area of the MCZ) to 34,560 m$^2$ (0.013% of the total area of the MCZ). Based on this reduction the magnitude of the impact has remained low and the conclusion remains that there will be no hinderance to the achievement of the conservation objectives of the Fylde MCZ, which is to maintain the protected features in a favourable condition.<br>Additionally, this impact will not be irreversible as the Applicants have committed to ensuring that all external cable protection used within the MCZ will be designed to be removable on decommissioning (CoT108, **Table 1.14**). |
| | | Natural England flagged that the MDS assumed the complete removal of all foundations and cables but that all cable and scour protection may be left *in situ*. This would equate to permanent changes in the benthic habitats within the site. Natural England highlighted that most of the study area comprises of sand/coarse mix material; it is a very sedimentary, dynamic part of the Irish Sea. Having permanent hard infrastructure present may impact the natural sedimentary process in the area. Additionally, they suggest that it will increase the risk of phase shifts in benthic community composition (including invasive non-native species (INNS)) due to the addition of hard substate.<br>Natural England were particularly concerned with cable and scour protection (i.e. hard infrastructure) being left *in situ* within the Fylde MCZ. | The Applicants have committed to ensuring that all external cable protection used within the MCZ will be designed to be removable on decommissioning (CoT108, **Table 1.14**). The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). |
| | | Natural England were concerned that no proposed future monitoring is being proposed to test predictions being made within the impact assessment.<br>Natural England advised that the project should have adequate scope to include long term impact/recovery monitoring especially for | **Table 1.20** and the Offshore In-Principle Monitoring Plan (OIPMP) (document reference J20) outline that the Applicants will monitor the recovery of sediments and benthic communities within representative areas of the Fylde MCZ potentially impacted by sandwave clearance, |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | receptors of medium and high sensitivity. Natural England also stated that an appropriate Benthic Monitoring Plan should be established at key impact locations that spatially and temporally represent all impacted biotopes, habitats, and species as well as focussing on the designated habitats of the Fylde MCZ.<br>Natural England also advised than an appropriate survey design and power analysis should be conducted to ensure that adequate data is collected for long term comparisons of the effect of change compared to baseline data. | cable installation and cable protection, at appropriate temporal intervals as part of the operational asset integrity surveys. Detailed Offshore Monitoring Plans will be produced prior to operation and maintenance phases in accordance with the OIPMP and will be approved in consultation with statutory advisors and regulators.<br>Monitoring areas where sandwave clearance and cable installation has occurred will help confirm the recovery of seabed features following construction activities. Monitoring cable protection will also help confirm the recovery of the sediments associated with the cable protection over an agreed period of time and by monitoring any recolonisation/recovery of the associated benthic communities. |
| | | Natural England highlighted that the Fylde MCZ condition assessment has recently been published on Natural England's Designated Sites Viewer – Fylde MCZ Marine Condition Assessment. Natural England advised the condition assessment and condition of the features of Fylde MCZ are taken into consideration when assessing the proposal against the conservation objectives for the site. | The latest Fylde MCZ condition assessment (Natural England, 2023b) has been incorporated this assessment (**section 1.7**). |
| | | Natural England highlighted that the developer uses the justification that by placing hard standing infrastructure on the seabed it will create habitat, increase species diversity and potentially produce beneficial effects for the wider ecosystem.<br>Natural England advised that this justification is wholly inappropriate as the Fylde MCZ and the wider Irish Sea study area is comprised of sedimentary habitats, not reef. Therefore, Natural England stated that introducing hard infrastructure has the potential to change the existing benthic composition but not necessarily benefit the wider ecosystem as the assessment currently suggests. | These comments are noted however the assessment considers both the potential adverse effects on the surrounding soft sediment environment as well as the potential for positive effects on the wider ecosystem. The wording has been reviewed to ensure we are covering both elements adequately with regard to the conservation objectives of the MCZ, but the wider potential benefits are still considered and are not framed as compensation for the long term loss of soft sediment habitats (**section 1.8.5**). |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | Natural England advised that the current wording is not appropriate and the wording around placing hard structures on the seabed needs to be revisited in the assessment. | |
| | | Natural England noted that the assessment stated that the Fylde MCZ sediment transport regime may be affected to a small degree if the Morgan Offshore Booster Station is located at the most easterly location within the Morgan Offshore Booster Station Indicative Search Areas. Given that Fylde MCZ is already under pressure from the proposed cable corridor, Natural England advised that the booster station should be located in the area which will have the least impact on Fylde MCZ. | As part of the project design refinements between PEIR and final application, the Morgan Offshore Booster Station is no longer required for the Transmission Assets (further details in Volume 1, Chapter 3: Project description of the ES (document reference F1.3)). The assessments in the Transmission Assets alone MCZ stage 1 assessment have been updated to reflect this amendment. |
| | | Natural England highlighted that the assessment stated, in regard to the changes in physical processes impact, the magnitude of the impact is low.<br>Natural England disagreed with the conclusion of the assessment and advised the magnitude will be greater due to impacts to both the surrounding environment and Fylde MCZ. Therefore Natural England advised that the magnitude of impact is reassessed in the ES Submission. | The magnitude of the changes to physical processes impact has reduced from post-PEIR as the OSPs and Morgan Offshore Booster Station have been removed from the project description (Volume 1, Chapter 3: Project description of the ES (document reference F1.3)). Cable protection is the only seabed-surface infrastructure to be installed within the Fylde MCZ with the potential to result in changes to physical processes. Modelling indicates that the impact of cable protection would be highly localised to the footprint of the infrastructure therefore a final magnitude of low has been concluded (further details in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) and Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1)). |
| | | Natural England highlighted that the assessment at PEIR concluded that a cumulative effect of around 2.07% of the MCZ is expected to be impacted. Natural England stated that when considering cumulative impacts within Fylde MCZ, it would be useful to include information regarding cable crossings within the MCZ. Natural England also expressed concern regarding habitat disturbance as a | Information regarding cable crossings within the Fylde MCZ has been included in **section 1.8.5**, and the location of cable crossing is shown in **Figure 1.8** and in Volume 1, Annex 3.1: Offshore Crossing Schedule of the ES (document reference F1.3.1). |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | result of Tier 2 projects (i.e. projects where a Scoping Report has been submitted and is in the public domain). | The Cumulative Effects Assessment (CEA) has been updated post-PEIR to include the most up to date values for the Transmission Assets including the operation and maintenance temporary habitat disturbance/loss values which have reduced from affecting 2.07% of the MCZ at PEIR to 0.35% of the MCZ (**section 1.9**). The details of the other CEA projects have also been updated where possible including the Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets as well as the Isle of Man – UK Interconnector 1. Additionally, a search was conducted for other new projects which may interact with the Fylde MCZ which resulted in the inclusion of the Isle of Man – UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets as Tier 3 projects in the CEA (i.e. a project where a Scoping report has been submitted but isn't in the public domain, a project which has been identified in the relevant Development Plan, or a project which has been identified then other plans and programmes; see **section 1.9.1**). |
| | | Natural England advised that the submitted ES should provide a map showing potential cable crossing locations, including designated areas, Annex I sandbanks etc (e.g. outline the anticipated spatial extent and dimensions of the Isle of Man Interconnector cable crossing). Natural England recommend that these cable crossings should be included in the CEA. | The location of the cable crossing in the Fylde MCZ is shown in **Figure 1.8** and detailed in Volume 1, Annex 3.1: Offshore Crossing Schedule of the ES (document reference F1.3.1).<br><br>The cable crossings for the Isle of Man Interconnector 1 have been added to **Figure 1.9** (i.e. they lie outwith the boundary of the Fylde MCZ) and information regarding the extent of the potential cable protection which could be installed in the Fylde MCZ in the future, as part of the maintenance of the Isle of Man Interconnector 1 project, has been included in **section 1.9**.<br><br>The Isle of Man Interconnector 2 is in its early stages therefore it is not yet known if or where any cable crossings may be within the Fylde MCZ. It is, however, considered as |

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| | | | a Tier 3 project (together with the Mooir Vannin – UK Transmission Assets) in the cumulative assessment (**section 1.9**). |
| | | Natural England highlighted that the following points should be considered when providing evidence to underpin an assessment of whether an impact is likely to have a significant risk of hindering the conservation objectives of the site.<br>• Location of the predicted loss in terms of whether it sits on a designated feature of the site.<br>• Duration of the loss – for loss to be considered temporary it must be clearly time-limited to the point where the impact is predicted to return to the same pre-impact condition and must include a detailed remediation plan using proven techniques as part of the licence.<br>• Scale of the loss in relation to the feature of the site including consideration of the quality and rarity of the affected area.<br>• Impact on structure, functioning or supporting processes of the habitat.<br>• Feature condition.<br>• Existing habitat loss within the same site/feature. | The Applicants' position remains that the information requested by Natural England in this response has been provided in the MCZ stage 1 assessment and that there will be no significant risks to the achievement of the conservation objectives of the Fylde MCZ. In acknowledgment of the mitigation hierarchy, and to incorporate feedback from Natural England, a number of project refinements have been made between the PEIR and to final application.<br>Temporary habitat loss/disturbance has been apportioned based on the coverage of each protected feature within the overlap of the Fylde MCZ (**section 1.8.1**) and the Offshore Order Limits as the protected features of the Fylde MCZ cover the full extent of the overlap with the Offshore Order Limits.<br>Separate assessments have been undertaken for each of the designated features of the Fylde MCZ in relation to temporary habitat disturbance/loss (**section 1.8.2**) which includes the expected recovery times for the habitat identified.<br>The MDS has been provided in **sections 1.8.2** and **1.8.5** for temporary habitat disturbance/loss and long term habitat loss respectively. The assessments of these impacts include the consideration of the protected nature of these habitats and their significance on a national scale as well as the condition of the feature. These assessments also examined the effect of the relevant impacts on the structure, functions and supporting processes of each protected feature. |

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| | | Natural England advised that whilst there are no hard and fast rules or thresholds, in order for them to advise that there is no likelihood of a significant risk of hindering the conservation objectives of the site it should consider:<br>• that the loss is not on the priority habitat/feature;<br>• that the loss is temporarily and reversible (within guidelines above);<br>• that the scale of loss is so small as to be *de minimus* alone; and<br>• that the scale of loss is inconsequential including other impacts on the site/feature. | The Applicants' position remains that the information requested by Natural England in this response has been provided in the MCZ stage 1 assessment and that there will be no significant risks to the achievement of the conservation objectives of the Fylde MCZ. In acknowledgment of the mitigation hierarchy, and to incorporate feedback from Natural England a number of project refinements have been made between the PEIR and final application. These refinements have significantly reduced the requirements for cable protection (and associated long term habitat loss) within the Fylde MCZ. The MDS for cable protection due to ground conditions in the Fylde MCZ has reduced from 20% to 3% contingency for the Morgan offshore export cables and from 15% to 3% contingency for the Morecambe offshore export cables (as outlined in commitment CoT47, **Table 1.14**). It should be noted that the aim is to bury all cables in the first instance and only where this is unsuccessful or where a cable crossing is required would cable protection be used (CoT54, **Table 1.14**). Cable protection within the MCZ will very much be a contingency measure (further detail regarding cable protection is included in the Outline Offshore CSIP (document reference J15)).<br>The project has also committed to ensuring that all external cable protection used within the MCZ will be designed to be removable on decommissioning (CoT108, **Table 1.14**). The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). This is in line with the approach on the Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects (Equinor, 2022). |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | | The one cable crossing that is required for the four Morgan cables in the MCZ has been located as far west as possible and as close to the edge of the boundary of the MCZ as is feasible. Further details regarding cable protection for the cable crossing is included in the Outline Offshore CSIP (document reference J15). |
| | | Natural England requested that the submitted ES should confirm how Horizontal Directional Drilling (HDD) works intend to operate (i.e., terrestrially, bank to bank) to confirm whether there will indeed be impacts on Smelt, a feature of the Ribble Estuary MCZ. Natural England also advised that the developer should consider impacts of alternate methods should HDD not be feasible or fail. | The Ribble Estuary crossing will be undertaken by direct pipe or micro tunnel trenchless installation techniques and the works will be bank to bank (i.e. no works will take place in the water) (CoT90, **Table 1.14**) (Volume 1, Chapter 3: Project description of the ES (document reference F1.3)). There will be no potential for impacts to the smelt feature of the Ribble Estuary MCZ which could undermine the conservation objectives. Smelt is therefore screened out (**section 1.6.3** and **Table 1.10**). |
| | | Natural England concluded that unless it can be demonstrated otherwise, the scale of impacts is likely to hinder the 'maintain' conservation objectives of Fylde MCZ whilst the protection is *in situ*, and potentially beyond due to removal implications. | This response is noted. Post-PEIR the MDS for the Fylde MCZ has been reduced and the impact assessment has been updated to provide the most up to date assessment. |
| | Natural Resources Wales (NRW) – Section 42 Response | NRW had no concerns regarding impacts to the following Welsh receptors: Marine Physical Processes, Benthic Subtidal and Intertidal Ecology and Designated Landscapes. | This response has been noted and no further action is required. |
| | Northwest Wildlife Trust – Section 42 Response | Northwest Wildlife Trust were concerned that the Transmission Assets will pass through designated sites, including Fylde MCZ and potentially the Ribble Estuary MCZ. They the Northwest Wildlife Trust would therefore expect to see an in-principle MEEB produced by the Applicants. | The Ribble Estuary MCZ has been screened out of further assessment in **section 1.6** due to the lack of interaction between the onshore infrastructure with the Ribble Estuary MCZ area. The conclusion of this assessment is that the conservation objective of the Fylde MCZ will not be hindered by the Transmission Assets, and a stage 2 |

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| | | | assessment, including an In-Principle MEEB Plan, is not required. (**section 1.10**). |
| | | The Northwest Wildlife Trusts concluded that the placement of hard infrastructure on soft sediment feature would lead to a permanent change in loss or damage of the feature for the lifetime of the project. The Northwest Wildlife Trusts therefore believed that this could result in the feature, and therefore the MCZ entering unfavourable condition.<br>The Northwest Wildlife Trusts noted that every effort should be taken to limit and reduce cable protection in soft sediments, particularly designated areas and MCZs. | **Section 1.8.1** details how the mitigation hierarchy has been used to ensure the impact on the Fylde MCZ has been minimised at each stage of the Transmission Assets development. Additionally **Table 1.14** details the measures which have been adopted as part of the Transmission Assets relevant to its impact on the Fylde MCZ, including a commitment to ensuring that all external cable protection used within the MCZ will be designed to be removable on decommissioning (CoT108, **Table 1.14**). |
| | | The Northwest Wildlife Trusts noted that the Ribble Estuary MCZ has not been screened in to the MCZ screening and stage 1 assessment report, however there is direct overlap with the MCZ and onshore search. The Northwest Wildlife Trusts would like to see a guarantee that the onshore elements will not impact the waterways of the Ribble Estuary. | The Ribble estuary crossing will be via HDD (or other trenchless techniques including micro tunnelling and direct pipe) (CoT90, **Table 1.14**) and so there will be no impacts to the smelt feature of the Ribble Estuary MCZ which could undermine the conservation objectives. Smelt is screened out (**section 1.6.3** and **Table 1.10**). |
| February 2024 | MMO, Environment Agency and Cefas – 03 benthic ecology, fish and shellfish and physical processes EWG | This meeting highlighted the key points raised in the Section 42 comments following the submission of the PEIR. These comments are addressed in the above responses.<br>No comments were raised by the attendees at this meeting. | No further comments regarding the Section 42 comments on the PEIR were raised during this EWG. |

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| | Natural England – 03 benthic ecology, fish and shellfish and physical processes EWG | Applicants presented the key section 42 responses received from SNCBs following the publishing of the PEIR as well as presenting the proposed actions to be taken to address these comments.<br>Natural England requested clarification regarding the area of long term habitat loss which would arise from cable crossings as well as which protected features of the Fylde MCZ are most likely to be impact by long term habitat loss. | The total long term habitat loss associated with the Transmission Assets is predicted to be up to 30,400 $m^2$ (0.012% of the Fylde MCZ). The long term habitat loss associated with the cable crossing for the Morgan export cables (4,000 $m^2$) may occur wholly within either the subtidal sand or subtidal mud designated feature of the Fylde MCZ. As the location of any cable protection which may be required in the Fylde MCZ due to ground conditions is currently unknown, the MCZ stage 1 assessment has adopted a precautionary approach which assumes that all of the long term habitat loss associated with any cable protection required due to ground conditions within the MCZ (26,400 $m^2$) could occur wholly within either the subtidal sand or subtidal mud protected features. Therefore the worst case scenario for the subtidal mud and subtidal sand feature is for 30,4000 $m^2$ of potential long term habitat loss. The impact of long term habitat loss within the Fylde MCZ is assessed in **section 1.8.5**. |
| | | Natural England suggested that an Outline CBRA, which will be required to be submitted with the application, should look at the tools likely to be used for the installation, and the likelihood of success for optimal cable burial depth. | The Outline Offshore CSIP (document reference J15) will include information such as the cable installation tools as well as the likelihood of success for optimal cable burial depth. An Outline CBRA is also included with the application (document reference J14). Detailed CSIP(s) and Outline CBRA(s) will be developed in accordance with the Outline Offshore CSIP and Outline CBRA (CoT45, **Table 1.14**). |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | | Information regarding the methods and tools used for cable burial is also detailed in Volume 1, Chapter 3: Project Description of the ES (document reference F1.3). |
| | | Natural England also highlighted that if fishing gear pulls up the cable this would come under operation and maintenance and a separate marine licence would be needed for any cable protection to be installed in Fylde MCZ in the operation and maintenance phase. | Export cable repair and reburial including remedial cable protection had been considered within the assessment for the parameters presented in the MDS (**Table 1.18**). Should remedial cable protection be required as part of cable repair or reburial, then the total installed cable protection during the construction phase and operation and maintenance phase would not exceed that assessed within the assessment, which is 10% of the overall cable route and 3% of the cable route through the Fylde MCZ. Any requirements for additional cable protection which are not included within the DCO application would require a new Marine Licence. |
| | | A CBRA will be needed which will need to include geotechnical survey data. Natural England suggested the Applicants should look at the Sheringham and Dudgeon extension projects as an example of what can be included. We would expect to see the same level of detail included in their application. | As outlined in **Table 1.14** (CoT45), an Outline CBRA (document reference J14) and Outline Offshore CSIP (document reference J15) is provided with the application. Detailed CSIP(s) and Outline CBRA(s) will be developed in accordance with the Outline Offshore CSIP and Outline CBRA. |
| | | Natural England queried if the full list of benthic mitigation measures included in their section 42 response had been considered. | These measures have been considered in relation to whether they can be applied to the Transmission Assets in **Table 1.15**. |
| | | Natural England stated that, based on the information presented to the EWG and the revised predicted extents of long term habitat loss, their advice is unchanged and they would still expect to require MEEB. | The Applicants' position remains that the mitigation hierarchy was applied and the conclusion in **section 1.10** is that there will be no significant risks to the achievement of the conservation objectives of the Fylde MCZ and therefore a stage 2 assessment is not required. |
| | | Natural England confirmed that sandwave levelling (which is included in temporary habitat disturbance/loss) is classed as | Sandwave clearance is an important tool to facilitate the successful burial of cables and to minimise the |

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| | | mitigation to reduce the need for cable protection and would not require MEEB. Natural England highlighted that the Applicants would however need to demonstrate why and where the sandwave levelling takes place. Natural England also stated that within designated sites the Applicants would need to dispose of sandwave material upstream within the site to ensure sediment is not lost from the system. | requirements for external cable protection. As outlined in **Table 1.14** (CoT116, **Table 1.14**), the material arising from sandwave clearance will be deposited in close proximity to the works and within the licenced disposal area applied. Material arising from sandwave clearance in the Fylde MCZ will therefore be deposited within the Fylde MCZ with further details in the Outline Offshore CSIP (document reference J15). |
| | | Natural England recommended relocating any Unexploded Ordnance (UXO) outside of the MCZ prior to detonation or using lower ordnance detonation as detonation in muddy areas is not ideal. | The Applicants will endeavour to avoid detonation but have committed to the use of low order techniques, where possible, as the primary mitigation measure alongside other measures if required (CoT64, **Table 1.14**). There are no known UXOs in the MCZ, but a precautionary assessment has been undertaken which assumes that clearance of up to four UXOs may be required in the MCZ and therefore it has been assessed in **section 1.8.2**. |
| August and September 2024 | Natural England – 04 benthic ecology, fish and shellfish and physical processes EWG and post-meeting discretionary advice (dated 11 September 2024) | Natural England welcomed the work undertaken by the Applicants to reduce the MDS within the Fylde MCZ. Natural England recognised that cable protection will only be installed where essential but noted that they had to consider the worst case scenario. | The reductions made to the MDS within the Fylde MCZ, post-PEIR, are summarised in **Table 1.13**. The Applicants' position remains that, as outlined in **section 1.10**, that there will be no significant risks to the achievement of the conservation objectives of the Fylde MCZ and therefore a stage 2 assessment is not required. |
| | | Natural England welcomed the commitment to deposit sandwave levelling material in close proximity to the works (CoT116) but advised that sandwave clearance deposition should also take place within the same sediment characteristic it was removed from. | The wording for CoT116 (**Table 1.14**) includes a commitment to deposit sandwave clearance material in close proximity to the works. Within this commitment it is therefore inherent that the material will be deposited in an area which has similar sediment characteristics to the material that was removed as part of sandwave clearance. |
| | | In relation to the In-Principal Monitoring plan, Natural England queried the proposed frequency of monitoring and suggested it should be tailored to the impact being monitored. | The wording of the commitment has been updated following the EWG and as outlined in CoT115 in **Table 1.20**, monitoring of the recovery of sediments and benthic communities within representative areas of the Fylde MCZ |

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| | | | will be undertaken at appropriate temporal intervals. These intervals will be outlined in the detailed Offshore Monitoring Plans that will be produced prior to operation and maintenance phases in accordance with the OIPMP and will be approved in consultation with statutory advisors and regulators. |
| | | Natural England requested clarification on the requirements for jack up barges in the Fylde MCZ and advised that the Applicants provides a commitment that a walking barge will not be used out to KP8.0. | Requirements for jack-up barges have been assessed in regard to the temporary habitat disturbance/loss impact in **section 1.8.2**. The MDS for the construction phase (as outlined in **Table 1.16**) accounts for one jack-up event per cable for each of the Morgan and Morecambe offshore export cables. The MDS for the operation and maintenance phase (as outlined in **Table 1.17**) accounts for up to eight jack-up events over the 35 year operational lifetime of the Transmission Assets. Additionally, following Natural England's recommendation, the Applicants have included a commitment to ensuring that no walking jack-ups will be used within the Fylde MCZ (CoT117; **Table 1.14**). |
| | | Natural England asked if the commitment for all external cable protection used within the Fylde MCZ to be designed to be removable on decommissioning would be included in an outline decommissioning plan at the time of the Applications submission. | An outline decommissioning plan has not been submitted with the Application. Some information regarding decommissioning is included in the Outline Offshore CSIP (document reference J15) and Volume 1, Chapter 3: Project description of the ES (document reference F1.3). No offshore decommissioning works will take place until a written decommissioning programme has been approved by the Secretary of State for the Department for Energy Security and Net Zero, a draft of which will be submitted prior to the construction of the Transmission Assets. The scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning (i.e. including latest guidance on best practice for the decommissioning of cables). |

| Date | Consultee and type of response | Comment raised | Response to comment raised and/or where considered in the MCZ screening and stage 1 assessment report |
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| | | Natural England questioned whether, if the intention is to remove the cable protection upon decommissioning, the cable itself will be left *in situ*. | The MDS for the impacts to the Fylde MCZ assumes that the cables would be removed during the decommissioning phase in addition to the cable protection within the Fylde MCZ (as per CoT108, **Table 1.14**). |
| August and September 2024 | Natural England, MMO, Cefas, Environment Agency, The Wildlife Trusts – 04 benthic ecology, fish and shellfish and physical processes EWG | The Environment Agency raised the issue of climate change and increased storminess and requested more detail. | The assessments of temporary habitat disturbance/loss, increase in SSC and associated deposition and changes in physical processes (**sections 1.8.2**, **1.8.3** and **1.8.8**) all consider the geomorphological features of the site and the likelihood of recovery following the conclusion of the construction phase. |
| | | The Environment Agency asked if there will be ongoing monitoring of cable protection. | Asset integrity surveys will be undertaken over the lifetime of the Transmission Assets as outlined in Volume 1, Chapter 3: Project description of the ES (document reference F1.3).<br>As outlined in **Table 1.20**, monitoring of the recovery of sediments and benthic communities within representative areas of the Fylde MCZ will also be undertaken at appropriate temporal intervals. |
| | | The Environment Agency queried the minimum cable burial depths and risks of cable exposure. | The recommended burial depths within the Outline CBRA (document reference J14) are set based on the potential risk of snagging and anchorage pulling. The preference is to bury cables in line with the Outline CBRA recommendations but as a means to facilitate cable burial in the Fylde MCZ and not use cable protection, there may be instances where 0.5 m burial depths would be suitable. |

## 1.5 Project description

### 1.5.1 Overview

1.5.1.1 This section provides an outline description of the Transmission Assets. It describes the activities likely to be associated with the construction, operation and maintenance, and decommissioning of the Transmission Assets which are of relevance to MCZs screened in to the assessment. A full description of all elements of the Transmissions Assets is provided in Volume 1, Chapter 3: Project Description of the ES (document reference F1.3).

### 1.5.2 Project design envelope approach

1.5.2.1 The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) has been adopted for this assessment of the Transmission Assets. The PDE approach defines a design envelope and parameters within which the final design will sit. It allows flexibility for elements that are likely to require more detailed design subsequent to submission of an ES, such as siting of infrastructure and construction methods. It also allows the findings of the consultation process and feedback from statutory and non-statutory stakeholders to be considered during the design process, where appropriate.

1.5.2.2 The Transmission Assets operational lifetime is 35 years.

### 1.5.3 Key elements

1.5.3.1 The key components of the Transmission Assets for both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm, relevant to this MCZ Screening and Stage 1 Assessment Report include:

- Offshore:
  - offshore export cables: these export cables will bring the electricity generated by the Generation Assets to the landfall for onward transmission.
- Landfall:
  - landfall site: this is where the offshore export cables are jointed to the onshore export cables via the transition joint bays. This term applies to the entire area between Mean Low Water Springs (MLWS) and the transition joint bays.

### 1.5.4 Programme

1.5.4.1 At this stage, the timing of construction activities set out within this report is indicative. Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm intend to be fully operational by 2030.

1.5.4.2 For the purposes of assessment, it is anticipated earliest construction start date for the Transmission Assets (i.e., both Morgan Offshore Wind

Project: Transmission Assets and Morecambe Offshore Windfarm: Transmission Assets) is 2027.

### 1.5.5 Construction scenarios

1.5.5.1 For the purposes of this MCZ Screening and Stage 1 Assessment Report, the following construction scenarios have been considered in determining the worst-case scenario for each respective topic.

- Scenario 1: Isolation:
  - Scenario 1a: construction of the Morgan Offshore Wind Project: Transmission Assets only (where the Morecambe Offshore Windfarm does not proceed to construction); or
  - Scenario 1b: construction of the Morecambe Offshore Windfarm: Transmission Assets only (where the Morgan Offshore Wind Project does not proceed to construction).
- Scenario 2: Concurrent construction (i.e., construction of the Morgan Offshore Wind Project: Transmission Assets and the Morecambe Offshore Windfarm: Transmission Assets at the same time).
- Scenario 3: Sequential construction, where the Morgan Offshore Wind Project: Transmission Assets are constructed first and the Morecambe Offshore Windfarm: Transmission Assets are constructed second, or vice versa. This may include:
  - Scenario 3a: immediate sequential construction of the Transmission Assets with no gap between the completion of construction of the transmission assets for the first project and commencement of construction for the second project; and
  - Scenario 3b: sequential construction with a gap of up to a maximum of four years between completion of construction of the transmission assets for the first project and commencement of construction for the second project.

### 1.5.6 Offshore elements of the Transmission Assets

1.5.6.1 The offshore infrastructure for the Transmission Assets includes offshore export cables between the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (referred to collectively as the ‘Generation Assets’) and the landfall. Other transmission infrastructure (offshore substation platforms and interconnector cables between the platforms) are included within the applications for the Generation Assets only.

#### Site preparation activities

1.5.6.2 Site preparation activities include:

- Unexploded Ordnance (UXO) clearance;
- boulder removal/placement and out of service cable removal;

  - sandwave clearance and removal which may include;
    - dredging and pre-clearance activities;
    - seabed excavation; and
  - pre-lay grapnel run.

1.5.6.3 Further details on each site preparation activity are provided below.

**Unexploded ordnance clearance**

1.5.6.4 It is possible that UXO may be encountered during the construction of the offshore export cables. This poses a health and safety risk where it coincides with the planned location of infrastructure and associated vessel activity and therefore it is necessary to survey for, and manage, potential UXO. In order to identify UXO, detailed surveys of the location where infrastructure will be located are required. This work cannot be conducted before an application for development consent is submitted because the detailed design work needed to confirm the location of infrastructure is reliant upon the pre-construction surveys.

1.5.6.5 Potential UXO identified during the pre-construction site investigation surveys will be investigated to determine whether they are confirmed as UXO. If they are classified as UXO, they will either be cleared or avoided. UXO may be avoided through micrositing of infrastructure or cleared through *in-situ* clearance or recovery of the UXO for disposal at an alternate location. The method of clearance will depend on factors such as the condition of the UXO and will be subject to the UXO clearance contractors' safety assessment.

1.5.6.6 There are a number of methodologies that may be used to clear UXO, including detonation of the UXO using an explosive counter-charge placed next to the UXO on the seabed (referred to as a 'high order' technique) or methods that neutralise the UXO to be safe without detonation (referred to as 'low order' techniques). These low order techniques include 'deflagration' which involves the use of a small charge to 'burn out' the explosive material without detonation.

1.5.6.7 The use of the low order techniques is dependent on the condition of the UXO and individual circumstances. Furthermore, the Applicants will not know what condition any UXO is in until it is investigated. Therefore, whilst the use of low-order techniques is a potentially viable and the preferred solution for clearance of UXO, it is not possible to commit to using these techniques at this stage.

1.5.6.8 The surveys for identification of potential UXO must be undertaken within approximately one year before the start of construction as there is potential for hydrodynamics to uncover further UXO over time. It is not therefore possible to specify at this stage the exact number of UXO which may require detonation.

1.5.6.9 Based on pre-application surveys and desk top studies, a conservative estimate of up to 25 UXO are assumed to require clearance. UXO clearance is likely to include a range of UXO sizes with the net explosive quantity ranging between 25 kg to 907 kg with 130 kg being the most likely. Based on current information (i.e. pre-application surveys and desk top studies), there is only one known buried UXO within the Offshore Order Limits, and this is outside the boundary of the Fylde MCZ. However a precautionary approach has been adopted which assumes that up to four UXOs may be require clearance in the Fylde MCZ. As outlined in **Table 1.14** (CoT64), detailed Marine Mammal Mitigation Protocols (MMMPs) will be developed and implemented which will include measures to apply in advance of and during surveys and UXO clearance. The detailed MMMP(s) will include for the use of low order techniques, where possible, as the primary mitigation measure alongside other measures.

1.5.6.10 Prior to any UXO removal or detonation, method statement(s) for UXO clearance will be submitted for approval by the MMO as secured through DCO Schedules 14 and 15, Part 2 - Condition 20(1)(b) (UXO clearance) (see CoT64 in **Table 1.14** and Outline Marine Mammal Mitigation Protocols (MMMPs) (document reference J18)). This will provide confirmation of the UXO identified for clearance and confirmation that clearance does not coincide with archaeology/sensitive seabed features. The method statement(s) for UXO clearance will be submitted prior to construction, once UXO surveys are complete.

**Boulder clearance and out of service cables**

1.5.6.11 Boulder clearance is commonly required during site preparation for installation of offshore infrastructure. Micrositing of cables around boulders would be onerous and impractical. Boulders pose a risk of damage and exposure to cables, as well as an obstruction risk to the cable installation equipment. Therefore, any boulders identified as likely to impact installation will need to be moved to the side (side-cast), away from the immediate location of the cable infrastructure. As described in Volume 1, Chapter 3: Project description of the ES (document reference F1.3), there are two key methods of clearing boulders: boulder plough and boulder grab. Where a high density of boulders is seen, the expectation is that a plough will be required to clear the cable installation corridor. Where medium and low densities of boulders are present, a subsea grab is expected to be employed.

1.5.6.12 Pre-application surveys have identified that boulder clearance may be required in the vicinity of the offshore export cables. Boulder clearance will occur within the footprint of other installation activities. The corridor width for boulder clearance is less than is required for sandwave clearance and therefore boulder clearance represents repeat disturbance to the seabed, as opposed to representing a different disturbance area. Therefore, the boulder clearance footprint is not presented to prevent double counting of the seabed footprint parameters.

1.5.6.13 If the final location of the offshore infrastructure crosses any existing out of service cables these will be removed. Any cable removal will be undertaken in consultation with the asset owner and in accordance with the International Cable Protection Committee guidelines (2011). Cables will be retrieved to a vessel deck, where one end will be cut, pulled past the crossing point and then cut again before being pulled to the surface and removed from site by the vessel.

**Sandwave clearance and removal for cables**

1.5.6.14 In some areas within the offshore export cable corridors, existing sandwaves and similar bedforms may require removal before cables are installed via techniques such as dredging or controlled flow excavation. Many of the cable installation tools require a stable, flat seabed surface. In addition, cables must be buried to a depth where they can be expected to stay buried for the operational lifetime of the Transmission Assets. Sandwaves are generally mobile in nature and therefore the offshore export cables must be buried sufficiently to reduce the risk of potential damage to the offshore export cables where sediment may become mobile. This can only be achieved by sufficiently lowering the tops of the mobile sandwaves before installation takes place.

1.5.6.15 The results of initial surveys (multi-beam echo sounder, side scan sonar, magnetometer, sub-bottom profiler, geotechnical and environmental surveys) have been used to provide an initial analysis of the bathymetry, soils and seabed features to inform the MDS for sandwave clearance as presented in the CBRA that accompanies the application (document reference J14). It is estimated that up to approximately 9% of the cable route (for the Transmission Assets as a whole) may require sandwave clearance with sandwaves more prevalent in the westerly extent of the Offshore Order Limits, in and around the Morgan Offshore Wind Project: Generation Assets, as detailed in the CBRA that accompanies the application (document reference J14). Initial surveys indicate that the Fylde MCZ is largely featureless with some minor extent of ripples and pitted seabed with limited wave height (further details are provided in the Outline Offshore CSIP, document reference J15, and the CBRA, document reference J14). Currently, it is not anticipated that exhaustive seabed levelling or sandwave clearance would be required within the Fylde MCZ, with an estimate that up to 5% of the export cables within the MCZ may require sandwave clearance (CoT47, **Table 1.14**).The maximum design parameters for sandwave clearance and seabed preparation are summarised in **Table 1.2**.

1.5.6.16 It is expected that material subject to seabed preparation activities will be released in the vicinity of where it was removed. A Dredging and disposal – site characterisation plan (document reference J22) presents further detail on the disposal of seabed preparation material.

### Table 1.2: Design envelope - sandwave clearance and seabed preparation

| Parameter | Maximum design parameter | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Total |
| **Maximum design parameters – offshore export cables** | | | |
| Sandwave clearance: offshore export cable ($m^3$) | 1,080,000 | 346,800 | 1,426,800 |
| Sandwave clearance outwith the MCZ ($m^3$) | 907,200 | 249,600 | 1,156,800 |
| Sandwave clearance within the Fylde MCZ ($m^3$) | 172,800 | 97,200 | 270,000 |

#### Pre-lay grapnel runs

1.5.6.17 Pre-lay grapnel runs will be required for the final cable routes to clear any remaining obstacles, such as discarded fishing gear, using a vessel equipped with a series of grapnels, chains, and / or recovery winch. The pre-lay grapnel run activities will take account of and adhere to any archaeological mitigation as detailed in the Outline Offshore Written Scheme of Investigation for archaeology (document reference J17).

1.5.6.18 Pre-lay grapnel runs will occur within the footprint of other installation activities and represents repeat disturbance to the seabed, as opposed to representing a different disturbance area. Therefore, the pre-lay grapnel run footprints are not presented to prevent double counting of the seabed footprint parameters.

### Offshore Order Limits and permanent infrastructure and Offshore Permanent Infrastructure Area

1.5.6.19 Offshore export cables are used for the transfer of power from the Generation Assets to the TJBs at the landfall. Where possible, a co-ordinated export cable corridor has been developed for the export cables for the Morgan Offshore Wind Project: Transmission Assets and the Morecambe Offshore Windfarm: Transmission Assets.

1.5.6.20 Up to six offshore export cables will be required (up to four for the Morgan Offshore Wind Project and up to two for the Morecambe Offshore Windfarm). Each offshore export cable will be installed in a separate trench with a typical separation distance of approximately 200 m between export cables. Only in very shallow water would the separation distance reduce to as close as 20 m as the cables converge to the direct pipe exit pit locations on the beach at Lytham St Annes.

1.5.6.21 The Applicants require flexibility in type, location, depth of burial and protection measures for the offshore export cables to ensure that anticipated physical and technical constraints and changes in available technology can be accommodated.

1.5.6.22 The design envelope for the offshore export cables is described in **Table 1.3**.

### Table 1.3: Design envelope - offshore export cables construction

| Parameter | Maximum design parameter | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum design parameter |
| Maximum number of offshore export cables | 4 | 2 | 6 |
| High Voltage Alternate Current (HVAC)/High Voltage Direct Current (HVDC) | HVAC | HVAC | HVAC |
| Maximum external cable diameter (mm) | 350 | 350 | 350 |
| Maximum length per cable (km) | 100 | 42 | - |
| Maximum total length of offshore export cables (km) | 400 | 84 | 484 |
| Burial techniques | Trenching, plough, jetting, mechanical cutting | | |
| Maximum target burial depth (m) | 3 | 3 | 3 |
| Minimum target burial depth (m) | 0.5 | 0.5 | 0.5 |
| Maximum trench width (m) | 3 | 3 | 3 |
| Maximum width of seabed disturbance from installation tools (m) | 20 | 20 | 20 |
| Maximum footprint of seabed disturbance – total ($km^2$) | 8 | 1.7 | 9.7 |

#### Offshore export cable construction and installation

1.5.6.23 The offshore export cables will be buried below the seabed wherever possible (CoT54, **Table 1.14**) and protected with cable protection where adequate burial is not achievable. The offshore export cables would be installed using a range of techniques, such as trenching, plough, jetting or mechanical cutting, as set out in **Table 1.3**.

1.5.6.24 Trenching, plough, jetting or mechanical cutting techniques, open the seabed and the cable is laid within the trench. Pre-trenching or post-lay burial methods may be used, or alternatively the approach of simultaneous lay and burial using a tool towed behind the installation vessel may be used. Further detail on cable installation within the Fylde MCZ is provided in the Outline Offshore CSIP (document reference J15).

1.5.6.25 An Outline Offshore CSIP (document reference J15) and Outline CBRA (document reference J14) are provided with the application for construction activities within the Fylde MCZ; however, the detailed installation methods will be defined post-consent taking into account further pre-construction survey results and human considerations such as trawling and vessel anchors (CoT45, **Table 1.14**). Typically, the cables will be buried between 0.5 to 3 m with a target burial depth of 1 m, dependent upon the outcome of the detailed CBRAs. Additionally, construction method statements will be produced and implemented prior to commencement of construction (CoT49, **Table 1.14**).

1.5.6.26 The Applicants may also need to undertake seabed preparation works prior to installation of export cables in order to level sandwaves and clear boulders on offshore export cable routes.

### Cable protection

1.5.6.27 Where offshore export cables cannot be buried sufficiently due to ground conditions, external cable protection measures, will be required. Up to 10% of the total offshore export cable length may require cable protection (i.e. 'whole route'). However, within the Fylde MCZ cable protection will only be used where deemed essential and will be limited to up to 3% of the offshore export cable route within the Fylde MCZ (excluding cable crossings) (CoT47, **Table 1.14**). In addition, any external cable protection used within the Fylde MCZ will be designed to be removable at decommissioning (CoT108 and CoT109, **Table 1.14**).

1.5.6.28 **Table 1.4** provides the maximum design parameters for cable protection due to ground conditions within the Fylde MCZ, outside of the Fylde MCZ, and for the 'whole route' calculations for both within and outside the Fylde MCZ.

**Table 1.4: Design envelope - cable protection due to ground conditions**

| Parameter | Maximum design parameter | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum design parameter |
| **Offshore export cables, cable protection due to ground conditions** | | | |
| Cable protection type (ground conditions) | Rock dump, rock armour, mattresses, articulated pipe | | |
| Maximum height of cable protection (m) | 2 | 2 | 2 |
| Maximum width of cable protection per cable (m) | 10 | 10 | 10 |
| Maximum offshore export cable corridor with cable protection coverage (%), **whole route.** | 10% | 10% | 10% |
| Maximum total length of offshore export cables (km) | 400 | 84 | 484 |
| Maximum total length of offshore export cables (km) | 400 | 84 | 484 |

| Parameter | Maximum design parameter | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum design parameter |
| Maximum total cable protection footprint for offshore export cable corridor (m), **whole route.** | 400,000 | 84,000 | 484,000 |
| Maximum total cable protection volume for offshore export cable corridor ($m^3$), **whole route.** | 400,000 | 68,640 | 468,650 |
| **Offshore export cables, cable protection due to ground conditions, within Fylde MCZ** | | | |
| Maximum length of offshore export cable (per cable) within MCZ (km) | 16 (16,000 m) | 12 (12,000 m) | - |
| Maximum total length of offshore export cable route within MCZ (m) | 64,000 | 24,000 | 88,000 |
| Maximum proportion of offshore export cable corridor with cable protection (%), within MCZ | 3% | 3% | 3% |
| Maximum length of offshore cables requiring cable protection (m), within MCZ | 1,920 | 720 | 2,640 |
| Maximum total cable protection footprint for offshore export cables ($m^2$), within MCZ | 19,200 | 7,200 | 26,400 |
| Maximum total cable protection volume for offshore export cables ($m^3$), within MCZ | 19,200 | 7,200 | 26,400 |
| **Offshore export cables, cable protection due to ground conditions, outside of Fylde MCZ** | | | |
| Maximum length of offshore export cable (per cable) outside of MCZ | 84 km (84,000 m) | 30 km (30,000 m) | - |
| Maximum total length of offshore export cable route outside MCZ (m) | 336,000 | 60,000 | 396,000 |
| Maximum length of cables requiring cable protection (m) outside of MCZ | 38,080 | 7,680 | 45,760 |
| Maximum total cable protection footprint for export cable route outside MCZ ($m^2$) | 380,800 | 76,800 | 457,600 |
| Maximum total cable protection volume for export cable route outside MCZ ($m^3$) | 380,800 | 61,440 | 442,240 |

1.5.6.29 The export cable corridor crosses a number of existing assets, including telecoms cables and oil and gas pipelines in the east Irish Sea. It is impossible to bury the cables at these crossings, so to protect the existing assets and the offshore export cables, cable protection will be used as set out in **Table 1.5**. Separate parameters for crossing within the Fylde MCZ and outside of the MCZ are provided as well as over the 'whole route' calculations for both within and outside the Fylde MCZ.

### Table 1.5: Design envelope - cable protection due to asset crossings

| Parameter | Maximum design parameter | | |
|---|---|---|---|
| | **Morgan Offshore Wind Project** | **Morecambe Offshore Windfarm** | **Maximum design parameter** |
| **Offshore export cables, cable protection due to asset crossings** | | | |
| Cable crossing protection type | Rock dump, rock armour, mattresses, articulated pipe | | |
| Maximum number of individual cable crossings, whole route | 45 | 6 | 51 |
| Maximum total area of crossings ($m^2$), whole route | 65,500 | 27,000 | 92,500 |
| Maximum total volume of crossing protection material ($m^3$), whole route | 90,100 | 37,800 | 127,900 |
| **Offshore export cables, cable protection due to asset crossing, outside of Fylde MCZ** | | | |
| Maximum number of individual cable crossing outside of MCZ | 41 | 6 | 47 |
| Maximum length of crossings (m) outside of MCZ | 50 | 150 | - |
| Maximum width of crossings (m) outside of MCZ, per cable | 30 | 30 | 30 |
| Maximum height of crossing (m) outside of MCZ | 2.8 | 2.8 | 2.8 |
| Maximum total area of crossings ($m^2$), outside of MCZ | 61,500 | 27,000 | 88,500 |
| Maximum total volume of crossing protection material ($m^3$), outside of MCZ | 86,100 | 37,800 | 123,900 |
| **Offshore export cables, cable protection due to asset crossing, within Fylde MCZ** | | | |
| Maximum number of individual cable crossings, within MCZ | 4 | 0 | 4 |
| Maximum length of crossings (m) within MCZ | 50 | - | 50 |
| Maximum width of crossings (m), within MCZ per cable | 20 | - | 20 |
| Maximum height of crossing (m) within MCZ | 2 | - | 2 |
| Maximum total area of crossings ($m^2$), within MCZ | 4,000 | - | 4,000 |
| Maximum total volume of crossing protection material ($m^3$), within MCZ | 4,000 | - | 4,000 |

1.5.6.30 The offshore export cable installation methodology and potential cable protection measures will be finalised at the final design stage (post-consent), informed by environmental and pre-construction site investigation survey results. The offshore export cable installation methodology, as well as the burial depth and any requirement for protection measures, will be defined by a detailed CBRA undertaken post-consent (CoT45; **Table 1.14**). An initial Outline CBRA is provided with the application (document reference J14).

1.5.6.31 The total amounts of cable protection required, for both ground conditions and asset crossings are given in **Table 1.6** for the 'whole route', as well as the calculations for within the Fylde MCZ and outside the Fylde MCZ.

**Table 1.6: Design envelope – total cable protection, including ground conditions and asset crossings**

| Parameter | Maximum design parameter | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum design parameter |
| **Offshore export cables cable protection due to ground conditions and asset crossings (summing the two)** | | | |
| Maximum total area of cable protection ($m^2$), **whole route** | 465,500 | 111,000 | 576,500 |
| Maximum total area of cable protection ($m^2$), **outside the MCZ** | 442,300 | 103,800 | 546,100 |
| Maximum total area of cable protection ($m^2$), **within Fylde MCZ** | 23,200 | 7,200 | 30,400 |
| Maximum total volume of cable protection ($m^3$), **whole route** | 490,100 | 106,440 | 596,540 |
| Maximum total volume of cable protection ($m^3$), **outside MCZ** | 466,900 | 99,240 | 566,140 |
| Maximum total volume of cable protection ($m^3$), **within MCZ** | 23,200 | 7,200 | 43,560 |

### Vessel requirements

1.5.6.32 Some of the offshore elements of the Transmission Assets are likely to be fabricated offsite at manufacturing sites in the UK and/or abroad.

1.5.6.33 The offshore construction phase will therefore be supported by various vessels including tug/anchor handles, cable lay installation and support vessels including jack-up vessels, guard vessels, survey vessels, seabed preparation vessels, crew transfer vessels, and cable protection installation vessels. Helicopters may also be used during the construction phase to transfer equipment and personnel to vessels that contain heli-decks.

1.5.6.34 **Table 1.7** sets out the indicative vessel requirements for the construction phase of the Transmission Assets.

## Table 1.7: Design envelope - vessel requirements during construction phase

| Vessel requirements | Morgan Offshore Wind Project | | Morecambe Offshore Windfarm | | Maximum design parameter | |
|---|---|---|---|---|---|---|
| | Maximum Number of vessels | Maximum Return trips | Maximum Number of vessels | Maximum Return trips | Maximum Number of vessels | Maximum Return trips |
| Cable lay and support vessels | 6 | 40 | 4 | 8 | 10 | 48 |
| Tug/anchor handlers | 2 | 8 | 1 | 4 | 3 | 12 |
| Guard vessels | 1 | 18 | 1 | 12 | 2 | 30 |
| Survey vessels | 2 | 4 | 1 | 2 | 3 | 6 |
| Seabed preparation vessels | 4 | 16 | 2 | 4 | 6 | 20 |
| Crew transfer vessels | 2 | 120 | 1 | 28 | 3 | 148 |
| Cable protection installation vessels | 2 | 20 | 1 | 2 | 3 | 22 |
| Helicopters | 1 | 20 | 0 | 0 | 1 | 20 |

## 1.5.7 Landfall

### Pull-in of the offshore export cables

1.5.7.1 The offshore export cables will be transported via cable lay vessels to the closest position of approach feasible and the pull-in operation will be supported by cable lay vessels (e.g., jack-up vessels or barges) to the direct pipe exit pits on the beach and towards the TJBs via the pre-installed direct pipe duct. Due to the anticipated distance that the offshore export cables will need to be pulled from the cable lay vessels to the TJBs (up to 7,000 m, dependent upon the draft of the selected cable lay vessels/barge and its closest approach position to the beach), up to two jack-up vessels per cable may be required to support the offshore export cable pull-in activities (counted as part of the cable lay and support vessels identified in **Table 1.7**). Whilst it is currently anticipated that the jack-up vessels could be accommodated outside of the Fylde MCZ, the worst case scenario has allowed for one jack-up vessel per circuit to be within the far east boundary of the Fylde MCZ and the other jack-up vessel outside of the Fylde MCZ between its east boundary and the intertidal area. No walking jack-up vessels would be used within the Fylde MCZ (CoT117, **Table 1.14**). The detailed installation methods, including vessel requirements and locations, will be refined post-consent taking into account further pre-construction survey results.

## 1.5.8 Operation and maintenance

1.5.8.1 The overall operation and maintenance strategy will be finalised once the detailed design and technical specifications of the Transmission Assets offshore and intertidal infrastructure are known. Further information on operation and maintenance requirements for the offshore export cables are set out within an outline Offshore Operations and Maintenance Plan (document reference J19). This section provides a description of the reasonably foreseeable planned and unplanned operation and maintenance activities for the offshore infrastructure.

1.5.8.2 The general operation and maintenance strategy may rely on crew transfer vehicles, special operations vessels, supply vessels, cable and remedial protection vessels and helicopters for the operations and maintenance services. The maximum number of operations and maintenance vessels on site at any one time are presented in **Table 1.8**. The total operations and maintenance vessel and helicopter round trips per year for the Transmission Assets are presented in **Table 1.9**.

1.5.8.3 Routine inspections of the offshore export cables will be undertaken to ensure the cables are buried to an adequate depth and not exposed. The integrity of the cables and cable protection systems will also be checked. It is expected that on average the offshore export cables will require up to one visit per year. Maintenance works to rebury/replace and carry out repair works on offshore export cables generally takes between one to two weeks for subsea repair/reburial and between two to four weeks for intertidal repair/reburial.

1.5.8.4 As outlined in **section 1.8.2**, within the Fylde MCZ, there may be up to 14 repair events (affecting up to 0.64 km of cable per repair event) and seven reburial events (affecting up to 2.56 km per reburial event) for the Morgan offshore export cables during the operations and maintenance phase. For the Morecambe offshore export cables, there may be up to seven repair events (affecting up to 1.14 km per repair event) and seven reburial events (affecting up to 0.972 km per reburial event) within the Fylde MCZ.

1.5.8.5 There may also be the requirement for up to eight jack-up events within the Fylde MCZ over the 35 year operational lifetime of the Transmission Assets, to facilitate repairs of the intertidal cables, for the reasons discussed in **paragraph 1.5.6.23**. No walking jack-up vessels would be used within the Fylde MCZ (CoT117, **Table 1.14**). As outlined in section 3.19 of Volume 1, Chapter 3: Project Description of the ES (document reference F1.3), in the nearshore area and Fylde MCZ, the Applicants will seek to utilise the least impactful methods but will be limited by the nature of the repair and the vessel availability at the time of the maintenance activity.

**Table 1.8: Design envelope – offshore operations and maintenance vessels on site at any time**

| Vessel requirements | Maximum number of vessels on site at any time | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum vessel requirements |
| Crew transfer vehicles/work boats | 2 | 2 | 4 |
| Jack-up vessels | 1 | 1 | 2 |
| Cable repair vessels | 1 | 1 | 2 |
| Other vessels | 2 | 1 | 3 |
| Excavators or backhoe dredgers | 2 | 1 | 3 |
| Helicopters | 2 | 1 | 3 |
| Inspection drones | 1 | 1 | 2 |

**Table 1.9: Design envelope – offshore operations and maintenance vessel return trips per year**

| Vessel requirements | Total anticipated return trips per year | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum design parameter |
| Crew transfer vehicles/work boats | 28 | 14 | 42 |
| Jack-up vessels | 2 | 1 | 3 |
| Cable repair vessels | 2 | 2 | 4 |
| Other vessels | 16 | 4 | 20 |

| Vessel requirements | Total anticipated return trips per year | | |
|---|---|---|---|
| | Morgan Offshore Wind Project | Morecambe Offshore Windfarm | Maximum design parameter |
| Excavators or backhoe dredgers | 4 | 4 | 8 |
| Helicopters | 10 | 6 | 16 |
| Inspection drones | 10 | 2 | 12 |

### 1.5.9 Decommissioning

1.5.9.1 At the end of the operational lifetime (assumed to be 35 years), the Transmission Assets may be decommissioned. As the seabed leases that the Applicants will enter into are for up to 60 years, it is anticipated that re-powering of the Generation Assets may be sought during the lease duration in line with the regulations, requirements, guidance and best practice relevant at that time. In this case, new consents are likely to be required for the Generation Assets, and the consenting requirements for the Transmission Assets would also be reviewed as part of that process alongside legislation and guidance in existence at that time. Although the design life of key components of the Transmission Assets (such as onshore substations) would allow for this, potential future repowering and operational life extension of the Transmission Assets is not included as part of the scope of the development consent application or EIA.

1.5.9.2 Offshore Decommissioning Programme(s) will be developed prior to decommissioning of each of the offshore wind farms to be submitted to the Secretary of State for Department for Energy Security and Net Zero (at the time of writing) prior to the commencement of construction. The offshore decommissioning programme(s) will be updated during the lifetime of the offshore wind farms, including to take consideration of the latest relevant best practice, technological changes, legislation and policy at the time. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.

1.5.9.3 The current preferred approach to the offshore export cables is that they would be left *in situ*; however, a future scenario could exist where they may be retrieved and, if retrieved, would be disposed of, or recycled, in line with latest relevant legislation and guidance at the time. It is preferable that cable protection outside of the Fylde MCZ (e.g. cable ducting, rock dump/armour, mattresses, etc) be left *in situ*. Further consultation would be undertaken with stakeholders and regulators at the time of decommissioning regarding the requirement for removal of cable protection that may have been installed within the Fylde MCZ (CoT109, **Table 1.9**). The removal of cables and cable protection has been assessed in relevant sections (**sections 1.8.2**, **1.8.3** and **1.8.4**) where this represents the worst case scenario for that topic.

1.5.9.4 At this time, it is difficult to foresee what techniques would be used to remove cables during decommissioning. However, it is likely that equipment similar to that which is used to install the cables and cable protection could be used to reverse the burial process. Therefore, the area of seabed impacted during the removal of the cables and cable protection is likely to be the same as the area impacted during the installation of the cables and cable protection.

## 1.6 MCZ screening

### 1.6.1 Introduction

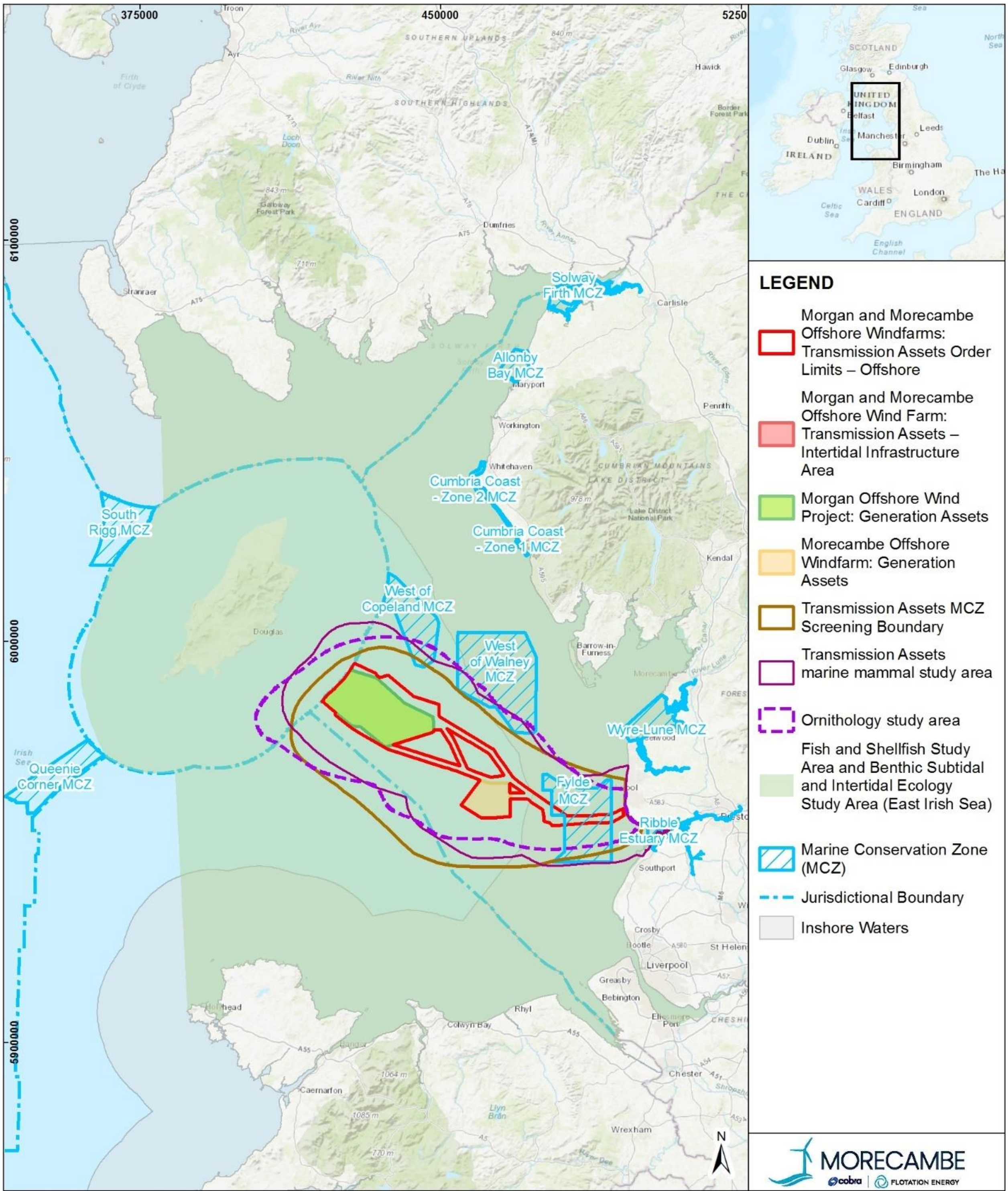
1.6.1.1 This section documents the MCZ screening for the Transmission Assets. The screening considers all MCZs located within the relevant study areas and shown in **Figure 1.2**.:

- Benthic receptors – the Transmission Assets benthic subtidal and intertidal ecology study area as defined in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2).
- Fish receptors – the Transmission Assets fish and shellfish ecology study area as defined in Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference F2.3).
- Marine mammals – the Transmission Assets marine mammal study area as defined in Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4).
- Birds – the footprint of the Transmission Assets plus a 15 km buffer, as defined in Volume 2, Chapter 5: Offshore ornithology of the ES (document reference F2.5).

1.6.1.2 As outlined in **paragraph 1.3.2.1**, the MMO (2013) guidelines suggest that section 126 would apply if it is determined through the course of screening that "the licensable activity is taking place within or near an area being put forward or already designated as an MCZ".

1.6.1.3 The following sections use the information presented in the ES to define the ZOI for the Transmission Assets. These ZOI have been used to determine the 'nearness' of the activities associated with the Transmission Assets and therefore to identify whether the Transmission Assets are likely to have the potential to directly or indirectly affect the interest features of any MCZ.

1.6.1.4 Features protected by MCZs include benthic habitats and species, and highly mobile species (i.e. fish, marine mammals and birds). The impact pathways and associated ZOI considered within this screening assessment are those that specifically relate to these receptors and draw on technical outputs of the reporting undertaken for the ES.




**Service Layer Credits:** Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

**Data Sources:** Client, The Crown Estate, Marine Management Organisation, Marine Scotland, Natural Resources Wales, JNCC,

**Project Name:**
MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

0 2.5 5 10 15 20 nm
0 5 10 20 30 40 km

**Drawing Number:**
RPSE-ES-MCZ-001-03

**Drawing Title:**
TRANSMISSION ASSETS MCZ SCREENING BOUNDARY

**Geodetic Information:**
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N
Scale@220mmx160mm: 1:1,600,000

| VER | DATE | DETAILS | BY | CHECK |
|---|---|---|---|---|
| 00 | 09/04/24 | First Issue | MJ | TH |
| 03 | 23/09/24 | Final | MJ | BM |

**Figure 1.2: MCZs considered within the MCZ screening for the Transmission Assets**

### 1.6.2 Screening criteria for benthic habitat features of MCZs

1.6.2.1 A total of seven MCZs within (or immediately adjacent to) the benthic subtidal and intertidal ecology study area are designated for benthic habitat features and have, therefore, been considered within this screening.

- Fylde MCZ.
- West of Copeland MCZ.
- West of Walney MCZ.
- Cumbria Coast MCZ.
- Queenie Corner MCZ (outside the study area but immediately adjacent so included on a precautionary basis).
- South Rigg MCZ (outside the study area but immediately adjacent so included on a precautionary basis).
- Allonby Bay MCZ.

1.6.2.2 To determine the 'nearness' of the activities associated with the Transmission Assets, and the potential for associated activities to affect (other than insignificantly) the protected habitat features of these sites, the following screening criteria have been used for MCZs with benthic feature.

- Direct impacts to benthic habitats and species (e.g. those arising from temporary habitat disturbance, long term habitat loss, colonisation of hard structures, electromagnetic fields (EMF), heats effects from cabling) will be confined to within the Offshore Order Limits. The Offshore Order Limits spatially overlaps with the Fylde MCZ (see **Figure 1.2**). As such, the Fylde MCZ is screened in for this criteria.
- Indirect impacts to benthic habitats and species of MCZs may occur as a result of increases in SSC (including remobilisation of contaminated sediments), sediment deposition, and also from the physical presence of the Transmission Assets infrastructure resulting in potential changes in physical processes. A physical processes assessment has been undertaken to inform the ES and is presented in Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1). The offshore section of the Offshore Order Limits encompasses the Morgan Offshore Wind Project: Generation Assets. For this associated project, modelling has been undertaken for the Morgan Offshore Wind Project: Generation Assets ES to examine sandwave clearance and cable installation/protection on physical processes, and this is therefore directly applicable to the Transmission Assets assessment as these structures and activities are analogous. This has considered the magnitude of the predicted increases in SSC and associated sediment deposition for construction activities including sandwave clearance and cable installation, which has refined the ZOI as follows.

- Sandwave clearance operations mobilise the greatest volume of material when compared to the range of construction activities. The Morgan Offshore Wind Project: Generation Assets ES modelling undertook a sample of sandwave clearance along the north east corner of the Morgan Offshore Wind Project: Generation Assets and, with relatively homogeneous tidal currents and sediments along much of the offshore cable corridors where sandwaves occur these simulations may be used to quantify potential impacts for the Transmission Assets. The sediment plume extends circa 5 km in a principally east/west orientation (**Figure 1.3** and **Figure 1.4**, these figures were produced for the Morgan Offshore Wind Project Generation Assets and therefore do not show the most up to date Offshore Order Limits). Increases in SSC are at their greatest at the dredging site and where they remobilise following slack tide and may reach up to 1,000 mg/l. However average concentrations are typically one tenth of this value and near background levels at the edge of the plume's extent. Sedimentation following the operation is in the order of 3 to 5 mm across the region where material is redistributed and <0.1 mm at the extent of the plume.
- Remobilised and redistributed material will not reach the Cumbria Coast MCZ, Queenie Corner MCZ, South Rigg MCZ and Allonby Bay MCZ however it may reach the south edges of West of Copeland MCZ and West of Walney MCZ in depths indistinguishable from background levels. The Fylde MCZ would experience greater levels of deposition if works were to be undertaken either within or in close proximity (< 10 km) to this site.
- Installation of export cables located to the south of the Morgan Offshore Wind Project: Generation Assets and extending to the east of the Morecambe Offshore Windfarm: Generation Assets where the offshore cables coalesce, would not impact on any MCZ. Deposition arising from cable installation and subsequent remobilisation and redistribution for cables located to the north of the Morgan Offshore Wind Project: Generation Assets and extending to the east of the Morecambe Offshore Windfarm: Generation Assets would also be indistinguishable from background levels at the adjacent MCZs. Where the Transmission Asset export cables passes though the Fylde MCZ, these areas would be directly affected. It is expected that cable installation activities will create a suspended sediment plume extending up to 5 km of the trenching operation. In the direct vicinity of the trenching SSC was found to be typically 500 mg/l whilst at the extents of the plume SSC levels dropped to 0.5 mg/l which is in the order of background level variation. Sedimentation levels beyond the immediate vicinity of the trench were circa 50 mm and reducing to < 0.5 mm within 2 km. Noting that much of the displaced material would, in reality, be used to backfill the trench.

- Although cable protection was included in the Morgan Offshore Wind Project: Generation Assets ES modelling its impact on physical processes is not readily isolated from the infrastructure as a whole. However, as part of the Mona Offshore Wind Project ES modelling it was provided along sections of the export cable as presented in Volume 2, Annex 1.1 Physical processes (Mona Offshore Wind Ltd., 2024) associated modelling studies. Where the cable protection height was less than circa 15% of the water depth there was no change in wave climate; whilst in shallower water the change was 0.5 – 1% of background levels at the site of cable protection. The cable protection installed as a result of the Transmission Assets will be compliant with the MCA navigation guidance which states that there will be no more than a 5% reduction in water depth (referenced to Chart Datum) at any point along the offshore export cable corridor route (CoT45, **Table 1.14**) without written approval from the MCA. All permanent infrastructure located between MLWS and MHWS will be buried to a target depth of 3 m (CoT114, **Table 1.14)**. As a result the impact on tidal flow, the driving factor behind sediment transport, would be imperceptible.

1.6.2.3 In summary, the Cumbria Coast MCZ, Queenie Corner MCZ, South Rigg MCZ and Allonby Bay MCZ are too far away from the Transmission Assets to be impacted indirectly by any of the activities within the Offshore Order Limits. Furthermore, neither the West of Walney MCZ nor the West of Copeland MCZ will be significantly affected by the Transmission Assets and so are not taken forward for consideration in the MCZ Stage 1 assessment. This decision was based on the limited extent and negligible magnitude of the relevant impacts on these MCZs as described in **paragraph 1.6.2.2**. As such, the Fylde MCZ is the only MCZ designated for benthic features that has been taken forward for consideration in a MCZ Stage 1 assessment.

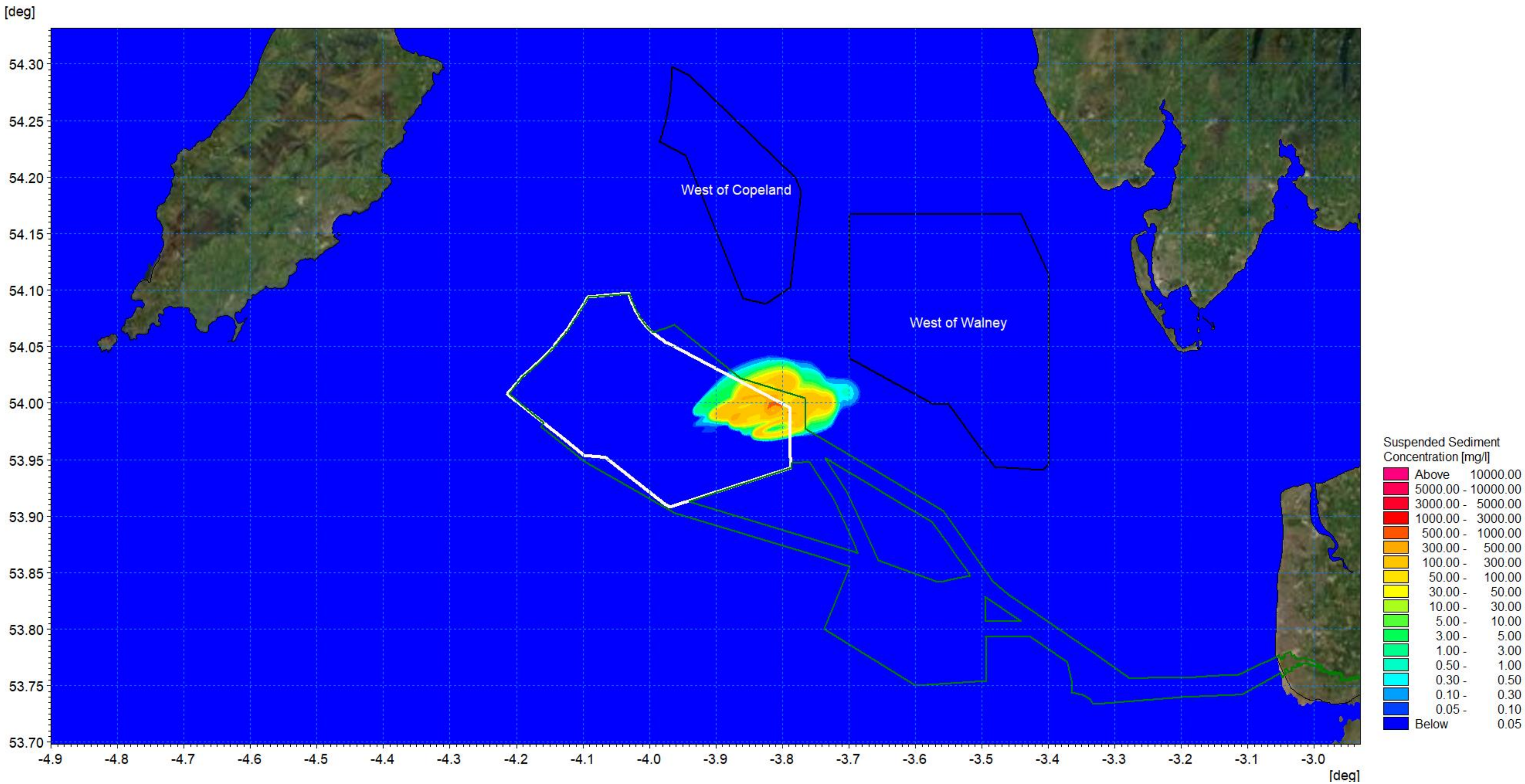



**Figure 1.3: Average SSCs during inter-array cable sandwave clearance modelled for the Morgan Offshore Wind Farm: Generation Assets**

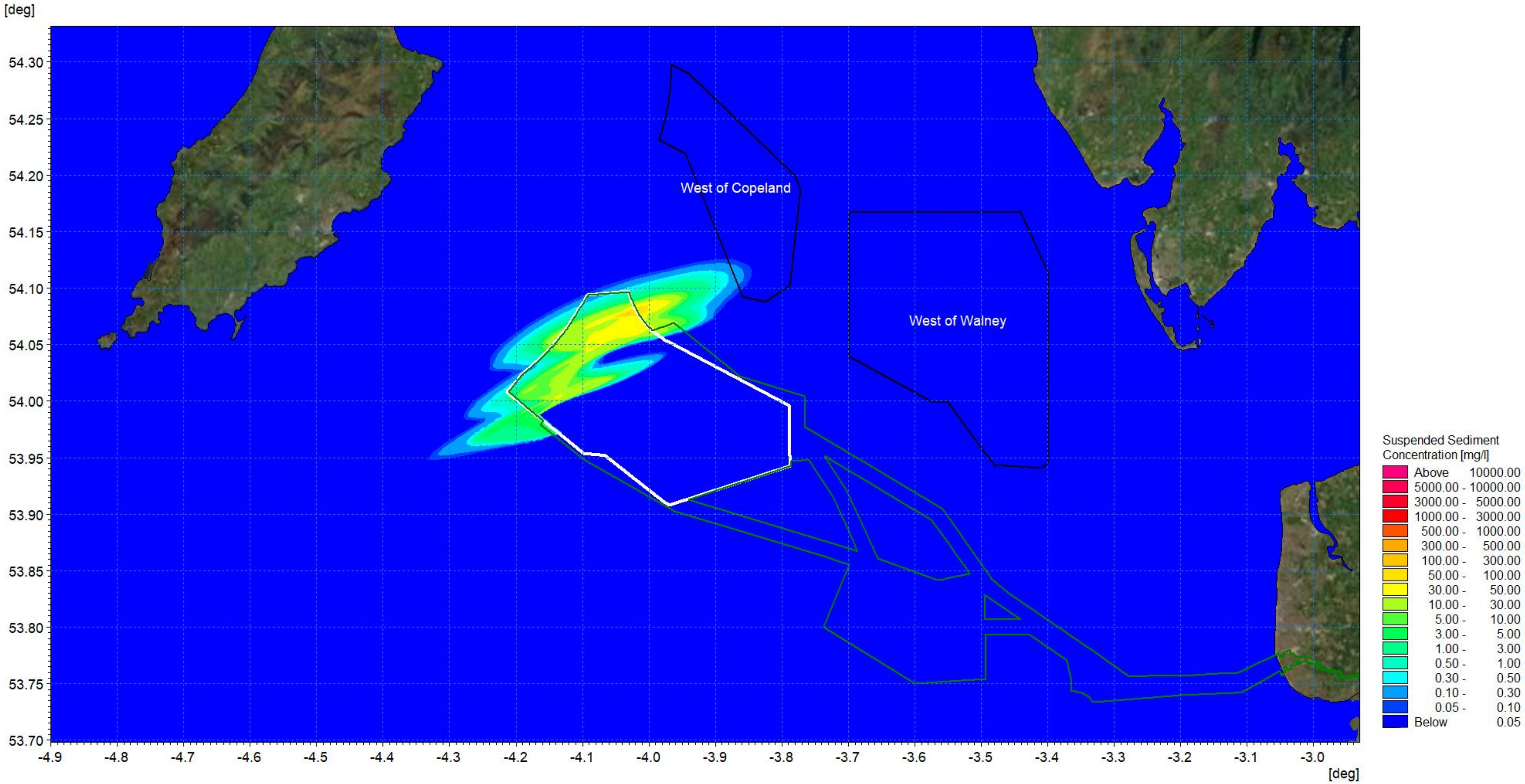



**Figure 1.4: Average SSCs during the trenching for the installation of inter-array cables modelled for the Morgan Offshore Wind Farm: Generation Assets**

### 1.6.3 Screening criteria for fish features of MCZs

1.6.3.1 A total of three MCZs within the fish and shellfish ecology study area are designated for fish features and have been considered within this screening.

- Ribble Estuary MCZ.
- Wyre Lune MCZ.
- Solway Firth MCZ.

1.6.3.2 All sites are located on the north west coast of England and are designated for smelt *Osmerus eperlanus.* To determine the 'nearness' of the activities associated with the Transmission Assets, and the potential for associated activities to affect (other than insignificantly) the protected smelt features of these sites, the following screening criteria have been used.

- Direct impacts to fish features of MCZs (e.g. arising from temporary habitat disturbance, long term habitat loss, colonisation of hard structures and EMF) will be confined to the area within the boundary of the Offshore Order Limits. As such there is no spatial overlap between the Offshore Order Limits and any MCZ designated for fish (see **Figure 1.2**). As such, no MCZs are screened in for this criterion.
- Direct impacts to fish features of MCZs (i.e. smelt) may occur as a result of increased underwater sound. Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference F2.3) provides a comprehensive assessment of the potential for behavioural effects in fish resulting from underwater sound during construction. The activities in the construction phase which could result in an increase in underwater sound include UXO clearance and geophysical surveys as well as lower level noise from vessel movement and cable installation methods.
  - It is anticipated that up to 25 UXOs within the Offshore Order Limits are to be cleared. Potential effects of underwater sound from high order UXO clearance (the worst-case scenario with low order clearance being the preference (CoT64, **Table 1.14**) on fish and shellfish include mortality, physical or auditory injury and/or disturbance depending on the proximity of the individuals to the UXO location and the size of the UXO. Mortality of fish resulting from UXO detonation is usually recorded in close proximity to the detonation location and behavioural responses may also be produced however there are no agreed thresholds for the onset of a behavioural response generated by explosives. A study by Pearson *et al*. (1994) on the effects of sound from geophysical surveys on caged Group 2 rockfish *Sebastes* spp. observed a startle (C-turn) response at peak pressure levels beginning around 200 dB re 1 μPa, although this was less common with the larger fish. The application of the abovementioned study should be interpreted with caution in

relation to UXO clearance as seismic airgun impulse sound creates a different sound profile compared to UXO clearance.

  – The pre-construction geophysical surveys are likely to be very short term and spatially limited at any one time. As the spatial scale of the impacts of UXO clearance and geophysical surveys as well as other lower level noise sources (e.g. vessel noise) is expected to be a small-scale impact and as the Offshore Order Limits does not directly pass through any MCZs with fish features there is unlikely to be any impact.

- Additionally underwater sound may result from the crossing of the Onshore Export Cable Corridor of the river Ribble within the Ribble Estuary MCZ. Volume 1, Chapter 3: Project description of the ES (document reference F1.3) provides detail on the two trenchless techniques being considered for this activity (micro-tunnelling and direct pipe). Open cut trenching has not been included as an option in the project description. None of these methods are likely to introduce new underwater sound in to the riverine environment therefore there will be no interaction with the protected feature (smelt) of the Ribble Estuary MCZ.
- Smelt are known to congregate in large shoals in lower estuaries and migrate into freshwater where they spawn in spring (Defra, 2019a). Evidence indicates that smelt are able to habituate to repeated noise impacts with no significant loss of ecological function (Jarv *et al*., 2015). Given the coastal distribution of smelt, and the fact that they are unlikely to travel offshore from the estuarine sites for which they are designated on the north west coast of England, it is considered highly unlikely that their habitats would overlap with those areas which may be influenced by construction related underwater sound (particularly since piling has been removed from the project design). As such, it is unlikely that they would be adversely affected by underwater sound arising from the construction of the Transmission Assets. As such, no fish features of MCZs are screened in for this criterion.
- Indirect impacts to fish features of MCZs may occur as a result of temporary increases in SSC and associated deposition. The ZOI applied for SSC and sediment deposition, together with the justification, is as outlined in **section 1.6.2** and no MCZs are screened in on this basis.

1.6.3.3 In summary, no MCZs designated for fish features will be affected, other than insignificantly, by the Transmission Assets. This conclusion has been reach based on the lack of direct spatial overlap between any MCZs with fish features and the Transmission Assets and the limited spatial and temporal extent of the underwater sound and SSC impacts. As such, no MCZs designated for fish features are taken forward for consideration in a MCZ Stage 1 assessment.

### 1.6.4 Screening criteria for marine mammal features of MCZs

1.6.4.1 No MCZs with marine mammals as designated features have been identified within the marine mammal study area. As such, no MCZs for marine mammals require further consideration in this MCZ screening as no will be affected by the Transmission Assets.

### 1.6.5 Screening criteria for ornithological features of MCZs

1.6.5.1 No MCZs with birds as designated features have been identified within the ornithology study area. As such, no MCZs for ornithological features require further consideration in this MCZ screening as no sites will be affected by the Transmission Assets.

### 1.6.6 MCZ screening conclusions

1.6.6.1 Only the Fylde MCZ spatially overlaps with the Offshore Order Limits (see **Figure 1.2**) with the majority of the other screened MCZs outside the ZOIs identified for impact pathways that have the potential to affect benthic habitat, fish, marine mammal or ornithological features of MCZs in the region (see **Table 1.10**). The Cumbria Coast MCZ, Queenie Corner MCZ, South Rigg MCZ and Allonby Bay MCZ are located a distances from the Transmission Assets that means they will not be directed or indirectly impacted by any of the activities within the Offshore Order Limits. Whilst the West of Walney MCZ and the West of Copeland MCZ, are within the ZOI of increased SSC, the physical processes assessment has demonstrated that the magnitude of the impact of increased SSC and deposition on these sites will be negligible compared to background levels and would therefore not be capable of resulting in anything other than insignificant effects on the protected features of the West of Walney MCZ and the West of Copeland MCZ. Furthermore the Ribble Estuary MCZ, Wyre Lune MCZ and Solway Firth MCZ are within the ZOI of underwater sound, the site-specific modelling has however demonstrated that the magnitude of the impact of underwater sound on these sites will be negligible and would therefore not be capable of resulting in anything other than insignificant effects on the protected features of the Ribble Estuary MCZ, Wyre Lune MCZ and Solway Firth MCZ.

1.6.6.2 It is concluded that the construction, operation and maintenance, and decommissioning of the Transmission Assets may directly and indirectly impact upon the features of the Fylde MCZ. The construction, operation and maintenance, and decommissioning of the Transmission Assets is unlikely to have the potential to directly or indirectly affect the interest features of any other MCZ.

## Table 1.10: Screening conclusions for MCZs

| MCZ | Protected Features | Distance to the Offshore Order Limits (km) | Potential Impact Pathway | Screening Conclusion and Justification |
|---|---|---|---|---|
| Fylde MCZ | • Subtidal sand.<br>• Subtidal mud. | 0 | Potential pathways identified | **Screened in** – the Fylde MCZ spatially overlaps with the Transmission Assets and falls within the ZOI identified for impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat features.<br>The Fylde MCZ has therefore been screened in and requires a MCZ Stage 1 assessment. |
| Ribble Estuary MCZ | • Smelt (*Osmerus eperlanus*). | 0 | Potential pathways identified | **Screened out** – the Ribble Estuary MCZ does not spatially overlap with the offshore elements of the Transmission Assets. While there is overlap with this MCZ and the onshore elements of the Transmission Assets (see **Figure 1.2**), onshore cables will cross the Ribble Estuary MCZ using trenchless technology (CoT90,**Table 1.14**) and therefore there will be no direct impacts on the Ribble Estuary MCZ from the onshore elements of the Transmission Assets. The Ribble Estuary MCZ also falls outside the ZOI identified for impact pathways associated with increased SSC, as well as underwater sound generated by geophysical surveys and UXO clearance, that have the potential to affect fish features.<br>The Ribble Estuary MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |
| West of Walney MCZ | • Subtidal sand.<br>• Subtidal mud.<br>• Sea pen and burrowing megafauna communities. | 5.86 | Potential pathways identified | **Screened out** – the West of Walney MCZ does not spatially overlap with the Transmission Assets however it does fall very close to the ZOI identified for impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat features. This screening assessment has however determined that the impact of increased SSC and deposition will be negligible compared to background levels and would therefore not be capable of resulting in anything other than insignificant effects on the protected features of the West of Walney MCZ.<br>The West of Walney MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |

| MCZ | Protected Features | Distance to the Offshore Order Limits (km) | Potential Impact Pathway | Screening Conclusion and Justification |
|---|---|---|---|---|
| West of Copeland MCZ | • Subtidal coarse sediment.<br>• Subtidal sand.<br>• Subtidal mixed sediment. | 7.3 | Potential pathways identified | **Screened out** – the West of Copeland MCZ does not spatially overlap with the Transmission Assets however it does fall within the ZOI identified for impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat features. This screening assessment has determined that the impact of increased SSC and deposition will be indistinguishable from background levels and would therefore not be capable of resulting in anything other than insignificant effects on the protected features of the West of Copeland MCZ.<br>The West of Copeland MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |
| Wyre Lune MCZ | • Smelt (*Osmerus eperlanus*). | 8.77 | Potential pathways identified | **Screened out** – the Wyre Lune MCZ does not spatially overlap with the Transmission Assets. Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference F2.3) has identified that the activities which may result in underwater sound however these are predicted to result in localised impacts and as this MCZ does not fall within the Offshore Order Limits it is unlikely to be impacted. The Wyre Lune MCZ also falls outside the ZOI identified for impact pathways associated with increased SSC, as well as underwater sound generated by geophysical surveys and UXO clearance, that have the potential to affect fish features.<br>The Wyre Lune MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |
| Cumbria Coast MCZ | • High energy intertidal rock.<br>• Honeycomb worm (*Sabellaria alveolata*) reefs.<br>• Intertidal biogenic reefs.<br>• Intertidal sand and muddy sand. | 42.91 | No potential pathways identified | **Screened out** – the Cumbria Coast MCZ does not spatially overlap with the Transmission Assets and falls outside the ZOI identified for impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat or ornithological features.<br>There is no risk of disturbance and displacement of the ornithological feature of the Cumbria Coast MCZ.<br>The Cumbria Coast MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |

| MCZ | Protected Features | Distance to the Offshore Order Limits (km) | Potential Impact Pathway | Screening Conclusion and Justification |
|---|---|---|---|---|
| | • Intertidal underboulder communities.<br>• Moderate energy infralittoral rock.<br>• Peat and clay exposures.<br>• Razorbill (*Alca torda*). | | | |
| Queenie Corner MCZ | • Sea pen and burrowing megfauna communties.<br>• Subtidal mud. | 56.04 | No potential pathways identified | **Screened out** – the Queenie Corner MCZ does not spatially overlap with the Transmission Assets and falls outside the ZOI identified for impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat features.<br>The Queenie Corner MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |
| South Rigg MCZ | • Moderate energy circalittoral rock.<br>• Subtial coarse sediment.<br>• Subtidal sand.<br>• Subtidal mud.<br>• Subtidal mixed sediment.<br>• Sea pen and burrowing megfauna communties. | 61.65 | No potential pathways identified | **Screened out** – the South Rigg MCZ does not spatially overlap with the Transmission Assets and falls outside the ZOI identified for impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat features.<br>The South Rigg MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |
| Allonby Bay MCZ | • Low energy intertidal rock. | 70.0 | No potential pathways identified | **Screened out** – the Allonby Bay MCZ does not spatially overlap with the Transmission Assets and falls outside the ZOI identified for |

| MCZ | Protected Features | Distance to the Offshore Order Limits (km) | Potential Impact Pathway | Screening Conclusion and Justification |
|---|---|---|---|---|
| | • Moderate energy intertidal rock.<br>• High energy intertidal rock.<br>• Intertidal biogenic reefs.<br>• Intertidal coarse sediment.<br>• Intertidal sand and muddy sand.<br>• Moderate energy infralittoral rock.<br>• Subtidal biogenic reefs.<br>• Subtidal coarse sediment.<br>• Subtidal mixed sediments.<br>• Subtidal sand.<br>• Peat and clay exposures.<br>• Blue mussel (*Mytilus edulis*) beds.<br>• Honeycomb worm (*Sabellaria alveolata*) reefs. | | | impact pathways (i.e. increased SSC and sediment deposition) that have the potential to affect benthic habitat features.<br>The Allonby Bay MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |
| Solway Firth MCZ | • Smelt (*Osmerus eperlanus*). | 98.8 | No potential pathways identified | **Screened out** – the Solway Firth MCZ does not spatially overlap with the Offshore Order Limits. Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference F2.3) has identified the |

| MCZ | Protected Features | Distance to the Offshore Order Limits (km) | Potential Impact Pathway | Screening Conclusion and Justification |
|---|---|---|---|---|
| | | | | activities which may result in the creation of underwater sound however these are predicted to result in localised impacts and as this site MCZ does not fall within the Offshore Order Limits it is unlikely to be impacted. Additionally, the Solway Firth MCZ also falls outside the 12 km ZOI identified for impact pathways associated with increased SSC that have the potential to affect fish features (**Figure 1.2**).<br>The Solway Firth MCZ has therefore been screened out and does not require a MCZ Stage 1 assessment. |

## 1.7 Fylde MCZ

### 1.7.1 Background information

1.7.1.1 The Fylde MCZ, which came into effect on 29 January 2016 (Natural England, 2019), is located in Liverpool Bay between 3 and 20 km off the Fylde coast and Ribble Estuary and extends over an area 260.6 km$^2$ (Natural England, 2019). The depth of the seabed within the site ranges from almost being exposed on low tide (approximately 35 cm depth) to 22 m at its deepest (Natural England, 2019).

1.7.1.2 The Fylde MCZ is designated for two broadscale marine habitat features: Subtidal sand and Subtidal mud (see **Table 1.11**). These features are considered to be good representatives of the seabed habitats and communities found on the east side of Liverpool Bay. The spatial extents of the protected features detailed in **Table 1.11** do not quite add up to the total area of the Fylde MCZ as noted in **paragraph 1.7.1.1**, this is due to the small area of high energy circalittoral rock (**Figure 1.5**), which is not a protected feature of the Fylde MCZ.

1.7.1.3 **Table 1.11** presents the protected features of the Fylde MCZ, with their spatial extents within the MCZ, and the general management approach as stated in Natural England's Supplementary Advice on Conservation Objectives (SACOs) (Natural England, 2023a) and the condition of the features a detailed in Natural England (2023b). These features are shown relative to the Transmission Assets in **Figure 1.5** and **Figure 1.6** discussed in full in **section 1.7.2** below.

**Table 1.11: Protected features of the Fylde MCZ, recorded extents (see Figure 1.5), feature condition and general management approach**

| Protected Features (Natural England, 2019) | Spatial Extent within MCZ (km$^2$) (Natural England, 2023a) | Feature Condition (Natural England, 2023b) | General Management Approach (Natural England, 2019) |
|---|---|---|---|
| Subtidal mud (A5.3) | 44.147 | Favourable | Maintain in favourable condition |
| Subtidal sand (A5.2) | 216.271 | Favourable | Maintain in favourable condition |

#### Site-specific surveys

1.7.1.4 Site specific surveys were conducted in the Offshore Order Limits which included the area overlapping with the Fylde MCZ. This information has been provided below to provide an up to date and relevant baseline characterisation of the Fylde MCZ and its features.

1.7.1.5 Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1) provides a full and detailed baseline characterisation drawing on the results of the site-specific survey together with a desktop data review. The baseline of relevance to the Fylde MCZ was informed by desktop sources such as:

- the National Biodiversity Network (NBN) Gateway; and
- the European Marine Observation and Data Network broadscale seabed habitat map for Europe (EUSeaMap).

1.7.1.6 The following site specific surveys were undertaken in the Fylde MCZ.

- Geophysical survey (conducted in 2022 using multi-beam echo sounder, side scan sonar, magnetometer and sub-bottom profiler) within the Offshore Order Limits.
- Combined grab and drop down video (DDV) sampling at ten stations within the overlap between the Fylde MCZ and the Offshore Order Limits. Samples from all stations were analysed for particle size analysis and macrofauna and samples from five stations were analysed for sediment chemistry.
- DDV only sampling at five stations within the Fylde MCZ (i.e. outside the Offshore Order Limits).

## 1.7.2 Protected features

### Subtidal sand (A5.2)

1.7.2.1 The Defra (2023) map of the Fylde MCZ (**Figure 1.5**) indicates that the subtidal sand feature occupies the majority of the area of the MCZ. This was further confirmed by the Environment Agency and Natural England surveys in 2015 (Environment Agency and Natural England, 2015) which mapped the sublittoral sand (A5.2) classification across the MCZ. This survey identified a number of biotopes in association with the subtidal sand including *Moerella* spp. with venerid bivalves in infralittoral gravelly sand (SS.SCS.ICS.MoeVen) and *Glycera lapidum* in impoverished infralittoral mobile gravel and sand (SS.SCS.ICS.Glap) (**Figure 1.6)** (Environment Agency and Natural England, 2015). Both of these biotopes are typically associated with coarse sediments however they have been identified as characteristic biotopes of the subtidal sand feature (Natural England, 2023a). The baseline survey also indicated that the *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand (SS.SSa.CMuSa.AalbNuc) biotope was present throughout the Fylde MCZ in areas where the subtidal sand feature was identified (**Figure 1.6** and Figure 1.7).

1.7.2.2 The site-specific surveys conducted for the Transmission Assets also sampled within the Fylde MCZ (as detailed in **paragraph 1.7.1.6**). The results of this survey also recorded the SS.SSa.CMuSa.AalbNuc biotope in the central section of the area of overlap between the Offshore Order Limits and the Fylde MCZ (**Figure 1.6**). The infralittoral fine sand (SS.SSa.IFiSa) biotope was also recorded to the east of this. From the five DDV-only samples collected outside the Offshore Order Limits the circalittoral muddy sand (SS.SSa.CMuSa) biotope was identified (see **Figure 1.6).** The full justification for the allocation of these biotopes can be found in Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1).

### Subtidal mud (A5.3)

1.7.2.3 The map of the Fylde MCZ (**Figure 1.5**) indicates that the subtidal mud feature occupies a swathe of the seabed which crosses the north of the MCZ. This was further confirmed by the Environment Agency and Natural England 2015 survey (Environment Agency and Natural England, 2015) which mapped the sublittoral mud (A5.3) classification across the MCZ. This survey identified the mud based biotope *Amphiura filiformis, Mysella bidentata* and *Abra nitida* in circalittoral sandy mud (SS.SMu.CSaMu.AfilMysAnit) (Environment Agency and Natural England, 2015) in association with the subtidal mud broadscale habitat. Also in this area of the MCZ the biotope *Echinocardium cordatum* and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand (SS.SSa.IMuSa.EcorEns) was identified close to the Offshore Order Limits at two sample locations which were classified as the subtidal mud feature on **Figure 1.6**. Based on the mapping undertaken by Defra (2023) shown in **Figure 1.5** there is no overlap between the subtidal mud feature and the Offshore Order Limits however a precautionary approach has been taken to this assessment and therefore this feature has been included.

1.7.2.4 **Figure 1.6** supports this approach as the point sampling data which it displays indicates that there are areas of subtidal mud within the areas more broadly characterised as subtidal sand. In particular, there are two subtidal mud sample points in the west of the section of the Offshore Order Limits which overlaps with the Fylde MCZ in an area otherwise mapped as subtidal sand.

1.7.2.5 The site-specific surveys conducted for the Transmission Assets also sampled within the Fylde MCZ (as detailed in **paragraph 1.7.1.6**). The results of this survey also identified the SS.SMu.CSaMu.AfilMysAnit (as recorded in the Environment Agency and Natural England 2015 survey) as well as one additional biotope the *Lagis koreni* and *Phaxas pellucidus* in circalittoral sandy mud (SS.SMu.CSaMu.LkorPpel) biotope (**Figure 1.6**). The full justification for the allocation of these biotopes can be found in Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1).

## 1.7.3 Conservation objectives

1.7.3.1 A condition assessment for the features of the Fylde MCZ was published in October 2023 which concluded that both features are in favourable condition (Natural England, 2023b). The conservation objective for the Subtidal Mud and Subtidal Sand features of the Fylde MCZ is therefore that the protected habitats are maintained in favourable condition.

1.7.3.2 For each protected feature, favourable condition means that, within a zone:

1. extent is stable increasing; and
2. its structures and functions, its quality, and the composition of its characteristic biological communities (including the diversity and

abundance of species forming part or inhabiting the habitat) are sufficient to ensure that it remains healthy and does not deteriorate.

1.7.3.3 Any temporary deterioration (on the scale of months up to five years) in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

1.7.3.4 Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

1.7.3.5 For the purposes of the MCZ Stage 1 assessment, attributes were broadly categorised as either physical or ecological attributes. The physical attributes and associated targets for the Subtidal Mud and Subtidal Sand features of the Fylde MCZ include the following (for a full list of attributes and targets for all features, see Natural England's SACOs; Natural England, 2023a).

- Extent and distribution – Target: Maintain the total extent of subtidal mud and subtidal sand features (at 44 km$^2$ and 216 km$^2$ respectively), and spatial distribution as defined in **Figure 1.5**, subject to natural variation.
- Structure and quality: sediment composition and distribution – Target: Maintain the distribution of sediment composition types across the MCZ.

1.7.3.6 Ecological attributes and associated targets for the Subtidal Mud and Subtidal Sand features of the Fylde MCZ include the following.

- Distribution: presence and spatial distribution of biological communities – Target: Maintain the presence and spatial distribution of Subtidal Mud and Subtidal Sand communities.
- Structure: species composition of component communities – Target: Maintain the species composition of component communities to ensure biological functions can continue.

### Supplementary Advice on Conservation Objectives (SACOs)

1.7.3.7 As discussed in **paragraph 1.7.3.1,** both the subtidal sand and subtidal mud protected features of the Fylde MCZ are in favourable condition (Natural England, 2023b). The SACOs for the Fylde MCZ (Natural England, 2023a) provide further detail about the subtidal sand and subtidal mud protected features' extent and distribution, structure, function and supporting processes. For these attributes, targets are provided and where possible quantified. It is against these attributes that an assessment of the Transmission Assets has been made and presented in **sections 1.8** of this report.

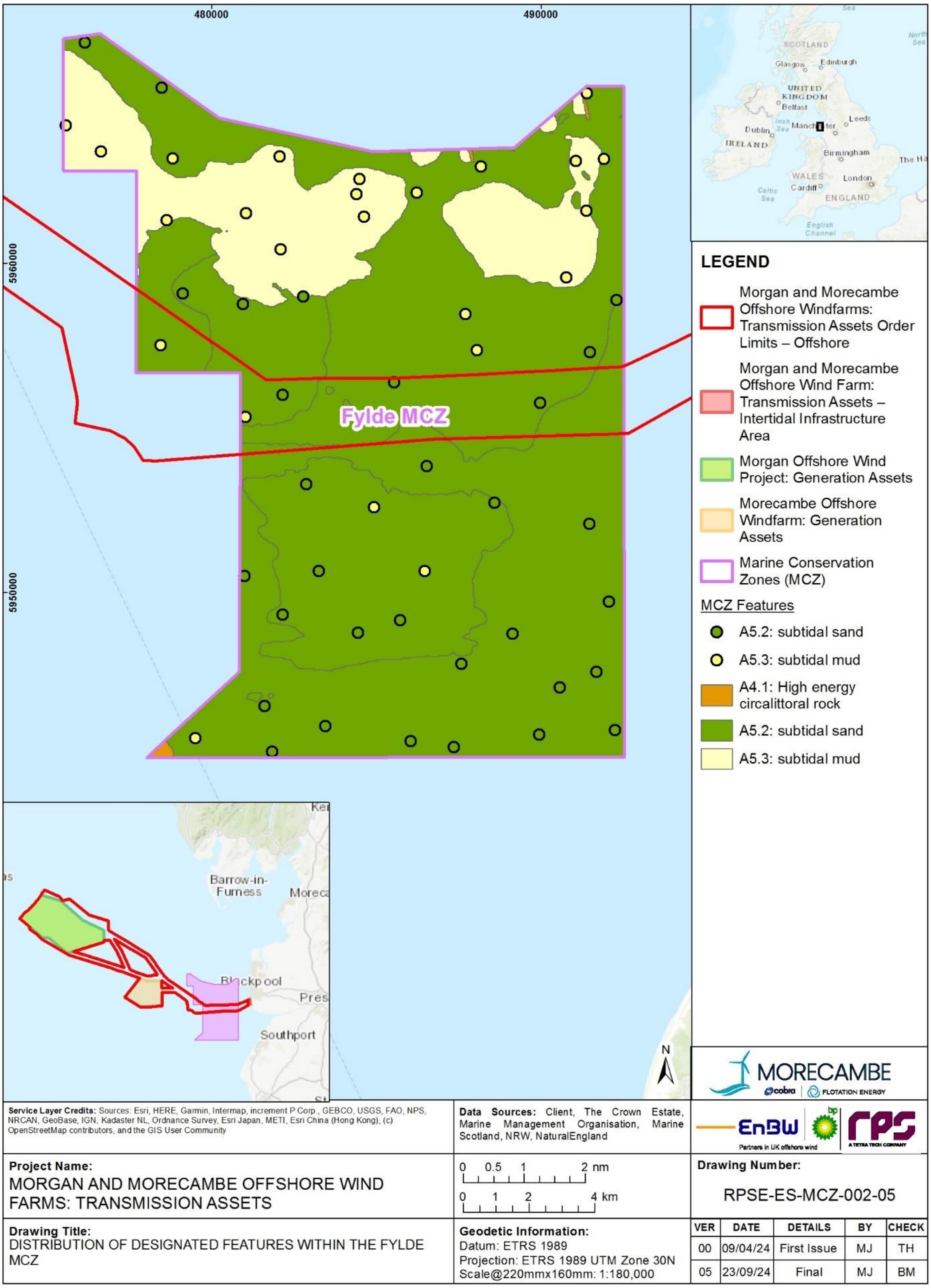



**Figure 1.5: Distribution of designated features within the Fylde MCZ (Defra, 2023)**

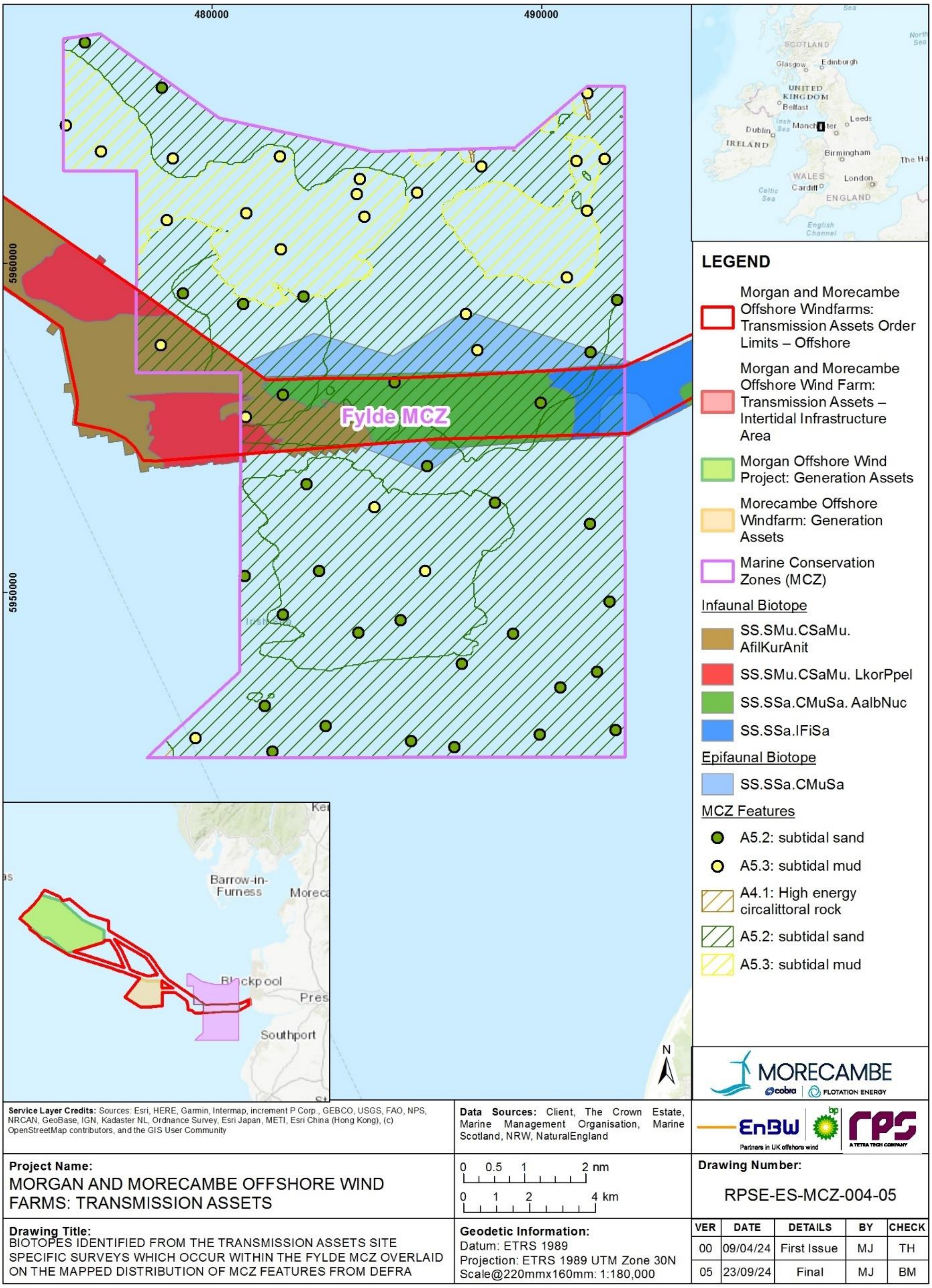



**Figure 1.6: Biotopes identified from the Transmission Assets site specific surveys which occur within the Fylde MCZ overlaid on the mapped distribution of MCZ features from Defra (2023)**

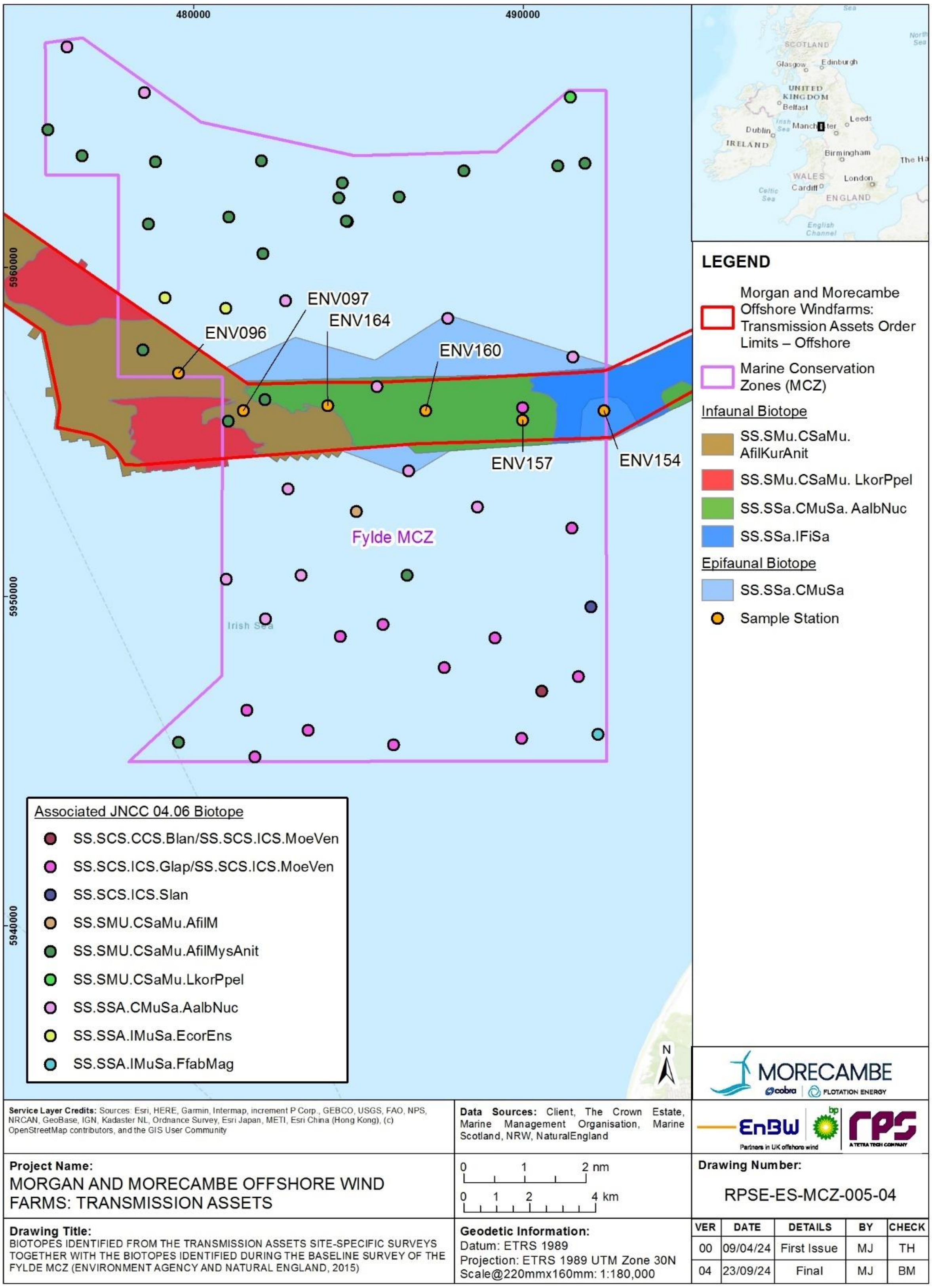



**Figure 1.7: Biotopes identified from the Transmission Assets site-specific surveys together with the biotopes identified during the baseline survey of the Fylde MCZ (Environment Agency and Natural England, 2015)**

## 1.8 MCZ Stage 1 Assessment – Fylde MCZ

### 1.8.1 Introduction

1.8.1.1 This section presents the main assessment of the effects of the construction, operation and maintenance, and decommissioning of the Transmission Assets on the subtidal sand and subtidal mud protected features of the Fylde MCZ. Each of the impacts identified in the Morgan and Morecambe Offshore Wind Farms: Transmission Assets Scoping Report (Morgan Offshore Wind Ltd and Morecambe Offshore Windfarm, 2022) are discussed individually in the following sections and within each assessment, the effects on attributes and targets of the relevant protected features, and subsequently on the conservation objectives, are considered, using the best available scientific evidence to support the conclusions made.

1.8.1.2 The attributes for the subtidal sand and subtidal mud protected features of the Fylde MCZ are listed in **Table 1.12** below, in the order they appear in the SACO (Natural England, 2023a), along with cross-references to the relevant assessments. The impact pathways assessed within the MCZ Stage 1 assessment were agreed through consultation with the SNCBs (**section 1.4**) and reflect the impact pathways assessed in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2). Attributes are categorised as either physical or ecological, with impacts on the physical attributes of features assessed first, and then the ecological attributes of the subtidal sand and subtidal mud protected features (which are largely dictated by physical attributes).

1.8.1.3 The MCZ Stage 1 assessment assesses the MDS for each impact with regard to the Transmission Assets. This MDS has been developed independently for each of the impacts. For this MCZ Stage 1 assessment the MDS has been determined in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2).

# Table 1.12: Pressures assessed in relation to the relevant attributes during the Fylde MCZ Stage 1 Assessment. Grey – no impact pathway; Blue – assessment undertaken

| MCZ Attribute | | Impacts | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attribute type | Attribute | Construction/Decommissioning | | | | | Operation and Maintenance | | | | | | | | |
| | | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Increase risk of introduction and spread of INNS | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Introduction of artificial structures | Increase risk of introduction and spread of INNS | Changes in physical processes | Impacts to benthic invertebrates due to EMF | Heat from subsea electrical cables |
| **Subtidal Sand** | | | | | | | | | | | | | | | |
| Ecological | Distribution: presence and spatial distribution of biological communities | **Paragraph 1.8.2.28/ 1.8.2.64** | **Paragraph 1.8.3.24/ 1.8.3.46** | N/A | **Paragraph 1.8.5.17** | **Paragraph 1.8.7.10** | **Paragraph 1.8.2.49** | **Paragraph 1.8.3.32** | N/A | **Paragraph 1.8.5.17** | **Paragraph 1.8.6.14** | **Paragraph 1.8.7.10** | **Paragraph 1.8.8.16** | **Paragraph 1.8.9.15** | **Paragraph 1.8.10.11** |
| Physical | Extent and distribution | **Paragraph 1.8.2.19/ 1.8.2.61** | N/A | N/A | **Paragraph 1.8.5.12** | N/A | **Paragraph 1.8.2.46** | N/A | N/A | **Paragraph 1.8.5.12** | N/A | N/A | N/A | N/A | N/A |
| Ecological | Structure and function: presence and abundance of key structural and influential species | **Paragraph 1.8.2.28/ 1.8.2.64** | **Paragraph 1.8.3.24/ 1.8.3.46** | N/A | **Paragraph 1.8.5.17** | **Paragraph 1.8.7.10** | **Paragraph 1.8.2.49** | **Paragraph 1.8.3.32** | N/A | **Paragraph 1.8.5.17** | **Paragraph 1.8.6.14** | **Paragraph 1.8.7.10** | **Paragraph 1.8.8.6** | **Paragraph 1.8.9.15** | **Paragraph 1.8.10.11** |
| Ecological | Structure: non-native species and pathogens (habitat) | N/A | N/A | N/A | N/A | **Paragraph 1.8.7.10** | N/A | N/A | N/A | N/A | N/A | **Paragraph 1.8.7.10** | N/A | N/A | N/A |
| Physical | Structure: sediment composition and distribution | **Paragraph 1.8.2.19/ 1.8.2.61** | **Paragraph 1.9.3.6/ 1.8.3.42** | N/A | **Paragraph 1.8.5.12** | N/A | **Paragraph 1.8.2.46** | **Paragraph 1.8.3.28** | N/A | **Paragraph 1.8.5.12** | N/A | N/A | **Paragraph 1.8.8.6** | N/A | N/A |
| Ecological | Structure: species composition of component communities | **Paragraph 1.8.2.28/ 1.8.2.64** | **Paragraph 1.8.3.24/ 1.8.3.46** | N/A | **Paragraph 1.8.5.17** | **Paragraph 1.8.7.10** | **Paragraph 1.8.2.49** | **Paragraph 1.8.3.32** | N/A | **Paragraph 1.8.5.17** | **Paragraph 1.8.6.14** | **Paragraph 1.8.7.10** | **Paragraph 1.8.8.16** | **Paragraph 1.8.9.15** | **Paragraph 1.8.10.11** |

| MCZ Attribute | | Impacts | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attribute type | Attribute | Construction/Decommissioning | | | | | Operation and Maintenance | | | | | | | | |
| | | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Increase risk of introduction and spread of INNS | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Introduction of artificial structures | Increase risk of introduction and spread of INNS | Changes in physical processes | Impacts to benthic invertebrates due to EMF | Heat from subsea electrical cables |
| Physical | Supporting processes: energy/ exposure | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **Paragraph 1.8.8.12** | N/A | N/A | **Paragraph 1.8.8.6** | N/A | N/A |
| Physical | Supporting processes: physico-chemical properties (habitat) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: sediment contaminants | N/A | N/A | **Paragraph 1.8.4.16** | N/A | N/A | N/A | N/A | **Paragraph 1.8.4.25** | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: sediment movement and hydrodynamic regime (habitat) | N/A | **Paragraph 1.8.3.6/ 1.8.3.42** | N/A | N/A | N/A | N/A | **Paragraph 1.8.3.28** | N/A | **Paragraph 1.8.8.12** | N/A | N/A | **Paragraph 1.8.8.6** | N/A | N/A |
| Physical | Supporting processes: water quality – contaminants (habitat) | N/A | N/A | **Paragraph 1.8.4.16** | N/A | N/A | N/A | N/A | **Paragraph 1.8.4.25** | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: water quality – dissolved oxygen (habitat) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: water quality – nutrients (habitat) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

| MCZ Attribute | | Impacts | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attribute type | Attribute | Construction/Decommissioning | | | | | Operation and Maintenance | | | | | | | | |
| | | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Increase risk of introduction and spread of INNS | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Introduction of artificial structures | Increase risk of introduction and spread of INNS | Changes in physical processes | Impacts to benthic invertebrates due to EMF | Heat from subsea electrical cables |
| Physical | Supporting processes: water quality – turbidity (habitat) | N/A | **Paragraph 1.8.3.13/ 1.8.3.43** | N/A | N/A | N/A | N/A | **Paragraph 1.8.3.29** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **Subtidal mud** | | | | | | | | | | | | | | | |
| Ecological | Distribution: presence and spatial distribution of biological communities | **Paragraph 1.8.2.33/ 1.8.2.67** | **Paragraph 1.8.3.21/ 1.8.3.49** | N/A | **Paragraph 1.8.5.21** | **Paragraph 1.8.7.10** | **Paragraph 1.8.2.52** | **Paragraph 1.8.3.35** | N/A | **Paragraph 1.8.5.21** | **Paragraph 1.8.6.14** | **Paragraph 1.8.7.10** | **Paragraph 1.8.8.20** | **Paragraph 1.8.9.15** | **Paragraph 1.8.10.15** |
| Physical | Extent and distribution | **Paragraph 1.8.2.19/ 1.8.2.61** | N/A | N/A | **Paragraph 1.8.5.12** | N/A | **Paragraph 1.8.2.46** | N/A | N/A | **Paragraph 1.8.5.12** | N/A | N/A | N/A | N/A | N/A |
| Ecological | Structure and function: presence and abundance of key structural and influential species | **Paragraph 1.8.2.33/ 1.8.2.67** | **Paragraph 1.8.3.21/ 1.8.3.49** | N/A | **Paragraph 1.8.5.21** | **Paragraph 1.8.7.10** | **Paragraph 1.8.2.52** | **Paragraph 1.8.3.35** | N/A | **Paragraph 1.8.5.21** | **Paragraph 1.8.6.14** | **Paragraph 1.8.7.10** | **Paragraph 1.8.8.20** | **Paragraph 1.8.9.15** | **Paragraph 1.8.10.15** |
| Ecological | Structure: non-native species and pathogens (habitat) | N/A | N/A | N/A | N/A | **Paragraph 1.8.7.10** | N/A | N/A | N/A | N/A | N/A | **Paragraph 1.8.7.10** | N/A | N/A | N/A |
| Physical | Structure: sediment composition and distribution | **Paragraph 1.8.2.19/ 1.8.2.61** | **Paragraph 1.9.3.6/ 1.8.3.42** | N/A | **Paragraph 1.8.5.12** | N/A | **Paragraph 1.8.2.46** | **Paragraph 1.8.3.28** | N/A | **Paragraph 1.8.5.12** | N/A | N/A | **Paragraph 1.8.8.6** | N/A | N/A |
| Ecological | Structure: species composition of | **Paragraph 1.8.2.33/ 1.8.2.67** | **Paragraph 1.8.3.21/ 1.8.3.49** | N/A | **Paragraph 1.8.5.21** | **Paragraph 1.8.7.10** | **Paragraph 1.8.2.52** | **Paragraph 1.8.3.35** | N/A | **Paragraph 1.8.5.21** | **Paragraph 1.8.6.14** | **Paragraph 1.8.7.10** | **Paragraph 1.8.8.20** | **Paragraph 1.8.9.15** | **Paragraph 1.8.10.15** |

| MCZ Attribute | | Impacts | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Construction/Decommissioning | | | | | Operation and Maintenance | | | | | | | | |
| Attribute type | Attribute | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Increase risk of introduction and spread of INNS | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Introduction of artificial structures | Increase risk of introduction and spread of INNS | Changes in physical processes | Impacts to benthic invertebrates due to EMF | Heat from subsea electrical cables |
| | component communities | | | | | | | | | | | | | | |
| Physical | Supporting processes: energy/ exposure | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **Paragraph 1.8.8.12** | N/A | N/A |
| Physical | Supporting processes: physico-chemical properties (habitat) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: sediment contaminants | N/A | N/A | **Paragraph 1.8.4.16** | | N/A | N/A | N/A | **Paragraph 1.8.4.25** | | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: sediment movement and hydrodynamic regime (habitat) | N/A | **Paragraph 1.8.3.6/ 1.8.3.42** | N/A | N/A | N/A | N/A | **Paragraph 1.8.3.28** | N/A | N/A | N/A | N/A | **Paragraph 1.8.8.12** | N/A | N/A |
| Physical | Supporting processes: water quality – contaminants (habitat) | N/A | N/A | **Paragraph 1.8.4.16** | N/A | N/A | N/A | N/A | **Paragraph 1.8.4.25** | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: water quality – dissolved oxygen (habitat) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Physical | Supporting processes: water quality | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

| MCZ Attribute | | Impacts | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attribute type | Attribute | Construction/Decommissioning | | | | | Operation and Maintenance | | | | | | | | |
| | | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Increase risk of introduction and spread of INNS | Temporary Habitat Disturbance /Loss | Increase in SSC and associated deposition | Disturbance /remobilisation of sediment-bound contaminants | Long term habitat loss | Introduction of artificial structures | Increase risk of introduction and spread of INNS | Changes in physical processes | Impacts to benthic invertebrates due to EMF | Heat from subsea electrical cables |
| | – nutrients (habitat) | | | | | | | | | | | | | | |
| Physical | Supporting processes: water quality – turbidity (habitat) | N/A | **Paragraph 1.8.3.13/ 1.8.3.43** | N/A | N/A | N/A | N/A | **Paragraph 1.8.3.29** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

### Overarching assessment assumptions

1.8.1.4 A number of key assumptions, which have been developed based on background information (**section 1.7**) as well as the project parameters outlined in Volume 1, Chapter 3: Project description of the ES (document reference F1.3), are relevant to this MCZ Stage 1 assessment and are outlined below.

- The total area of overlap between the Fylde MCZ and the Offshore Order Limits is 28.36 km$^2$.
- There could be up to six offshore export cables installed within the Fylde MCZ (i.e. four Morgan offshore export cables and two Morecambe offshore export cables).
- The maximum length a single offshore export cable could be through the Fylde MCZ is up to 16 km per cable for the Morgan offshore export cables and 12 km per cable for the Morecambe offshore export cables (88 km in total for all six cables) which represents 18.18% of the total offshore export cable length for the Transmission Assets (i.e. 484 km).
- The total area of the Transmission Assets which is assumed to overlap with the subtidal sand feature of the Fylde MCZ (as indicated by the SS.SSa.CMuSa.AalbNuc and SS.SSa.IFiSa biotopes mapped during the Transmission Assets site-specific surveys in **Figure 1.6**) is 17.67 km$^2$ (62.33% of the total area of the overlap).
- The total area of the Transmission Assets which is assumed to overlap with the subtidal mud feature of the Fylde MCZ (as indicated by the SS.SMu.CSaMu.AfilKurAnit and SS.SMu.CSaMu.LkorPpel biotopes in (**Figure 1.6**) is 10.68 km$^2$ (37.67% of the total area of the overlap).

### Consideration of the mitigation hierarchy

1.8.1.5 A key element of the development of the Transmission Assets project description (Volume 1, Chapter 3: Project description of the ES (document reference F1.3)) has been the consideration of the mitigation hierarchy which provides clear steps regarding how to minimise the impact of a project on the natural environment. The first stage of the mitigation hierarchy involves the implementation of measures to avoid impacts from the outset (e.g. avoiding designated sites and sensitive habitats through initial project design. Where impacts cannot be completely avoided, the second stage of the mitigation hierarchy requires that measures are taken to reduce the magnitude of the impact on the designated site/habitats (e.g. through refinement/reduction of project parameters). The third stage is to remediate/restore habitats affected by impacts to reduce, as far as possible, the residual impacts that a project has on a designated site/feature. As a last resort, the mitigation hierarchy states that compensation for any residual harm should be undertaken through habitat creation or restoration. **Table**

**1.13** below lays out how the avoid and minimise stages of the mitigation hierarchy have been applied to the Transmission Assets.

### Table 1.13: Application of the mitigation hierarchy within the development of the MCZ Stage 1 assessment

| Mitigation hierarchy stage | How the mitigation hierarchy stage has been applied |
|---|---|
| Avoid | The avoid principle was first applied through the Offshore Export Cable Corridor routing exercise which sought to identify the shortest route from the Agreement for Lease areas to the selected landfall location at Lytham St Annes, whilst avoiding environmental sensitivities, such as MCZs, as well as third-party/existing seabed users. The Offshore Export Cable Corridor routing exercise was driven by consideration of the guiding principles described in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the ES (document reference F1.4) and The Crown Estate (TCE) Cable Route Protocol (TCE, 2021).<br>The Offshore Export Cable Corridor search area was defined to minimise interaction with any designated sites, avoiding the Shell Flat and Lune Deep SAC and the West of Walney MCZ and West of Copeland MZC to the north. The Fylde MCZ could not, however, be avoided entirely due to its north-south extent between the Generation Assets and the point of interconnection at Penwortham. Routing around the Fylde MCZ to reach landfall location at Lytham St Anne's was not feasible due to the existing cables that run east/west through the MCZ which would need to be crossed in the shallow waters between the east edge of the MCZ and the coast.<br>These offshore constraints, together with engineering feasibility and the location of the grid connection point at the Penwortham National Grid substation made an overlap with the Fylde MCZ unavoidable (further details in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the ES (document reference F1.4)). |
| Reduce/minimise | As outlined in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the ES (document reference F1.4), the final offshore export cable route has been designed to cross the Fylde MCZ at its the narrowest point to minimise the interaction with, and impacts on, the Fylde MCZ. |
| | Refinements have been made to the project description (Volume 1, Chapter 3: Project description of the ES (document reference F1.3)) post-PEIR to significantly reduce the extent of long term habitat loss and temporary habitat disturbance within the Fylde MCZ as follows.<br>• Post-PEIR, the MDS for cable protection in the Fylde MCZ due to ground conditions has reduced from 20% to 3% contingency for the Morgan offshore export cables and from 15% to 3% contingency for the Morecambe offshore export cables. Cable protection will only be required in the event that cable burial is unsuccessful (CoT47, **Table 1.14**).<br>• Post-PEIR, the proportion of cables requiring sandwave clearance has reduced from 60% to 5% for the Morgan offshore export cables and 30% to 5% for the Morecambe offshore export cables (CoT47, **Table 1.14**).<br>• Post-PEIR the width of disturbance associated with sandwave clearance has reduced from 104 m to 60 m for the Morgan offshore export cables and from 104 m to 48 m for the Morecambe offshore export cables. |

| Mitigation hierarchy stage | How the mitigation hierarchy stage has been applied |
|---|---|
| | • Post-PEIR the width of disturbance associated with boulder clearance for the Morecambe offshore export cables has reduced from 25 m to 20 m.<br>• Post-PEIR, the requirement for a Morgan Offshore Booster Station has been removed from the project design, reducing the potential for indirect impacts on the Fylde MCZ from changes in physical processes as there will be no surface piercing infrastructure associated with the Transmission Assets.<br>• Post-PEIR the MDS for the total length of offshore export cables within the Fylde MCZ has reduced from 94.8 km to 88 km (i.e. 16 km for each of the four Morgan offshore export cables and 12 km for each of the two Morecambe offshore export cables) as a result of further design and route identification.<br>• Post-PEIR the MDS for the volume of spoil arising from sandwave clearance within the Fylde MCZ has reduced from 1,268,642 $m^3$ (previously calculated as a proportion of the overall spoil generated for the Transmission Assets) to 270,000 $m^3$. |
| | The offshore export cable route has been designed to minimise the number of crossings with existing cables, and therefore long term habitat loss, within the Fylde MCZ. The Applicants have attempted to move the crossings outwith the Fylde MCZ however they are limited by existing infrastructure (i.e. Hibernia Atlantic which runs north west/south east to the west of the Transmission Assets just outside of the Fylde MCZ) and engineering constraints (e.g. the need to cross the cable at a 90 degree angle). As such, whilst the Morecambe offshore export cable crossings were able to be pushed westward beyond the boundary of the MCZ (i.e. no cable crossings are required for the Morecambe offshore export cables within the Fylde MCZ), the Morgan offshore export cables would need to cross the Lanis 1 cable within the Fylde MCZ. Therefore the Applicants have sought to reduce the parameters of the crossing, such as length and height, to minimise its impact. |
| | As outlined in Volume 1, Chapter 3: Project description of the ES (document reference F1.3) and **Table 1.14**, and as a result of consultation with the relevant SNCBs (**section 1.4**), the Applicants are committed to ensuring that any external cable protection installed within the Fylde MCZ (if any is required) will be designed to be removable upon decommissioning (CoT108, **Table 1.14**). The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). This will reduce the long-term impacts associated with habitat loss within the Fylde MCZ and restrict these to the operation and maintenance phase only. |

### Measures adopted as part of the Transmission Assets (Commitments)

1.8.1.6 **Table 1.14** details the measures (commitments) adopted as part of the Transmission Assets to reduce the potential for impacts on benthic features of the MCZ. As there is a commitment to implement these measures, they have therefore been considered in this MCZ Stage 1 Assessment.

## Table 1.14: Measures (commitments) adopted as part of the Transmission Assets

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| CoT45 | The Outline Offshore Cable Specification and Installation Plan (CSIP) (document reference J15) for the Fylde MCZ includes: details of cable burial depths, cable protection, and cable monitoring. The Outline CSIP also includes an Outline Cable Burial Risk Assessment (CBRA) (document reference J14). Detailed CSIP(s) and CBRA(s) will be prepared by the Applicants covering the full extent of their respective offshore export cable corridors. Detailed CSIPs will be developed in accordance with the Outline CSIP and will ensure safe navigation is not compromised including consideration of under keel clearance. No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point on the offshore export cable corridor route without prior written approval from the MCA. | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets)<br>Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation). |
| CoT47 | The Outline Offshore CSIP (document reference J15) includes measures to limit the extent of cable protection to 3% of the offshore export cable route within the Fylde MCZ (excluding cable crossings) and sandwave clearance up to 5% of the offshore export cable route within the Fylde MCZ. Within the Fylde MCZ, external cable protection will only be used where deemed to be essential, e.g. for cable crossings or in the instance that adequate burial / reburial is not possible for any section of the route through the Fylde MCZ.<br>The Outline CSIP also includes measures to limit sandwave clearance to up to 5% of the offshore export cable corridor route within the Fylde MCZ. Material arising from sandwave clearance in the Fylde MCZ will be deposited within the Fylde MCZ.<br>The requirements for cable protection and sandwave clearance will be informed through the undertaking of survey works pre-construction. Detailed CSIP(s) will be developed in accordance with the Outline Offshore CSIP (document reference J15). | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation). |
| CoT49 | Construction Method Statement(s) (CMSs) including Offshore Cable Specification and Installation Plan(s), will be produced and implemented prior to construction. These will contain:<br>• details of cable installation and methodology; and<br>• details of foundation installation methodology covering scour protection and the deposition of material arising from | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre- |

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| | drilling, dredging, and/or sandwave clearance. | construction plans and documentation). |
| CoT54 | An Outline Offshore CSIP (document reference J15) includes for cable burial to be the preferred option for cable protection, where practicable. Detailed CSIP(s) will be developed in accordance with the Outline Offshore CSIP (document reference J15). | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation). |
| CoT64 | Detailed Marine Mammal Mitigation Protocols (MMMPs) will be developed and implemented in accordance with the Outline MMMP (document reference J18), to reduce the risk of injury to marine mammals. The Detailed MMMP(s) will include measures to apply in advance of and during surveys and UXO clearance. The Detailed MMMP(s) will include for the use of low order techniques, where possible, as the primary mitigation measure alongside other measures. The detailed MMMP(s) will be approved by MMO, in consultation with Natural England. | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 – Condition 20(1)(b) (UXO clearance) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition20(1)(b) (UXO clearance). |
| CoT65 | Offshore Environmental Management Plan(s) (EMPs) will be developed and will include details of:<br>– a marine pollution contingency plan to address the risks, methods and procedures to deal with any spills and collision incidents during construction and operation of the authorised scheme for activities carried out below MHWS;<br>– a chemical risk review to include information regarding how and when chemicals are to be used, stored and transported in accordance with recognised best practice guidance;<br>– waste management and disposal arrangements;<br>– the appointment and responsibilities of a fisheries liaison officer;<br>– a fisheries liaison and coexistence plan (which accords with the outline fisheries liaison and co-existence plan) to ensure relevant fishing fleets are notified of commencement of licensed activities pursuant to condition and to address the interaction of the licensed activities with fishing activities; | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets)<br>Part 2 - Condition18(1)(f) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(f) (Pre-construction plans and documentation). |

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| | – measures to minimise disturbance to marine mammals and rafting birds from vessels; and<br>– measures to minimise the potential spread of invasive non-native species, including adherence to IMO ballast water management guidelines. | |
| CoT90 | The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the 400kV Grid Connection Cable Corridor beneath the River Ribble will be undertaken by direct pipe or micro tunnel trenchless installation techniques. | DCO Schedules 2A & 2B, Requirement 5(3)(Detailed design parameters onshore) and<br>Requirement 8 (Code of Construction Practice). |
| CoT108 | The Outline Offshore CSIP (document reference J15) submitted as part of the application for development consent, includes for all external cable protection used within the Fylde MCZ to be designed to be removable on decommissioning. Detailed CSIP(s) will be developed in accordance with the Outline Offshore CSIP (document reference J15). | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation). |
| CoT109 | The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning. Removal of cable protection will be in accordance with the Offshore Decommissioning Programme. | DCO Schedule 2A Requirement 21 (Offshore decommissioning) and DCO Schedule 2B Requirement 21 (Offshore decommissioning). |
| CoT114 | All permanent infrastructure located between MLWS and MHWS will be buried to a target depth of 3 metres, subject to further pre-construction surveys to be reported within Detailed CBRAs. An Outline CBRA (document reference J14) has been prepared and submitted with the application for development consent. | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets)<br>Part 2 – Condition 18(1)(e)(i)(bb) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e)(i)(bb) (Pre-construction plans and documentation). |
| CoT116 | Any material arising from sandwave clearance within the Transmission Assets Order Limits will be deposited in close proximity to the works and within the licensed disposal sites within the Order Limits, as detailed in the Dredging and Disposal - Site Characterisation Plan prepared and submitted as part of the application for development consent. | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 1 - Condition 2(f) (Design Parameters) and Part 2 – Condition 16(4) (Chemicals, drilling and debris); and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm |

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| | | Transmission Assets) Part 1 - Condition 2(f) (Design Parameters) and Part 2 – Condition 16(4) (Chemicals, drilling and debris). |
| CoT117 | The Outline Offshore CSIP includes details for any jack-up vessels used within the Fylde MCZ to be stationary. No walking jack-ups would be used within the Fylde MCZ. Detailed CSIP(s) will be developed in accordance with the Outline CSIP. | DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation). |

1.8.1.7 As part of the Section 42 responses Natural England highlighted a number of mitigation measures which have been recommended/adopted for other offshore windfarm projects to reduce impacts to designated sites. **Table 1.15** details the potential measures highlighted by Natural England and presents the conclusions of the consideration of the potential suitability/relevance of these for the Transmission Assets.

**Table 1.15: Mitigation measures suggested by Natural England in Section 42 response**

| Potential mitigation measure proposed by Natural England | Consideration of the potential suitability/relevance of these measures for the Transmission Assets |
|---|---|
| Avoid designated sites (e.g., Hornsea Three removed infrastructure from Markham's Triangle MCZ) | As noted in **Table 1.13**, avoidance was the first step in the mitigation hierarchy to be considered when determining the Transmission Assets project parameters. As previously noted there are a number of offshore constraints (detailed in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives of the ES (document reference F1.4)) including designated sites and existing infrastructure that makes an overlap with the Fylde MCZ unavoidable. |

| Potential mitigation measure proposed by Natural England | Consideration of the potential suitability/relevance of these measures for the Transmission Assets |
|---|---|
| Reduce the number of offshore export cables through the use of HV/DC system or coordinated approach with other projects (e.g., Norfolk Projects) | The Transmission Assets is a collaborative project between Morgan Offshore Wind Project and the Morecambe Offshore Windfarm which were both awarded licences during The Crown Estate's Offshore Wind Leasing Round 4 (i.e. the process by which The Crown Estate leases out the seabed to potential offshore windfarm developers). Both projects were scoped into the 'Pathways to 2030' workstream under OTNR. The OTNR aims to consider, simplify, and wherever possible facilitate a collaborative approach to offshore wind project s connecting to the National Grid. Therefore Morgan OWL and Morecambe OWL (the Applicants), are jointly seeking a single consent for their Transmission Assets.<br><br>Additionally post-PEIR the Morgan Offshore Booster Station was removed from the project design (Volume 1, Chapter 3: Project Description of the ES (document reference F1.3)) following review by Transmission Asset engineers. This is another example of minimising the offshore export cable infrastructure associated with the Transmission Assets. |
| Reduce the number of cable crossings within a designed site to avoid the requirement for cable protection (e.g., Hornsea Project Three) | As outlined in **Table 1.13**, post-PEIR refinement of the project design (Volume 1, Chapter 3: Project description of the ES (document reference F1.3)) has sought to minimise the number of cable crossings required within the Fylde MCZ. This refinement has resulted in no cable crossings being required for the Morecambe offshore export cables within the Fylde MCZ. One crossing is required for the four Morgan offshore export cables which has been located as far west as possible within the Fylde MCZ. The Applicants have sought to minimise the crossings within the Fylde MCZ by pushing the crossings as far as west as possible to the west edge of the MCZ. However, due to other existing infrastructure alignments within and adjacent to the Fylde MCZ and the need to cross existing infrastructure at 90-degree angles, cable crossing of the operational LANIS-1 fibre optic cable within the Fylde MCZ is required for the Morgan offshore export cables. |
| Cutting and removing sections of disused cables to avoid cable crossings (e.g., Norfolk projects) | The cable crossing required for Morgan offshore export cables is required to facilitate the crossing of an operational assets, the LANIS-1 fibre-optic cable. Surveys have not identified any disused cables which would need to be removed in the Fylde MCZ so the potential to cut and remove disused cables or pipelines is not applicable for the Transmission Assets. |
| Micrositing cables around reef and other features of ecological importance (e.g., all projects post Lincs offshore wind farm consent 2008) | The benthic subtidal and intertidal ecology site specific surveys of the Offshore Order Limits (detail regarding the findings of the site specific benthic subtidal and intertidal ecology surveys can be found in Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1)) did not identify any reefs within the Fylde MCZ therefore micro-siting would not be an appropriate measure to adopt. Furthermore, given the mapped distribution of the designated features of the Fylde MCZ within the Offshore Order Limits, as shown in **Figure 1.6**, it would not be possible to avoid either of the features of the MCZ therefore the focus has been to minimise the interaction with each through the project refinements post-PEIR. |

| Potential mitigation measure proposed by Natural England | Consideration of the potential suitability/relevance of these measures for the Transmission Assets |
|---|---|
| Sandwave levelling to reduce risk of free spanning cables and requirement for external cable protection (all projects since 2016 have included an element of this) | Sandwave clearance is included in the project description to facilitate the subsequent burial of cables and to ensure that cable burial success can be maximised (CoT47). As outlined in **Table 1.13**, the MDS for sandwave clearance has, however, been reduced post-PEIR. Cable protection will only be required in the event that cable burial is unsuccessful, as a contingency measure. **Table 1.14** details the commitment to prioritise cable burial (CoT54). Further detail on cable installation, burial and protection can be found in the Outline Offshore CSIP (document reference J15). |
| Adoption of the reburial hierarchy with external cable protection being last resort (all projects) | As noted in **Table 1.14** the Applicants have committed to prioritise cable burial where possible (CoT54) and cable protection will only be used in the Fylde MCZ in the event that cable burial is unsuccessful (CoT47). In the event that a buried cable becomes unburied, it will subsequently be reburied as part of the operation and maintenance activities. |
| Pre-consent – finalise cable burial risk assessment using geotechnical data to focus cable protection requirements to areas where cables are likely to be sub-optimally buried (e.g., mixed sediment – all projects since Vanguard) | The Applicants have committed to submitting an Outline Offshore CSIP, including an Outline CBRA, with the application (CoT45, **Table 1.14**) as requested by Natural England through the EPP. Detailed CSIP(s) and CBRA(s) will be developed in accordance with the Outline Offshore CSIP and Outline CBRA and updated with the most accurate information regarding the parameters of cable protection and cable burial prior to construction as outlined in **Table 1.14.** Further detail on cable installation, burial and protection can be found in the Outline Offshore CSIP (document reference J15)**.** |
| Use of guard vessels and/or advance mapping to avoid sub-optimally buried/surface laid cables negating the need for physical cable protection (e.g., Lincs cable in the Wash) | As detailed in the Outline Offshore CSIP (document reference J15), prior to the installation to the Transmission Assets offshore export cables detailed geophysical and geotechnical surveys will be undertaken within, and in the vicinity of, the footprints of the offshore export cables. Geophysical survey works will be carried out to provide detailed UXO, bedform and boulder mapping, bathymetry, a topographical overview of the seabed, and an indication of sub-layers. This information will be incorporated in to the detailed CSIP(s) and CBRA(s) which will be developed in accordance with the Outline Offshore CSIP and Outline CBRA prior to construction, to ensure optimal burial of cables. |
| Requirement to install cable protection with the minimal footprint (e.g., pinning – TWT cable corridors work) | The project description outlined in Volume 1, Chapter 3: Project description of the ES (document reference F1.3) includes for a number of different cable protection material types including rock dump, mattresses and articulated pipe (noting that cable burial is the primary measure to be implemented in the first instance to protect the cables; CoT54 (**Table 1.14)**).<br>As outlined in **Table 1.13**, post-PEIR the MDS for cable protection in the Fylde MCZ has reduced from 20% to 3% contingency for the Morgan offshore export cables and from 15% to 3% contingency for the Morecambe offshore export cables (CoT47, **Table 1.14**). Cable protection will only to be required in the event that cable burial is unsuccessful (CoT54, **Table 1.14**). |

| Potential mitigation measure proposed by Natural England | Consideration of the potential suitability/relevance of these measures for the Transmission Assets |
|---|---|
| Requirement to install cable protection with the greatest likelihood of removal (e.g., rock bags as used for the Norfolk Projects) | As noted in **Table 1.13** and **Table 1.14** the project description (Volume 1, Chapter 3: Project Description of the ES (document reference F1.3)) includes a commitment to ensuring that all external cable protection used within the Fylde MCZ will be designed to be removable upon decommissioning (CoT108). |
| No use of jack up barges along offshore export cable routes through benthic SACs/MCZs (e.g., Norfolk offshore wind farm projects) | One jack-up event (each with a total area of 16 $m^2$) per cable may be required within the Fylde MCZ due to shallow water depths constraining the vessel type that can be used for cable pull in at the landfall. Up to eight jack-ups may be required in the Fylde MCZ during the operation and maintenance phase to support intertidal cable repairs. Alternative options are being explored but can't be confirmed until post-consent with further details provided in the Outline Offshore CSIP (document reference J15). No walking jack-up vessels would be used within the Fylde MCZ (CoT117, **Table 1.14**). |
| Detonation of UXO outside of designated sites to avoid the creation of a crater (e.g. suggested for the Sheringham Extension Project and the Dudgeon Extension Project and Dudgeon Offshore Wind Farm Extension Project) | The MDS includes for the clearance of up to 25 UXOs within the Offshore Order Limits. Based on current information, there is only one known buried UXO within the Offshore Order Limits and this is outside the boundary of the Fylde MCZ. However, a precautionary approach has been adopted to the assessment which assumes that up to four UXOs may require clearance within the MCZ. The feasibility of moving UXOs would depend on their condition and safety and no commitments can be made until the Applicants have more information on the presence and types of UXO in the Fylde MCZ (if any).<br>As outlined in **Table 1.14**, a detailed UXO MMMP(s) will be implemented during UXO clearance which will use low order techniques, where possible, as the primary mitigation measure alongside other measures as in consultation with Natural England and the MMO (CoT64). |
| Minimise cable protection by conducting additional passes of the trenching tools | As outlined in **Table 1.14**, cable burial is the preferred option for cable protection, where practicable (CoT54). This may therefore reasonably require multiple passes of the installation tools to facilitate burial. Cable protection for ground conditions is only included in the project design for the Fylde MCZ as a contingency measure (CoT47, **Table 1.14**). further detail on cable installation, burial and protection can be found in the Outline Offshore CSIP (document reference J15). |

## 1.8.2 Temporary habitat disturbance/loss

### Construction phase

1.8.2.1 Direct temporary habitat loss/disturbance of subtidal habitat within the Fylde MCZ will occur as a result of site preparation, UXO clearance, the burial of the offshore export cables, jack-up events and the anchor placements associated with cable burial. Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) provides further detail on the magnitude of impact and MDS assumptions with respect to cable installation for the Transmission

Assets as a whole. **Table 1.16** presents the MDS for temporary habitat disturbance within the Fylde MCZ during the construction phase.

1.8.2.2 For the purposes of this assessment, temporary habitat disturbance refers to the impact of activities and events which will produce effects which are temporary within the environment. After the cessation of the activities associated with this impact there will be a shift back toward the original baseline of the environment, via the recovery of the sediments themselves and the associated communities. Temporary impacts to sediments and benthic communities have been considered separately from long term habitat loss/habitat alteration (see **paragraph 1.8.5.1** *et seq*.) which considers the footprint of seabed which will be occupied by the Transmission Assets infrastructure (e.g. cable protection) over its 35 year operational lifetime. Temporary impacts have been assumed, for the purposes of this assessment, to be those associated with potential changes during the construction and decommissioning phases of the Transmission Assets, which are either reversible and/or benthic receptors have the ability to recover from in the short to medium term (i.e. a scale of months to up to five years).

1.8.2.3 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Habitat structure changes – removal of substratum (extraction): the benchmark for which is the extraction of substratum to 30 cm. This pressure is considered to be analogous to the impacts associated with sandwave clearance and pre-lay preparation (e.g. boulder and debris clearance).
- Abrasion/disturbance of the substrate on the surface of the seabed: the benchmark for which is damage to surface features (e.g. species and physical structures within the habitat). This pressure corresponds to the impacts associated with jack-up vessel activities and anchor placements.
- Penetration and/or disturbance of the substratum subsurface below the surface of the seabed, including abrasion: the benchmark for which is damage to sub-surface features (e.g. species and physical structures within the habitat). This pressure corresponds to the impacts associated with cable installation, the removal of existing cables and jack-up vessel activities.
- Smothering and siltation rate changes (heavy): the benchmark for which is heavy deposition of up to 30 cm of fine material added to the habitat in a single discrete event. This pressure corresponds to impacts associated with the deposition of sandwave material dredged prior to cable installation.

1.8.2.4 On the basis of the assumptions outlined in **Table 1.16**, the MDS assumes there may be up to 2.50 $km^2$ of temporary habitat disturbance within the Fylde MCZ during the construction phase, equating to 0.96% of the total area of the MCZ. The assessment that follows considers the effects of temporary habitat loss and disturbance during the construction phase against the attributes and targets for each feature of the Fylde MCZ. The maximum design scenario is for the sequential construction scenario (i.e. construction will take place over a maximum of 30 months, noting that there is potential for a gap between the construction periods for Morgan and Morecambe) as this equates to the greatest time over which disturbance may occur. Although it should be noted that the total extent of habitat disturbance is the same for both the concurrent and sequential scenarios.

1.8.2.5 The amount of temporary habitat disturbance/loss within the Fylde MCZ has decreased following post-PEIR refinements made to the MDS (as outlined in full in **Table 1.13**). This is primarily as a result of a reduction in the width of the area affected by sandwave clearance, from 104 m to 60 m for the Morgan offshore export cables and from 104 m to 48 m for the Morecambe offshore export cables. Additionally the percentage of the cable within the Fylde MCZ which may require sandwave clearance has reduced from 60% to 5% for the Morgan offshore export cable and from 30% to 5% for the Morecambe offshore export cables.

1.8.2.6 These changes have resulted in a decrease in temporary habitat disturbance/loss associated with this activity. For example, the area affected by the deposition of sandwave clearance material within the Fylde MCZ has decreased from 2,537,283 $m^2$ to 540,000 $m^2$ post-PEIR. Overall the amount of temporary habitat disturbance/loss which may occur as a result of the Transmission Assets has reduced by 71% from 8,532,443 $m^2$ in the PEIR to 2,497,196 $m^2$. Further detail on cable installation within the Fylde MCZ is provided in the Outline Offshore CSIP (document reference J15).

1.8.2.7 Initial surveys indicate that the Fylde MCZ is largely featureless with some minor extent of ripples and pitted seabed with limited wave height. Further details are provided in the Outline Offshore CSIP (document reference J15) and the Outline CBRA (document reference J14). Currently, it is not anticipated that exhaustive seabed levelling or sandwave clearance would be required within the MCZ, with an estimate that up to 5% of the export cables within the MCZ may require sandwave clearance (CoT47, **Table 1.14**).

1.8.2.8 The MDS also assumes up to six jack-up events may be required within the Fylde MCZ, to support cable pull-in at the landfall. However, as outlined in CoT117 (**Table 1.14**), the Applicants are committed to ensuring that any jack-up vessels within the Fylde MCZ will be stationary, and no walking jack-ups will be used within the Fylde MCZ.

## Table 1.16: MDS for temporary habitat disturbance within the Fylde MCZ during the construction phase

| Project element | Temporary habitat disturbance (km$^2$) | Justification |
|---|---|---|
| Sandwave and boulder clearance (including subsequent cable burial) | 1.92 | Temporary habitat disturbance/loss of up to **1,408,000 m$^2$** associated with sandwave and boulder clearance (including subsequent cable burial) for up to 64 km of Morgan offshore export cables (i.e. up to four cables each up to 16 km in length) comprising:<br>• 192,000 m$^2$ from sandwave clearance for 5% of Morgan offshore export cables (i.e. 3.20 km) and 60 m width of disturbance; and<br>• 1,216,000 m$^2$ from boulder clearance for 95% of Morgan offshore export cables (i.e. 60.80 km) and 20 m width of disturbance.<br>Temporary habitat disturbance of up to **513,600 m$^2$** associated with sandwave and boulder clearance (including subsequent cable burial) for up to 24 km of Morecambe offshore export cables (i.e. up to two cables each up to 12 km in length) comprising:<br>• 57,600 m$^2$ from sandwave clearance for 5% of Morecambe offshore export cables (i.e. 1.20 km) and 48 m width of disturbance; and<br>• 456,000 m$^2$ from boulder clearance for 95% of Morecambe offshore export cables (i.e. 22.80 km) and 20 m width of disturbance. |
| Sandwave clearance (deposition of material) | 0.54 | Temporary habitat disturbance/loss of **345,600 m$^2$** from the deposition of 172,800 m$^3$ of sandwave clearance material for the Morgan offshore export cables to uniform depth of 0.50 m within the MCZ.<br>Temporary habitat disturbance/loss of **194,400 m$^2$** from the deposition of 97,200 m$^3$ of sandwave clearance material for the Morecambe offshore export cables to uniform depth of 0.50 m within the MCZ. |
| Anchor placements | 0.04 | Anchors sets (each set comprising five anchors each with a 100 m$^2$ footprint) will be placed up to every 500 m for the 10 km of cable closest to the landfall, 5.80 km of which fall within the Fylde MCZ.<br>Temporary habitat disturbance/loss of up to **23,500 m$^2$** associated with anchor placement for up to 23.20 km of Morgan offshore export cables (i.e. up to four cables each up to 5.80 km in length).<br>Temporary habitat disturbance of up to **12,000 m$^2$** associated with anchor placement for up to 11.60 km of Morecambe offshore export cables (i.e. up to two cables each up to 5.80 km in length). |

| Project element | Temporary habitat disturbance (km$^2$) | Justification |
|---|---|---|
| Jack-up events | 0.00001 | Temporary habitat disturbance/loss of **64 m$^2$** associated with one jack-up event per cable for each of the four Morgan offshore export cables. Each jack-up comprises four spud legs each with an area of 4 m$^2$.<br>Temporary habitat disturbance/loss of **32 m$^2$** associated with one jack-up event per cable for each of the two Morecambe offshore export cables. Each jack-up comprises four spud legs each with an area of 4 m$^2$. |
| UXO clearance | Not quantified but likely to be within footprint of the sandwave clearance activities | Temporary habitat disturbance/loss may result from clearance of up to four UXOs within the Fylde MCZ ranging in size from 25 kg up to 907 kg, with 130 kg being the most likely maximum. |
| **Total** | **2.50 km$^2$ (equates to 0.96% of the total area of the Fylde MCZ)**<br>**Subtidal sand: 1.56 km$^2$ (0.72% of the area of this feature in the MCZ)**<br>**Subtidal mud: 0.94 km$^2$ (2.13% of the area of this feature in the MCZ)** | |

### Physical attributes

1.8.2.9 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to temporary habitat disturbance/loss.

- Extent and distribution.
- Structure: sediment composition and distribution.

1.8.2.10 As outlined in **paragraph 1.8.1.4**, the MDS for the subtidal sand feature of the Fylde MCZ assumes that up to 62.33% of the temporary habitat disturbance predicted within the MCZ could occur within this feature. The MDS for the subtidal sand feature is, therefore, for up to 1.56 km$^2$ of temporary habitat disturbance within this feature during the construction phase. This would equate to temporary habitat disturbance of up to 0.72% of the subtidal sand feature within the MCZ.

1.8.2.11 As outlined in **paragraph 1.8.1.4**, the MDS for the subtidal mud feature of the Fylde MCZ assumes that up to 37.67% of the temporary habitat disturbance predicted within the MCZ could occur within this feature. The MDS for the subtidal mud feature is, therefore, for up to 0.94 km$^2$ of temporary habitat disturbance within this feature during the construction phase. This would equate to temporary habitat disturbance of up to 2.13% of the subtidal mud feature within the MCZ.

1.8.2.12 The MDS assumes that activities resulting in temporary habitat disturbance will occur intermittently over a maximum of 30 months (i.e. the sequential construction scenario, noting that there is potential for a gap between the construction periods for Morgan and Morecambe), with only a small proportion of the total maximum area of temporary habitat disturbance occurring at any one time (i.e. highly unlikely that all cables will be installed at exactly the same time). During boulder clearance, any boulders identified as likely to impact installation will need to be moved to the side (i.e. sidecast), away from the immediate location of the cable infrastructure. There are two key methods of clearing boulders, boulder plough and boulder grab. Where a high density of boulders is seen, the expectation is that a plough will be required to clear the cable installation corridor. Where medium and low densities of boulders are present, a subsea grab is expected to be employed. Boulder clearance will occur within the footprint of other site preparation activities and the activity has been considered as temporary habitat disturbance (rather than loss) as the process will effectively redistribute boulders and cobbles within discrete areas. Given the patchiness of the distribution of boulders in the survey area this is considered unlikely to represent a significant shift in the baseline and, since no sediment/substrate is being removed, this will not act as a barrier for the recovery of any epifaunal communities impacted during the process. Furthermore, the MDS assumes that all of the habitat within the boulder clearance corridor will be disturbed (i.e. the situation in the event that a plough us used) but, in reality, it is likely that only some parts will require clearance via a subsea grab. This methodology would be more targeted and would result in less habitat disturbance than that assumed for the MDS.

1.8.2.13 As detailed in the Outline Offshore CSIP (document reference J15), the Fylde MCZ has few major features that would affect cable burial operations with cable burial being the preferred method of cable protection (CoT54, **Table 1.14**). Ridge and runnel features are present in the nearshore area extending into the east edges of the Fylde MCZ and ripples and mega-ripples have been identified sporadically along the cable route within the Fylde MCZ, becoming more prevalent along the west edges of the Fylde MCZ. These features may require some levelling in order to allow cable installation. This levelling activity may be required to facilitate cable burial tool passage, cable ship grounding, or for ensuring cable protection at asset crossings in mobile seabed. However, initial geophysical survey data analysis has indicated that sandwave levelling (pre-sweeping) is not required within the MCZ. Sandwave clearance of up to 5% of the offshore export cable route within the Fylde MCZ (CoT47, **Table 1.14**) has been included for the aforementioned features to ensure adequate burial of the cables through the MCZ.

1.8.2.14 As outlined in CoT116, any material arising from sandwave clearance within the Transmission Assets Order Limits will be deposited in close proximity to the works. Therefore, material arising from sandwave clearance within the Fylde MCZ will be disposed of within the Transmission Assets Order Limits that overlaps with the Fylde MCZ (i.e. no material arising from outside the Fylde MCZ will be disposed of within it) (CoT116, **Table 1.14)**. This will ensure that material is not lost from the system within the MCZ).

1.8.2.15 Any mounds of cleared material will be deposited within the area disturbed and then erode over time, and displaced material will re-join the natural sedimentary environment, gradually reducing the size of the deposits. As the sediment type deposited on the seabed will be similar to that of the surrounding areas, benthic assemblages would be expected to recolonise these areas. A sandwave recoverability study associated with the cable trenching activities of the Race Bank Offshore Wind Farm, showed that within two years of offshore export cable trenching operations, sandwaves affected within the Inner Dowsing, Race Bank and North Ridge SAC had mostly recovered to pre-construction levels (Larsen *et al*., 2019).

1.8.2.16 Following seabed preparation and cable installation (including jack-ups events), the sediment is expected to recover back to its baseline state through wave and tidal action, which would also allow the associated communities to recover into these areas. It should be noted that when undertaking sandwave clearance the material will be sidecast to a location adjacent to the sandwave clearance to allow this material to be available for migration and sandwave recovery.

1.8.2.17 A review of the effects of cable installation on subtidal sediments (RPS, 2019), which drew on monitoring reports from over 20 UK offshore wind farms found that sandy sediments recover quickly following cable installation. Trenches are likely to infill quickly following cable installation and little or no evidence of disturbance is likely to be visible in the years following cable installation. The review also presented evidence that remnant cable trenches in coarse and mixed sediments were conspicuous for several years after installation. However, these shallow depressions were of limited depth (i.e. tens of centimetres) relative to the surrounding seabed, over a horizontal distance of several metres and therefore did not represent a large shift from the baseline environment (RPS, 2019). The review also looked at the impact on benthic communities and reported that benthic communities associated with soft sediments (e.g. muds, sands and gravels) readily recover and re-emerge if the sediment type remains reflective of the baseline environment (RPS, 2019). Evidence for other industries and regions suggests that sand-based sediments can recover over even shorter periods. For example, Newell *et al*. (2004) reports recovery times of months to one or two years.

1.8.2.18 In addition to the impact of trenching for cable installation, jack-up footprints associated with the pull-in of the offshore export cables (described in **paragraph 1.5.6.23**) will result in compression of seabed sediments beneath spud cans where these are placed on the seabed. This is estimated to disturb a total of up to 96 $m^2$ of seabed habitat across all jack-up events within the Fylde MCZ (i.e. one per cable). It should be noted that the area associated with each jack-up event is very small (16 $m^2$), and considerably smaller than jack-ups required for the installation of wind turbine foundations for offshore wind farm projects. These depressions will infill over time, although may remain visible for a number of years following construction (BOWind, 2008; Centrica Energy, 2016). Monitoring at the Barrow offshore wind farm showed depressions were almost entirely infilled 12 months after construction (BOWind, 2008). Monitoring at the Lynn and Inner Dowsing offshore wind farm also showed some infilling of the footprints, although the depressions were still visible four years post-construction (Centrica Energy, 2016). The jack-up events, if required, would be near the east boundary of the Fylde MCZ, where sediments are predominantly sandy (see **section 1.7.2**). It is, therefore, reasonable to predict that the recovery of sediments within the Fylde MCZ would be in line with that observed at the neighbouring Barrow offshore wind farm (i.e. almost entirely infilled within 12 months), located approximately 18 km to the north where sediments are comparable (i.e. muddy sands; RSK Environment Ltd. (2002)).

1.8.2.19 The effects of temporary habitat disturbance during the construction phase will be temporary and cease following completion of the construction activities. Whilst flora and fauna will be affected for both the subtidal sand and subtidal mud features, recoverability, in most cases, is likely to be medium to high based on the assessment made in the MarESA (further detail regarding the MarESA is include in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2)) indicating a high likelihood of recovery. This is due to the number of characterising species remaining in the area and variability in recruitment patterns, increasing the likelihood of the community being representative of the relevant biotopes and hence considered recovered after two years although some parameters such as species richness, abundance and biotopes may be altered. Evidence from the marine aggregates industry suggests that recovery on sandy sediments will happen over a relatively short time scale (e.g. months to one or two years; Newell *et al*., 2004), and coarse, gravelly and mixed sediments showing longer recovery timescales, usually within five years (Desprez, 2000; Newell *et al*., 1998), but in some cases, recovery has been reported as taking up to nine years following cessation of dredging (Foden *et al*., 2009).

1.8.2.20 The impact upon the subtidal mud feature is likely to be similar to the effects on the subtidal sand feature, with recovery in the Offshore Order Limits likely within a couple years following cessation of activity. The RPS (2019) review of the impacts of cable installation on sedimentary habitats did however note some key physical differences in the effects associated with disturbance in comparison with sandy sediment. In areas with relatively low levels of sediment transport and areas with higher fine sediment content (e.g. muddy sands and sandy muds) trenches were observed, although these were relatively shallow features (primarily based on post-construction monitoring conducted one to three years following construction). Offshore windfarms such as Ormonde and Gunfleet Sands 1, 2 and 3, identified shallow (i.e. a few 10s of centimetres) remnant trenches in the years following cable installation. Similarly, Kentish Flats and London Array cables showed some evidence of relic trenches in stable sediments and muddy sands (e.g. in inshore areas), although these were relatively low relief, showing as slight scars on the seabed. Regarding the infilling of these trenches the degree to which these trenches infill over time and the rate of infilling, is likely to be site specific and dependant on the direction of sediment transport processes in the vicinity of the project and these factors are shown to be variable over a relatively small area. BERR

(2008) reports that infilling can occur rapidly either through the trenches collapsing on themselves or through the natural sediment mobility in the local area, alternatively infilling can occur over multiple years. At Walney 1 and 2 (north of the Offshore Order Limits) most of the array cable trenches were considered to be remnant, with the majority of these recorded as being infilled during the first post construction survey (one year following the completion of construction at Walney 1 and three months following the completion of construction of Walney 2) and having little relief showing in the geophysical datasets, while others were shown to infill over time (i.e. in further post construction monitoring) (RPS, 2019). Analysis of inter-array cable installation activities modelled for the Morgan Offshore Wind Project (with the same 3 m width and depth) showed that sedimentation can be in excess of 50 mm at the trench site and much of this material would backfill the trench enhancing recovery.

1.8.2.21 As outlined in CoT115 in **Table 1.20,** the Applicants are committed to producing an OIPMP (document reference J20) which will include provisions for the monitoring of the recovery of sediments and benthic communities within representative areas of the Fylde MCZ affected by sandwave clearance, cable installation and cable protection, at appropriate temporal intervals as part of the operational asset integrity surveys.

1.8.2.22 The MDS also includes the clearance of up to four UXOs within the Fylde MCZ with a 130 kg UXO considered the most likely however they could range from 25 kg to 907 kg. Based on current information however there is only one known buried UXO within the Offshore Order Limits, and this is outside the boundaries of the Fylde MCZ. However a precautionary approach has been adopted which assumes that up to four UXOs may require clearance in the MCZ. Studies undertaken for the Norfolk Vanguard offshore wind farm (Ordtek, 2018) considered the likely crater sizes for a range of UXOs. For the smallest UXO considered (25 kg) in the Ordtek (2018) study, the likely diameter of the crater was estimated at 8.91 m and a likely depth of 1.3 m. For a 150 kg UXO (the option most similar to the most likely maximum for the Transmission Assets) the likely diameter of the crater was estimated at 12.61 m and a likely depth of 1.8 to 2.8 m (Ordtek, 2018). The project is committed to applying low order/low yield techniques where safe and logistically viable to do so (CoT64, **Table 1.14**) and therefore UXO clearance will most likely be within the 20 m of disturbance assumed for cable burial (including boulder clearance) and also the width of disturbance assumed for sandwave clearance. UXO clearance will therefore be within the 20 m width of disturbance assumed for cable burial (including boulder clearance) and also the 60 m width assumed for sandwave clearance. Any craters created during detonation are expected to backfill by natural processes, the speed of which would depend on the sediment transport regimes in the area.

1.8.2.23 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Extent and distribution:** The AoO states that the surveys undertaken to date within the MCZ indicate that the features are not considered to have decreased in extent (Envision Mapping Ltd., 2014) despite the installation of other cables within the MCZ (e.g. Rockabill in 2019 (TeleGeography, 2024)) and therefore there has been no decline in condition. This is supported by the recent assessment of the condition of the features of the Fylde MCZ which concluded that both features are deemed to be in favourable condition (Natural England, 2023b). The extent and distribution of the subtidal sand and subtidal mud features will be maintained in the long term following the completion of the construction phase, with only a small proportion of the total extent of these features within the MCZ affected (0.72% of the total subtidal sand feature and 2.13% of the total subtidal mud feature). It should be noted that the extent of the predicted impact on the subtidal mud feature is considered to be highly precautionary as, as outlined in **paragraph 1.7.2.3**, according to the mapped distribution of the subtidal mud protected feature, there is no overlap with the Transmission Assets. However, on the basis of the sandy mud biotopes assigned to two stations during the Transmission Assets site-specific surveys, a precautionary approach has been adopted which assumes that there is overlap with the subtidal mud feature. In addition, any effects on the subtidal mud protected features will be temporary and reversible with recovery of sediments occurring following the completion of construction.
- **Structure: sediment composition and distribution**: This attribute is unlikely to be affected by temporary habitat disturbance. Whilst sandwave clearance will temporarily remove sediment, it will be deposited locally (CoT116, **Table 1.14**) within the Fylde MCZ, and the high rate of deposition will ensure rapid redistribution of material. Whilst cable burial activities will temporarily disturb the distribution of sediment, trenches will infill following completion of installation with sediments from surrounding areas infilling any cable trench. The sediment composition within the trench is predicted to return to baseline levels.

### Ecological attributes

1.8.2.24 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to temporary habitat disturbance/loss.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

### Subtidal sand

1.8.2.25 Natural England's AoO identifies 11 biotopes that may be represented within the subtidal sand feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Medium (see **Appendix A**: Biotope Sensitivity Ranges), with the highest sensitivity being to the physical disturbance pressures such as abrasion, penetration and substrate removal (Natural England, 2023c). Natural England's AoO also highlights that the effects are relevant to epiflora and epifauna living on the surface of the substratum and unlike a permanent change in sea bed type a change in habitat structure relates to temporary and/or reversible change where a residual layer of the seabed remains and as such biological communities could re-colonise.

1.8.2.26 The subtidal sand-based biotopes identified in the MCZ baseline survey (Environment Agency and Natural England, 2015) identified the SS.SCS.ICS.MoeVen and SS.SCS.ICS.Glap biotopes. This sandy sediment environment is characterised by polychaetes such as *Glycera lapidum* and bivalves such as *Moerella* sp., *Spisula elliptica* and *Asbjornsenia pygmaea* which are unlikely to experience anything other than localised decline in species richness. The majority of infauna will be expected to burrow back into the sediment following displacement or are adapted to habitats with frequent disturbance (natural or anthropogenic) and recover quickly (Tillin and Watson, 2023a; Tillin and Watson, 2023b). Recovery is likely to occur as a result of a combination of recruitment from adjacent habitats and larval dispersal. The MarESA draws from available studies to confirm the general trend that, following severe disturbance, habitats are recolonised rapidly by opportunistic species (Pearson and Rosenberg, 1978). Van Dalfsen *et al.* (2000) found that polychaetes recolonized a dredged area within five to ten months, with biomass recovery predicted within two to four years. This kind of dredging would disturb a much larger area than expected for cable installation therefore recovery from cable installation is likely to occur within a minimum of one year (RPS, 2019). Recovery of sediments will be site-specific and will be influenced by currents, wave action and sediment availability (Desprez, 2000) all of which are addressed in **section 1.8.8**.

1.8.2.27 The site specific subtidal surveys conducted for the Transmission Assets also identified the SS.SSa.CMuSa.AalbNuc biotope within the Fylde MCZ which, based on the MarESA, has a low to medium sensitivity to the relevant pressures (Tillin and Budd, 2023). This biotope is also predominantly infaunal but with a significant bivalve component, therefore pressures such as abrasion and penetration are likely to cause physical damage to the characteristic species such as *A. alba* however, they also have a short recovery period due to the variety of recruitment methods employed by the characterising species (Tillin and Budd, 2023). Additionally as noted in **paragraph 1.8.2.26** the majority of infauna have the ability to reburrow themselves and this includes burrowing out of displaced sediment, particularly sandy sediment which is not as cohesive as mud-based sediment. Due to the similarities with the communities described in **paragraph 1.8.2.26** it is likely the recovery time will be similar and will largely depend on the recovery of the sediment and the speed of recruitment.

1.8.2.28 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: The effect of temporary habitat disturbance/loss on the presence and spatial distribution of biological communities within the subtidal sand feature is likely to be minimal. Where temporary disturbance occurs, this will lead to localised reductions in species richness and abundance especially where sediment is, temporarily, physically removed (e.g. seabed preparation such as sandwave clearance). A full recovery of these communities into these affected areas would be expected one to two years following disturbance. Whilst the temporary removal of sediment will occur during sandwave clearance, as detailed in CoT116 (**Table 1.14**) the material will be deposited local to the area (i.e. within the Fylde MCZ) and redistributed as the Fylde MCZ is an area of active sediment transport (with net sediment transport rates of *c*. 0.75 $m^3$/d/m within the Morgan Offshore Wind Project: Generation Assets), particularly under spring tides and/or relatively frequent storm conditions (Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1)). This will lead to repopulation within a matter of years due to passive recruitment and active migration of juveniles and adults from adjacent non-disturbed areas.
- **Structure and function: presence and abundance of key structural and influential species**: By maintaining the extent and distribution of this feature it will ensure that the key structural and influential species of this feature remain prevalent throughout Fylde MCZ. The physical environment within which the identified biotopes occur is characterised by its high energy currents which support and form the characteristic community of this feature, this suggests that the communities present may be relatively robust and able to tolerate the low level disturbance associated with offshore export cable installation.
- **Structure: species composition of component communities**: The component community of the Fylde MCZ which defines its function as a site of high biological productivity, will be maintained throughout the construction phase of the Transmission Assets. The highly localised and temporary nature of the disturbance of the subtidal sand feature will ensure that the stability of the majority of the sediment is maintained. The recovery time of one to two years for the key biotopes identified (SS.SCS.ICS.Glap and SS.SCS.ICS.MoeVen) is facilitated by active recruitment in to the area and is supported by evidence from similar and more damaging activities such as dredging (**paragraph 1.8.2.26**). This will enable the community to maintain its function as a good representative of the seabed habitats in the east of Liverpool Bay as well as providing

a food source for local fish and bird communities. This outcome is consistent with the conservation objective of the subtidal sand feature, which is to restore and maintain the feature in a favourable condition.

1.8.2.29 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary, reversible, and intermittent nature of the impact of temporary habitat disturbance during construction, and the relatively small proportion (0.72%) of the subtidal sand protected feature to be affected during construction, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal sand feature of the Fylde MCZ was considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have an overall medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.2.30 Natural England's AoO identifies six biotopes that may be represented within the subtidal mud feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Medium (see **Appendix A**: Biotope Sensitivity Ranges), with the highest sensitivity being to the physical disturbance pressures such as abrasion, penetration and substrate removal (Natural England, 2023bc).

1.8.2.31 The subtidal mud-based biotopes identified in the MCZ baseline survey (Environment Agency and Natural England, 2015) (**Figure 1.6** and **Figure 1.7**) included SS.SSa.IMuSa.EcorEns and SS.SMu.CSaMu.AfilKurAnit). Based on the MarESA, both of these biotopes have a low to medium sensitivity to penetration and surface abrasion and medium sensitivity to removal of substratum. This muddy sediment environment has been characterised by bivalves, such as *A. alba, Ensis* and *N. nitidosa,* and echinoderms such as *A. filiformis* (Natural England, 2023a). Although the communities associated with the subtidal mud feature are typical of low energy environments, the majority of these communities are infaunal which offers some protection against surface level disturbance such as abrasion (De-Bastos *et al*., 2023a; De-Bastos *et al*., 2023b). The species which characterise these biotopes are predominantly infaunal burrowing species such as echinoderms, polychaetes and bivalves such as *A. filiformis* and *E. cordatum*, which are capable of re-entering the substratum following disturbance (De-Bastos *et al*., 2023a; De-Bastos *et al*., 2023b). Penetration of the sediment has a varied impact on these communities, some species are highly sensitive such as *E. cordatum* which is highly sensitive based on the fragility of their tests (Bergman and van Santbrink, 2000). Whereas mortality associated with species such as *A. filiformis* and *K. bidentata* is much lower (Bergman and van Santbrink, 2000). Dernie *et al*. (2003) found that muddy sand habitats had the longest recovery times, compared to mud and clean sand habitats, the specific recovery time will depend on the species present. Brittlestar *A. filiformis* is able to repair arms, has long dispersal potential, but is slow growing and takes two years to reach maturity. Similarly *E. cordatum* re-populated sediments two years after disturbance such as oil spills (Southward and Southward, 1978). So where the majority of the population remain, and/or recruitment by adult mobility is possible, resilience is likely to be high and recovery quick (i.e. within two years). However, where recovery through juvenile recruitment is required, which can be dependent on favourable hydrodynamic conditions and the environment is low energy it is likely to take more time for most species populations to recover potentially requiring two to ten years (De-Bastos, and Hill, 2016a).

1.8.2.32 The site specific surveys conducted for the Transmission Assets also identified the SS.SMu.CSaMu.AfilKurAnit biotope (discussed above in **paragraph 1.8.2.31**) as well as the SS.SMu.CSaMu.LkorPpel biotope. The SS.SMu.CSaMu.LkorPpel biotope is characterised by the opportunistic *Lagis koreni*, which has been noted as dominant at a dredged material site in Liverpool Bay (Whomerslwey *et al*., 2008) and the similarly opportunistic *P. pellucidus* which also dominates dredge spoil dump sites (Rees *et al*., 1992). These characteristic species have been found to have a low resistance to pressure such as abrasion and penetration when associated with activities such as trawling, for example Hiddink *et al*. (2006) reported direct mortality of up to 31% of *L. koreni* caused by a single passage of a trawl. *L. koreni* is however short-lived, reaches maturity quickly, within one year, and is capable of rapid recolonisation through larval recruitment following disturbance events, and reaches former densities within a year (Arntz and Rumohr, 1986). This indicates a broadly low sensitivity of this biotope to disturbance pressures.

1.8.2.33 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: The impact of temporary habitat disturbance/loss on the presence and spatial distribution of biological communities within the subtidal mud feature of the Fylde MCZ is likely to be limited. Where temporary disturbance occurs, as for the subtidal sand feature, this may lead to localised reductions in species richness and abundance especially where sediment is, temporarily, physically removed (e.g. seabed preparation such as sandwave clearance). Full recovery of these communities into affected areas would be expected within two to ten years following completion of the construction activities.
- **Structure and function: presence and abundance of key structural and influential species:** The key structural and influential species identified for this feature are those which form part of the habitat structure or function of the characteristic community. The maintenance of these species will depend on the recovery of their physical environment which may take longer than for the subtidal sand feature due to this feature being typically lower energy, although the Fylde MCZ as a whole sits in an area of active

sediment transport. Recovery however is highly likely due to the resilient nature of these species for example brittlestars can resist considerable damage to limbs and even the central disk without experiencing mortality and are capable of limb regeneration (Sköld, 1998). It is possible that remnant trenches may persist in the years following installation (RPS, 2019), but this is considered unlikely to impede the recovery of the benthic communities associated with the sediments. Walney 1 and 2 Offshore Windfarms in the region had trenches from array and offshore export cables which recovered within a year as well as some which recovered over multiple years (RPS, 2019). This will lead to repopulation and the creation of a mature benthic community within a matter of years due to passive recruitment and active migration of juveniles and adults from adjacent non-disturbed areas (**paragraphs 1.8.2.31** and **1.8.2.32**). These processes ensure that the presence and abundance of key structural and influential species of this feature remain prevalent throughout Fylde MCZ.

- **Structure: species composition of component communities**: The highly localised and temporary nature of the disturbance of the subtidal mud feature will ensure that the stability of the majority of the sediment is maintained. The majority of the Fylde MCZ will therefore still act as good representative of the seabed habitats and communities found on the east side of Liverpool Bay particularly the SS.SMu.CSaMu.AfilMysAnit which was identified as the component community by Natural England (2023a). The subtidal mud feature will also be able to continue functioning as a food source for local fish populations by maintaining these key bivalve and polychaete based communities.

1.8.2.34 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary, reversible, and intermittent nature of the impact of temporary habitat disturbance during construction, and the relatively minor proportion (2.13%) of the subtidal mud protected features to be affected during construction, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal mud feature of the Fylde MCZ was considered to be of medium to very high vulnerability, high to medium recoverability and national importance and therefore was considered to have an overall medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.2.35 Based on the information presented in **paragraphs 1.8.2.9** to **1.8.2.34**, it can be concluded that temporary habitat disturbance during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- While the temporary habitat disturbance is predicted to affect a small proportion of the subtidal sand and subtidal mud features (0.72% and 2.13% respectively) intermittently during the construction phase, these habitats will recover such that the **extent and distribution** of the subtidal sand and subtidal mud protected features will remain stable following the construction phase.
- The **structures and functions** provided by the **component communities** will remain in a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the first couple of years following seabed preparation and cable installation, with complete recovery within the areas affected within a two to ten years, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of construction for subtidal sand and up to ten years for subtidal mud.

### Operation and maintenance phase

1.8.2.36 Direct temporary disturbance of subtidal habitat within the Fylde MCZ may occur during the operation and maintenance phase as a result of repair and reburial events for offshore export cables within the Fylde MCZ and from jack-up activities associated with intertidal cable repair events. Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) provides further detail on the magnitude of impact and project design assumptions with respect to cable maintenance activities for the Transmission Assets as a whole. **Table 1.17** presents the MDS for temporary habitat disturbance within the Fylde MCZ during the operation and maintenance phase.

1.8.2.37 The MDS assumes that, in the operations and maintenance phase, up to 14 repair events and seven reburial events for the Morgan offshore export cables may occur within the MCZ. Additionally, the MDS assumes that up to seven repair events and seven reburial events for the Morecambe offshore export cables may occur within the MCZ. The MDS also assumes that there may be up to eight jack-up events within the Fylde MCZ, over the 35 year lifetime of the Transmission Assets, to facilitate cable repairs in the intertidal. Further details regarding the width of cable burial, number of events and area of jack-up footprints are presented in **Table 1.17**.

1.8.2.38 The relevant pressures and associated benchmarks which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are as listed for the construction phase (**paragraph 1.8.2.3**). The habitat structure changes – removal of substratum (extraction) pressure however is not relevant to the operation and maintenance phase.

### Table 1.17: MDS for temporary habitat disturbance within the Fylde MCZ during the operation and maintenance phase

| Project element | Temporary habitat disturbance ($km^2$) | Justification |
|---|---|---|
| Offshore export cable repair | 0.34 | • 179,200 $m^2$ for Morgan offshore export cables from one repair event for each of the four offshore export cables every 10 years (14 repair events in total) affecting up to 0.64 km of cable per repair event at a width of 20 m.<br>• 160,160 $m^2$ for Morecambe offshore export cables from one repair for each of the two offshore export cables every 10 years (seven repair events in total) affecting up to 1.14 km per repair event at a width of 20 m. |
| Offshore export cable reburial | 0.49 | • 358,400 $m^2$ for Morgan offshore export cables from one reburial event every five years (seven reburial events in total) affecting up to 2.56 km per reburial event at a width of 20 m.<br>• 136,136 $m^2$ for Morecambe offshore export cables from one reburial event every five years (seven reburial events in total) affecting up to 0.972 km per reburial event at a width of 20 m. |
| Jack-up events to facilitate intertidal cable repair | 0.00013 | • Temporary habitat disturbance/loss of **64 $m^2$** associated with four jack-up events for the Morgan offshore export cables over the 35 year operational lifetime. Each jack-up comprises four spud legs each with an area of 4 $m^2$.<br>• Temporary habitat disturbance/loss of **64 $m^2$** associated with four jack-up events for the Morecambe offshore export cables. Each jack-up comprises four spud legs each with an area of 4 $m^2$. |
| **Total** | **0.83 $km^2$ (equates to 0.32% of the total area of the Fylde MCZ)**<br>**Subtidal sand: 0.52 $km^2$ (0.24% of the area of this feature in the MCZ)**<br>**Subtidal mud: 0.31 $km^2$ (0.71% of the area of this feature in the MCZ)** | |

1.8.2.39 The MDS for temporary habitat disturbance within the Fylde MCZ in the operation and maintenance phase assumes that up to 0.83 $km^2$ of temporary seabed disturbance may occur over the lifetime of the Transmission Assets. This equates to 0.32% of the total area of the MCZ.

#### Physical attributes

1.8.2.40 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to temporary habitat disturbance during the operation and maintenance phase.

- Extent and distribution.
- Structure: sediment composition and distribution.

1.8.2.41 As outlined in **paragraph 1.8.1.4**, the MDS for the subtidal sand feature of the Fylde MCZ assumes that up 62.33% of the temporary habitat disturbance predicted within the MCZ could occur within this feature.

The MDS for the subtidal sand feature is, therefore, for up to 0.52 $km^2$ of temporary habitat disturbance within this feature during the operation and maintenance phase. This would equate to temporary habitat disturbance of up to 0.24% of the subtidal sand feature within the MCZ. As discussed in **paragraph 1.8.2.37**, this is considered highly precautionary and, in realty, the maintenance activities likely to occur within the MCZ will be much less than this.

1.8.2.42 As outlined in **paragraph 1.8.1.4**, the MDS for the subtidal mud feature of the Fylde MCZ assumes that up 37.67% of the temporary habitat disturbance predicted within the MCZ could occur within this feature. The MDS for the subtidal mud feature is, therefore, for up to 0.31 $km^2$ of temporary habitat disturbance within this feature during the operation and maintenance phase. This would equate to temporary habitat disturbance of up to 0.71% of the subtidal mud feature within the MCZ.

1.8.2.43 Activities resulting in temporary habitat disturbance will occur intermittently throughout the operation and maintenance phase which will last up to 35 years, with only a small proportion of the total maximum area of temporary habitat disturbance occurring at any one time. Following these activities sediments would be expected to recover to their baseline state through wave and tidal action, allowing the associated communities to recover into these areas.

1.8.2.44 With regards to the eight jack-up events within the Fylde MCZ associated with intertidal cable repairs that may be required over the operation and maintenance phase, as outlined in **paragraph 1.8.2.18**, the area associated with each jack-up event is very small (16 $m^2$), and considerably smaller than jack-ups required for the installation of wind turbine foundations for offshore wind farm projects. Furthermore, as outlined in **paragraph 1.5.8.3**, intertidal repair events generally take between two to four weeks, with the jack-up vessel only required for a small proportion of this time. The jack-up events, if required, would be near the east boundary of the Fylde MCZ, where sediments are predominantly sandy (see **section 1.7.2**). It is, therefore, reasonable to predict that the recovery of sediments within jack-up depressions in the Fylde MCZ would be in line with that observed at the neighbouring Barrow offshore wind farm (i.e. almost entirely infilled within 12 months) where sediments are comparable (i.e. muddy sands; RSK Environment Ltd. (2002)). Therefore, recovery of the sediments would be predicted in between jack-up events over the 35 year operational lifetime. As outlined in CoT115 in **Table 1.20,** the Applicants are committed to producing an OIPMP (document reference J20) which will include provisions for the monitoring of the recovery of sediments and benthic communities within representative areas of the Fylde MCZ affected by cable installation, at appropriate temporal intervals as part of the operational asset integrity surveys.

1.8.2.45 The sensitivity of the subtidal sand and subtidal mud protected features of the MCZ to disturbance of this nature is as described for the construction phase in **paragraphs 1.8.2.10** to **1.8.2.19**.

1.8.2.46 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Extent and distribution:** The AoO states that the surveys undertaken to date within the MCZ indicate that the features are not considered to have decreased in extent (Envision Mapping Ltd., 2014) and therefore there has been no decline in condition. The extent and distribution of the subtidal sand and subtidal mud features will be maintained as this impact in this phase of the project will be temporary, intermittent, and small scale at any one time/per maintenance event (up 0.24% of the subtidal sand feature across the 35 year operational lifetime for all maintenance events and up 0.71% of the subtidal mud feature across the 35 year operational lifetime for all maintenance events). The effects of this impact in the operation and maintenance phase will have a minimal impact on the extent and distribution of both of the features within the Fylde MCZ. Additionally, the magnitude of this impact is greatly reduced per maintenance event (both spatially and temporally) compared to the construction phase as activities such as sandwave clearance, which directly displace sediment, will not occur. The localised repair and reburial events, and jack-up events will result in surface level abrasion and small-scale seabed penetration on a much-reduced scale compared to the construction phase, also reducing the potential for community mortality in this phase. This is consistent with the ‘maintain’ objective of the extent and spatial distribution attribute for this feature.
- **Structure: sediment composition and distribution:** This attribute is unlikely to be affected by temporary habitat disturbance. The highly localised repair and reburial events will temporarily disturb sediment which is likely to resettle in the immediate vicinity of the disturbance site within the Offshore Order Limits and within the Fylde MCZ, and the high rate of deposition will ensure rapid redistribution of material within a couple of tidal cycles of being deposited. Additionally the majority of the material disturbed will be deposited back in the trench from which it came following cable burial activities limiting the need for redistribution of material to be required to help the recovery of the physical attributes of the features of Fylde MCZ.

#### Ecological attributes

1.8.2.47 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to temporary habitat disturbance during the operation and maintenance phase.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

### Subtidal sand

1.8.2.48 The sensitivity of the subtidal sand feature to disturbance of this nature is as described for the construction phase in **paragraphs 1.8.2.25** to **1.8.2.27**.

1.8.2.49 The following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: The presence and spatial distribution of biological communities within the subtidal sand feature is considered to be minimally affected by temporary habitat disturbance. In the operation and maintenance phase temporary disturbance may lead to highly localised reductions in species richness and abundance on an intermittent basis. A full recovery of these communities into these affected areas would be expected one to two years following disturbance (**paragraphs 1.8.2.25** to **1.8.2.27**), however this may be accelerated due to the limited extent of this impact.
- **Structure and function: presence and abundance of key structural and influential species**: By maintaining the extent and distribution of this feature it ensures that the key structural and influential species of this feature remain prevalent throughout Fylde MCZ. The physical environment within which the identified biotopes occur is characterised by its high energy currents which would help enable the repopulation of these areas of disturbance.
- **Structure: species composition of component communities**: The temporary and localised nature of the habitat disturbance associated with maintenance activities suggest it is unlikely there will be any disturbance to the long term function of the subtidal sand feature. The highly limited nature of this impact (0.32%) will ensure the majority of this habitat remains suitable for use as a spawning and nursery ground for commercially valuable fish species. Additionally, the intermittent nature of each potential disturbance event will ensure time for recovery between events throughout the 35 year operational lifetime of the project. This is consistent with the 'maintain' objective of the structure attribute for this feature.

1.8.2.50 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary, reversible, and intermittent nature of the impact of temporary habitat disturbance during the operation and maintenance phase, and the relatively small proportion (0.32%) of the subtidal sand and subtidal mud protected features to be affected during maintenance, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal sand feature of the Fylde MCZ was considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have an overall medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.2.51 The sensitivity of the subtidal mud feature to disturbance of this nature is as described for the construction phase in **paragraphs 1.8.2.30** to **1.8.2.32**.

1.8.2.52 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: The presence and spatial distribution of biological communities within the subtidal mud feature is considered to be minimally affected by temporary habitat disturbance. In the operation and maintenance phase temporary disturbance may lead to highly localised reductions in species richness and abundance on an intermittent basis. The effect of this impact may be longer lived in subtidal mud than subtidal sand resulting in visible trenches however a full recovery of these communities into these affected areas would be expected two to ten years following disturbance (**paragraphs 1.8.2.30** to **1.8.2.32**).
- **Structure and function: presence and abundance of key structural and influential species**: Cable repair and reburial are likely to particularly affect the epifaunal component of the community as well as those which live in the surface sediments including the brittlestar *A. filiformis*, and bivalves *K. bidentata* and *N. nitidosa* as they are exposed to the abrasive effect of activities such as reburial. It is likely that this habitat will recover from temporary habitat disturbance/loss as described in **paragraph 1.8.2.33**.
- **Structure: species composition of component communities**: The temporary and localised nature of the habitat disturbance associated with maintenance activities means they are unlikely to disturb these long term functions. As noted in **paragraph 1.8.2.33** the subtidal mud features key function in this region is as a producer of food for commercially valuable fish species as well as a nursery ground for these species. Additionally, the intermittent nature of the disturbance events will ensure time for recovery between events throughout the 35 year operational lifetime of the project. This is consistent with the ‘restore and maintain’ objective of the structure attribute for this feature.

1.8.2.53 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary, reversible, and intermittent nature of the impact of temporary habitat disturbance during the operation and maintenance phase, and the relatively small proportion (0.71%) of the subtidal mud protected feature to be affected during maintenance, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal mud feature of the Fylde MCZ was considered to be of medium to very high vulnerability, high to medium recoverability and national importance and therefore was considered to have an overall medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.2.54 Based on the information presented in **paragraphs 1.8.2.40** to **1.8.2.53**, it can be concluded that temporary habitat disturbance during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The temporary habitat disturbance is predicted to affect a small proportion of the subtidal sand and subtidal mud features (0.24% and 0.71% respectively) intermittently during the 35 year long operation and maintenance phase. These habitats will recover such that the **extent and distribution** of the subtidal sand and subtidal mud protected features will remain stable following the disturbance.
- The **structures and functions** provided by the **component communities** will remain in a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the months and years following cable repair, cable reburial and jack-up events, with complete recovery within the areas affected within two to ten years, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of disturbance for subtidal sand and up to ten years for subtidal mud, although this may be accelerated by the small area affected.

### Decommissioning phase

1.8.2.55 The current preferred decommissioning approach to the offshore export cables is that they would be left *in situ*; however, a future scenario could exist where they may be retrieved. As outlined in **Table 1.14**, all external cable protection used within the Fylde MCZ will be designed to be removable on decommissioning (CoT108). The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). The removal of cables and cable protection has been considered as the worst case scenario for temporary habitat disturbance during the decommissioning phase.

1.8.2.56 Direct temporary disturbance of subtidal habitat within the Fylde MCZ may occur during the decommissioning phase as a result of the removal of cables, cable protection and associated anchor placements. The magnitude of temporary habitat disturbance/loss associated with the decommissioning phase of the Transmission Assets is likely to be similar to the construction phase. It is however unlikely that there will be a requirement for sandwave and boulder clearance in the decommissioning phase therefore it is also likely the temporary habitat disturbance/loss in the decommissioning phase will be reduced compared to the construction phase. Based on the above assumptions regarding all of the infrastructure (offshore export cables and cable protection) installed in the Fylde MCZ being removed in the decommissioning phase (i.e. excluding sandwave and boulder clearance activities), up to 1.76 $km^2$ (0.68% of the total area of the MCZ) of temporary habitat disturbance could occur. Of this 1.76 $km^2$ total, up to 1.10 $km^2$ could occur within the subtidal sand feature (0.51% of the area of this feature in the MCZ) and 0.66 $km^2$ could occur within the subtidal mud feature (1.50% of the area of this feature in the MCZ).

1.8.2.57 The relevant pressures are as listed for the construction phase (**paragraph 1.8.2.3**).

### Physical attributes

1.8.2.58 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to temporary habitat disturbance/loss.

- Extent and distribution.
- Structure: sediment composition and distribution.

1.8.2.59 The potential magnitude of this impact in the decommissioning phase is discussed in **paragraph 1.8.2.55**, however the decommissioning activities regarding the Transmission Assets may change as a result of guidance and legislation in place at the time of decommissioning.

1.8.2.60 The description of the activities and sensitivity of the subtidal sand and subtidal mud protected features to habitat disturbance is as discussed for the construction phase in **paragraph 1.8.2.12** to **1.8.2.20**. Whilst there is currently no set time period for decommissioning, the effects of decommissioning are expected to be the same or less than construction and therefore these previous statements are applicable to this phase.

1.8.2.61 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Extent and distribution**: The subtidal sand and subtidal mud protected features of the Fylde MCZ will be maintained in the long term following the completion of the decommissioning phase, with only a small proportion of the total extent of this feature within the MCZ likely to be affected (potentially up to 0.68% of the MCZ total area). In addition, any effects on the subtidal sand and subtidal mud protected features will be temporary and reversible with recovery of sediments occurring following decommissioning.
- **Structure: sediment composition and distribution**: Any effects on the subtidal sand and subtidal mud protected features will be temporary and reversible with recovery of sediment occurring following the completion of decommissioning. Unlike the construction phase there will be little removal of sediment, with only

a maximum of a 20 m wide corridor for disturbance associated with the deburial of cables and no new permanent structures added. Decommissioning will unlikely involve the movement of large amount of sediment (i.e. due to the assumption that site preparation will not be required), with sediment only being displaced into the immediate vicinity of the cables removed. There will, therefore, be little impact on the sediment composition and distribution of the subtidal sand and subtidal mud protected features.

### Ecological attributes

1.8.2.62 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to temporary habitat disturbance/loss during the decommissioning phase.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

#### Subtidal sand

1.8.2.63 The sensitivity of the biotopes which characterise the subtidal sand feature are described in **paragraphs** 1.8.2.25 to 1.8.2.27.

1.8.2.64 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The impact of the decommissioning activities on the communities associated with the subtidal sand feature is likely to be similar to the impact described for the construction phase in **paragraph 1.8.2.28**. Overall the temporary nature of this disturbance is unlikely to affect the presence of key structural and influential species individually or the distribution of these species as a community within the Fylde MCZ. This is consistent with the ‘restore and maintain’ objective of the structure and function attribute for this feature.

1.8.2.65 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary, reversible, and intermittent nature of the impact of temporary habitat disturbance during decommissioning, and the relatively small proportion of the subtidal sand protected feature to be affected during decommissioning, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal sand feature of the Fylde MCZ is considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have a medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.2.66 The sensitivity of the biotopes which characterise the subtidal mud feature are described in **paragraph 1.8.2.30** to **1.8.2.32**.

1.8.2.67 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The impact of the decommissioning activities on the communities associated with the subtidal mud feature is likely to be similar to the impact described for the construction phase in **paragraph 1.8.2.33**. Overall the temporary nature of this disturbance is unlikely to affect the presence of key structural and influential species individually or the distribution of these species as a community within the Fylde MCZ. This is consistent with the 'restore and maintain' objective of the structure and function attribute for this feature.

1.8.2.68 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary, reversible, and intermittent nature of the impact of temporary habitat disturbance during decommissioning, and the relatively small proportion of the subtidal mud protected feature to be affected during decommissioning, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal mud feature of the Fylde MCZ is considered to be of medium to very high vulnerability, high to medium recoverability and national importance and therefore was considered to have a medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.2.69 Based on the information presented in **paragraphs 1.8.2.58** to **1.8.2.68**, it can be concluded that temporary habitat disturbance during the Transmission Assets decommissioning phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- While the temporary habitat disturbance is predicted to affect a very small proportion of the subtidal sand and subtidal mud features (0.51% and 1.50% respectively) during the decommissioning phase, these habitats will recover such that the **extent and distribution** of the subtidal sand and subtidal mud protected features will remain stable following the decommissioning phase.
- The **structures and functions** provided by the **component communities** will remain in (or recover to) a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the years following cable removal, with complete recovery within the areas affected within a two to ten years, allowing the long term maintenance of the **sediment**

**composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of decommissioning.

## 1.8.3 Increase in suspended sediment concentration and associated deposition

### Construction phase

1.8.3.1 Increases in SSC and associated sediment deposition in subtidal habitats during the construction phase of the Transmission Assets in the Fylde MCZ will occur as a result of the installation of offshore export cables (via prelay plough, plough, trenching and/or jetting) and seabed preparation (i.e. sandwave and boulder clearance) ahead of cable installation.

1.8.3.2 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Changes in suspended solids (water clarity): the benchmark for which is a change in one rank on the Water Framework Directive scale (e.g. from clear to intermediate for one year, caused by activities disturbing sediment or organic particulate material and mobilising it into the water column such as dredging, disposal at sea, cable and pipeline burial).
- Smothering and siltation rate changes (light): the benchmark for light deposition is up to 5 cm of fine material added to the habitat in a single discrete event.

1.8.3.3 Increases in SSC and associated sediment deposition resulting from construction activities could affect both the subtidal sand and subtidal mud features of the Fylde MCZ.

1.8.3.4 The project design includes the provision of site preparation/sandwave clearance activities which have the potential to increase SSC in the construction phase with associated deposition. The MDS for sandwave clearance for cable installation within the MCZ is that it may be required along 5% of the 16 km of Morgan offshore export cables within the MCZ at a width of 20 m and along 5% of the 12 km of Morecambe offshore export cables with a width of 20 m. Additionally increases in SSC may also arise from the installation of export cables. In each case, cables will be installed in a trench with a maximum depth of 3 m, a width of 3 m at the bed. Further detail on cable installation within the MCZ is provided in the Outline Offshore CSIP (document reference J15).

1.8.3.5 The MDS for increases in SSC and associated deposition, as outlined in **paragraph 1.8.3.4,** considers activities to be carried out concurrently (i.e. over up to 21 months, as this has the potential to result in the greatest increases in SSC).

### Physical attributes

1.8.3.6 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and sediment deposition during the construction phase.

- Structure: sediment composition and distribution.
- Supporting processes: sediment movement and hydrodynamic regime (habitat).
- Supporting processes: water quality - turbidity (habitat).

1.8.3.7 As outlined in Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1), the assessment for the Transmission Assets draws on the modelling carried out for the Morgan Offshore Wind Project: Generation Assets ES (**paragraph 1.6.2.2**) which simulated the use of a suction hopper dredger with a phasing representative of the scale of the sandwaves; dredging, and then depositing material by side casting within the cable corridor as it progressed along the route, resulting in higher SSC and dispersion plumes compared to plough dredging.

1.8.3.8 Sandwave clearance operations, including those which may occur within the Fylde MCZ, mobilise the greatest volume of material when compared to the range of construction activities. It should however be noted that, as outlined in **paragraph 1.8.2.13**, the initial geophysical survey data analysis has indicated that sandwave levelling (pre-sweeping) is unlikely to be required within the MCZ as it is largely featureless with sporadic ripples present along the west edge of the MCZ (further details on seabed features and cable installation can be found in the Outline Offshore CSIP (document reference J15)). Sandwave clearance within the MCZ has however been assessed in the MDS to ensure adequate burial of the cables through the MCZ. The Morgan Offshore Wind Project: Generation Assets ES modelling undertook a sample of sandwave clearance along the north east corner of the Morgan Offshore Wind Project: Generation Assets and, with relatively homogeneous tidal currents and sediments along much of the offshore cable corridors where sandwaves occur these simulations have been used to quantify potential impacts for the Transmission Assets. The sediment plume is predicted to extend circa 5 km in a principally east/west orientation (**Figure 1.3**). Increases in SSC are at their greatest at the dredging site and where they have been remobilised following slack tide may reach up to 1,000 mg/l. However average concentrations are typically one tenth of this value and near background levels are predicted at the edge of the plume's extent. Sedimentation following the sandwave clearance is in the order of up to 100 m along the site of trenching, 3 to 5 mm across the region where material is redistributed and <0.1 mm at the extent of the plume.

1.8.3.9 Due to the nature of the site as an active bedform and its natural exposure to sediment redistribution, it is likely that the site would recover quickly. A sandwave recoverability study associated with the cable trenching activities of the Race Bank Offshore Wind Farm, showed that within two years of offshore export cable trenching operations, sandwaves affected within the Inner Dowsing, Race Bank and North Ridge SAC had mostly recovered to pre-construction levels.

1.8.3.10 The installation of cabling related to the Transmission Assets may lead to increased SSC and associated deposition within the Fylde MCZ. The installation of offshore export cables associated with the Morgan Offshore Wind Project: Generation Assets was modelled as part of the Morgan Offshore Wind Project: Generation Assets ES (Morgan Offshore Wind Ltd, 2024a) and is discussed in Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1). As with the sandwave clearance, it is expected that cable installation activities will create a suspended sediment plume extending up to 5 km of the trenching operation. In the direct vicinity of the trenching SSC was found to be typically 500 mg/l whilst at the extents of the plume SSC levels dropped to 0.5 mg/l which is in the order of background level variation. Sedimentation levels beyond the immediate vicinity of the trench were circa 50 mm and reducing to < 0.5 mm within 2 km. Noting that much of the displaced material would, in reality, be used to backfill the trench. Cabling along routes located to the south of the Morgan Offshore Wind Project: Generation Assets and extending to the east of the Morecambe Offshore Windfarm: Generation Assets where the offshore cables coalesce would not impact on the Fylde MCZ.

1.8.3.11 As per the construction programme, there remains a possibility that sandwave clearance activities may be undertaken simultaneously with cable installation activities. Given the mobile nature of sediment within the Offshore Order Limits it is likely that sandwave clearance, if required, would occur in sections of the cable route just prior to cable trenching in that area, to avoid the newly formed channels from in-filling. Thus, it is likely that plumes from these activities will coalesce, and greater levels of SCC and deposition can be expected within the Fylde MCZ as a result.

1.8.3.12 This is the case not only for activities relating to the individual components of the Transmission Assets, i.e., sandwave clearance/cable installation activities relating to just the Morgan Offshore Wind Project: Transmission Assets, but also sandwave clearance/cable installation activities for both the Morgan Offshore Wind Project: Transmission Assets and the Morecambe Offshore Windfarm: Transmission Assets. Where this does occur, plumes will likely interact resulting in increased cumulative deposition within the Fylde MCZ.

1.8.3.13 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Structure: sediment composition and distribution:** The sediment composition and distribution will be temporarily impacted by sandwave clearance and cable installation. The deposition of sediments released during any necessary sandwave clearance activities will be a maximum of 50 mm in the immediate vicinity of the cable installation trenches and up to 10 mm within a 5 km plume. The techniques used for sandwave clearance will also be undertaken with the aim of depositing material in the direct vicinity of its original location, with no sediment being removed from the sediment cell. This will ensure that sediment is redistributed within the relevant sediment cell including feeding back in to the active seabed features within the Fylde MCZ, making this only a temporary impact which is unlikely to affect the overall sediment composition and distribution. Affected features such as sandwaves are likely to recover over a similar timescale as presented for the Race Bank Offshore Wind Farm, as presented in **paragraph 1.8.3.9**. Furthermore, as detailed in the SACO for the site, the area is also subjected to regular 'Benthic storms' (dominated by wave-driven oscillatory currents in shallow water) which disturb the sediment and benthic communities, the mechanisms which facilitate recovery of the subtidal sand and subtidal mud features following these events is also likely to enable the recovery of the features following anthropogenic disturbance.

- **Supporting processes: sediment movement and hydrodynamic regime (habitat):** The sediment which may be disturbed as a result of sandwave clearance and cable installation, as noted above, will remain within 5 km of the site of disturbance. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Supporting processes: water quality - turbidity (habitat):** The maximum change to SSC within the Fylde MCZ are at their greatest at the dredging site and where they are remobilisation following slack tide and may reach up to 1,000 mg/l as a result of sandwave clearance. However average concentrations are typically one tenth of this value and near background levels at the edge of the plume's extent resulting in a minimal change to the majority of the MCZ. Areas which experience the highest increase in SSC will be affected on a temporary basis until sediment is deposited on the seabed once again.

### Ecological attributes

1.8.3.14 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and associated sediment deposition during the construction phase.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

#### Subtidal sand

1.8.3.15 Natural England's AoO identifies 11 biotopes that may be represented within the subtidal sand feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Low (see **Appendix A**: Biotope Sensitivity Ranges), with the highest sensitivity being to the smothering and siltation rate changes (heavy) pressure (Natural England, 2023c). Natural England's AoO also highlights that the effects are relevant to sessile epiflora and epifauna living on the surface of the substratum where a layer of sediment may be deposited or changes in water clarity may change the scour. They also note that the deposition of material similar physical characteristics to the existing seabed may enable biota to re-establish their position in the sediment.

1.8.3.16 The representative biotopes of the subtidal sand feature (SS.SSa.CMuSa.AalbNuc, SS.SCS.ICS.MoeVen and SS.SCS.ICS.Glap) of the Fylde MCZ are indicated by the MarESA as having a low sensitivity to the changes in suspended solids and light smothering and siltation rate change pressure associated with this impact. The infaunal organisms associated with this feature, such as *Nephtys* sp., *Glycera* sp., *Spiophanes bombyx* and *L. latreilli*, are unlikely to be affected by these changes as they are not affected by water clarity and are highly likely to be able to survive burial of this magnitude (Tillin and Watson, 2023a; Tillin and Watson, 2023b). Bivalves' characteristic of these biotopes, such as *Timoclea ovata*, however are suspension feeders which filter food through delicate structures which could be clogged by increases in suspended solids (Tillin and Watson, 2023b). It is likely however that the characterising suspension and filter feeders would be tolerant of a short term increase in suspended sediments (Tillin and Budd, 2023; Tillin and Watson, 2023a; Tillin and Watson, 2023b). Most bivalve species are also capable of surviving short periods of burial and reposition themselves in the sediment, for example *A. alba* are capable of upwardly migrating if lightly buried by additional sediment (Schafer, 1972). Kranz (1972) noted that shallowly buried siphoned suspension feeders could reposition themselves following smothering by 10-50 cm of their native sediment.

1.8.3.17 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: As a sedimentary habitat the biological communities in these habitats are likely to have a reasonable tolerance to the resuspension and deposition of sediment as demonstrated in **paragraph 1.8.3.16**. As a result, increases in SSC and deposition are unlikely to adversely impact these communities. Where some species are more sensitive to this impact the effect is likely to be limited to the area immediately around construction activity where SSC deposition will be highest.
- **Structure: species composition of component communities**: The component communities of the subtidal sand feature are characterised by sedimentary adapted species. It is therefore highly unlikely they will be adverse impacted by the introduction of new

material, especially by material from adjacent habitats of the same composition to their original habitat.

- **Structure and function: presence and abundance of key structural and influential species**: The key structural and influential species of the subtidal sand feature are infaunal and therefore adapted to sedimentary habitat which often is key to their function. As the sediment composition of the habitat will not change as a result of this impact it is unlikely they will be adversely impacted by a temporary influx of new material which will be quickly redispersed throughout the wider area.

1.8.3.18 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of SSC and deposition of the impact of increases in SSC and associated sediment deposition during construction, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal sand feature of the Fylde MCZ was considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have an overall low sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.3.19 Natural England's AoO identifies six biotopes that may be represented within the subtidal mud feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Low (see **Appendix A**: Biotope Sensitivity Ranges), with the highest sensitivity being to smothering and siltation rate changes (heavy) pressure (Natural England, 2023c). Other relevant highlights by Natural England have been noted in **paragraph 1.8.3.15**.

1.8.3.20 The component biotopes of the subtidal mud feature (SS.SMu.CSaMu.AfilMysAnit, SS.SSa.IMuSa.EcorEns and SS.SMu.CSaMu.LkorPpel) of the Fylde MCZ are considered to not be sensitive to the changes in suspended solids and light smothering, and siltation rate change pressure associated with this impact. The key species of these biotopes including the brittlestar *A. filiformis*, bivalves *K. bidentata* and the echinoderm *E. cordatum* are suspension and deposit feeders which rely on a steady source of sedimentary material. An increase in suspended solids changing the water clarity is therefore unlikely to adversely affect these communities and may increase food availability (De-Bastos *et al*., 2023a; De-Bastos *et al*., 2023b). Furthermore many bivalves, such as those which are characteristic of these biotopes, are capable of repositioning themselves in sediment following smothering.

1.8.3.21 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: As a sedimentary habitat the biological communities in these habitats are likely to have a reasonable tolerance to the resuspension and deposition of sediment as demonstrated in **paragraph 1.8.3.20**. The deposited material will be from the immediately adjacent habitat and will be quickly redistributed resulting in a temporary and low-level disturbance which could be similar to a storm event.
- **Structure: species composition of component communities**: The communities associated with the subtidal mud feature are characterised by sedimentary adapted species. It is therefore highly unlikely they will be adversely impacted by the introduction of new material, especially by material from adjacent habitats of the same composition to their original habitat. Additionally as noted in **paragraph 1.8.3.20** the influx of new sediment may be beneficial for the component community.
- **Structure and function: presence and abundance of key structural and influential species**: The key structural and influential species of the subtidal mud feature are infaunal or surface feeding, and in both cases they are able to resituate themselves in the sediment following deposition. The filter function of some filter species may be temporarily impeded by clogging however this effect will quickly be abated. As the sediment composition of the habitat will not change as a result of this impact it is unlikely that the key species will adversely impact by a temporary influx of new material which will be quickly redispersed throughout the wider area.

1.8.3.22 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of SSC and deposition of the impact of increases in SSC and associated sediment deposition during construction, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal mud feature of the Fylde MCZ was considered to be of low vulnerability, high recoverability and national importance and therefore was considered to have an overall negligible sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.3.23 Based on the information presented in **paragraphs 1.8.3.15** to **1.8.3.23**, it can be concluded that increases in SSC and sediment deposition during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be temporarily disturbed as a result of sandwave clearance and cable installation however the effect will remain highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience temporary changes such as an increase in SSC up to 1,000 mg/l however these will be short term events with the majority of the MCZ predicted to experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are characterised by sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to relocate themselves to a preferred depth in the sediment following deposition. Additionally any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Operation and maintenance phase

1.8.3.24 Increases in SSC and associated sediment deposition may occur during the operation and maintenance phase as a result of the repair and reburial events for the offshore export cables. Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) and Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1) provide full detail on the magnitude of impact and MDS assumptions with respect to increases in SSC and sediment deposition associated with cable installation for the Transmission Assets as a whole.

1.8.3.25 The relevant pressures identified by Natural England's AoO for the Fylde MCZ are as listed for the construction phase (**paragraph 1.8.3.2**).

1.8.3.26 Increases in SSC and associated sediment deposition resulting from maintenance activities could affect both the subtidal sand and subtidal mud features of the Fylde MCZ.

2.1.1.1 Operation and maintenance associated with the Transmission Assets may lead to increases in SSC and associated sediment deposition. The MDS for offshore export cable repairs is one repair event for each of the four Morgan offshore export cables every 10 years (14 repair events in total) affecting up to 0.64 km per repair event with a disturbance width of 20 m and one repair event for each of the two Morecambe offshore export cables every 10 years (seven repair events in total) affecting up to 1.14 km per repair event with a disturbance width of 20 m. The MDS for offshore export cable reburial is one reburial event every five years for the Morgan offshore export cables (seven reburial events in total) affecting up to 2.56 km per reburial event with a disturbance width of 20 m and one reburial event every five years for the two Morecambe offshore export cables (seven reburial events in total) affecting up to 0.97 km per reburial event with a disturbance width of 20 m. The Outline Offshore CSIP (document reference J15) which is applicable to cable installation also includes an Outline CBRA (document reference J14) to inform maintenance and reburial specification in line with project commitment CoT45, outlined in **Table 1.14**.

### Physical attributes

1.8.3.27 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and sediment deposition during the operation and maintenance phase.

- Structure: sediment composition and distribution.
- Supporting processes: sediment movement and hydrodynamic regime (habitat).
- Supporting processes: water quality - turbidity (habitat).

1.8.3.28 Repairs and reburial would be undertaken using similar methods as those for cable installation activities (i.e. trenching/jetting, with trench width up to 3 m and trench depth up to 3 m), therefore the magnitude of the impacts would be a fraction of those described for the construction phase (**paragraphs 1.8.3.7** to **1.8.3.11**). The sediment plumes and sedimentation footprints would be dependent on which section of the cable is being repaired. With regards to cables repairs within, and within 5 km of, the Fylde MCZ, then the magnitude of impact would be as described for the construction phase in the previous section (**paragraph 1.8.3.10**) but more localised and highly intermittent.

1.8.3.29 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- The impact on the physical attributes of the Fylde MCZ (structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)) will be similar that described for the construction phase in **paragraph 1.8.3.13**. The impact in the operation and maintenance phase however will be reduced in area and in time scale due to the nature of the repair activities which will not include sandwave clearance. The disturbances will also occur over a much-extended time period of 35 years.

### Ecological attributes

1.8.3.30 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and associated sediment deposition during the operation and maintenance phase.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

### Subtidal sand

1.8.3.31 The sensitivity of the subtidal sand feature to increases in SSC and associated deposition is as described in **paragraphs 1.8.3.15** and **1.8.3.16** for the construction phase assessment.

1.8.3.32 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- Repair and reburial of cables in the operation and maintenance phase will lead to a much smaller increase in SSC and associated deposition than in the construction phase. Therefore it is likely that the sensitivity of these communities to the impact of increased SSC and associated deposition will remain Not sensitive – Low (Natural England, 2023c). The impact will be much more intermittent, across the 35 year operational lifetime of the Transmission Assets and on a much smaller scale. Therefore the assessment and conclusions presented in **paragraph 1.8.3.17** for the construction phase are deemed to be applicable to the operation and maintenance phase with regards to the effect this impact will have on **distribution: presence and spatial distribution of biological communities**, **structure and function: presence and abundance of key structural and influential species** and **structure: species composition of component communities.**

1.8.3.33 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of SSC and deposition of the impact of increases in SSC and associated sediment deposition during the operation and maintenance phase, the magnitude of the impact on the features of the Fylde MCZ was assessed as negligible. The subtidal sand feature of the Fylde MCZ was considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have an overall low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.3.34 The sensitivity of the subtidal mud feature to increases in SSC and associated deposition is as described in **paragraphs 1.8.3.19** and **1.8.3.20** for the construction phase assessment.

1.8.3.35 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- Repair and reburial of cables in the operation and maintenance phase will lead to a much smaller increase in SSC and associated deposition than in the construction phase. Therefore it is likely that the sensitivity of these communities to the impact of increased SSC and associated deposition will remain Not sensitive – Low (Natural England, 2023c). The impact will be much more intermittent, across the 35 year lifetime of the Transmission Assets and on a much smaller scale. Therefore the assessment and conclusions presented in **paragraph 1.8.3.21** for the construction phase are deemed to be applicable to the operation and maintenance phase with regards to the effect this impact will have on **distribution: presence and spatial distribution of biological communities**, **structure and function: presence and abundance of key structural and influential species** and **structure: species composition of component communities.**

1.8.3.36 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of SSC and deposition of the impact of increases in SSC and associated sediment deposition during the operation and maintenance phase, the magnitude of the impact on the features of the Fylde MCZ was assessed as negligible. The subtidal mud feature of the Fylde MCZ was considered to be of low vulnerability, high recoverability and national importance and therefore was considered to have an overall negligible sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

#### Summary

1.8.3.37 Based on the information presented in **paragraphs 1.8.3.27** to **1.8.3.36**, it can be concluded that increases in SSC and sediment deposition during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of cable repair and reburial however the effect will remain highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes such as an increase in SSC up to 500 mg/l however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The effect of this impact on the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ (**distribution and composition of biological communities and presence and**

**abundance of key species)** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are characterised by sedimentary based infaunal species adapted for these kinds of conditions. Additionally the level of SSC and deposition as a result of this phase of the Transmission Assets will be minor.

### Decommissioning phase

1.8.3.38 Increases in SSC and associated sediment deposition may occur during the decommissioning phase as a result of the removal of offshore export cables, cable protection and the cable crossing (although this will be informed by best practice and guidance at the time). As outlined in **paragraph 1.8.2.55**, the current preferred decommissioning approach to the offshore export cables is that they would be left *in situ*; however, a future scenario could exist where they may be retrieved. As outlined in **Table 1.14**, all external cable protection used within the Fylde MCZ to be designed to be removable on decommissioning (CoT108). The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). The removal of cables and cable protection has been considered as the worst case scenario for temporary habitat disturbance during the decommissioning phase.

1.8.3.39 The relevant pressures, as identified by Natural England's AoO for the Fylde MCZ, are as listed for the construction phase (**paragraph 1.8.3.2**).

1.8.3.40 Increases in SSC and associated sediment deposition resulting from decommissioning activities could affect both the subtidal sand and subtidal mud features of the Fylde MCZ.

### Physical attributes

1.8.3.41 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and sediment deposition during the decommissioning phase.

- Structure: sediment composition and distribution.
- Supporting processes: sediment movement and hydrodynamic regime (habitat).
- Supporting processes: water quality - turbidity (habitat).

1.8.3.42 Following decommissioning, increases in suspended sediments and potential impacts on the physical features would be of a similar magnitude to those described for the construction phase but slightly reduced with the reduction in seabed preparation activities. The removal of project cabling would lead to an increase in SSC through similar trenching techniques as implemented during installation. The expected magnitude of impact is therefore assumed at a MDS equal to that of the construction phase (as described in **paragraphs 1.8.3.7** and **1.8.3.11**).

1.8.3.43 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- The impact on the physical attributes of the Fylde MCZ (structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)) will be similar to what has been described in **paragraph 1.8.3.13**. The impact in the decommissioning phase however will be reduced in area and in time scale due to the nature of the activities which will not include sandwave clearance.

**Ecological attributes**

1.8.3.44 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and associated sediment deposition during the decommissioning phase.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

**Subtidal sand**

1.8.3.45 The sensitivity of the subtidal sand feature to increases in SSC and associated deposition is as described in **paragraphs 1.8.3.15** and **1.8.3.16** for the construction phase assessment.

1.8.3.46 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The removal of cables in the decommissioning phase will lead to a similar, if not reduced, increase in SSC and associated deposition to that predicted for the construction phase. Therefore it is likely that the sensitivity of these communities to the impact of increased SSC and associated deposition will remain Not sensitive – Low (Natural England, 2023c). Therefore the assessment and conclusions presented in **paragraph 1.8.3.17** for the construction phase are deemed to be applicable to the decommissioning phase with regards to the effect this impact will have on **distribution: presence and spatial distribution of biological communities**, **structure and function: presence and abundance of key structural and influential species** and **structure: species composition of component communities.**

1.8.3.47 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of SSC and deposition of the impact of increases in SSC and associated sediment deposition during decommissioning, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal sand feature of the Fylde MCZ was considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have an overall low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.3.48 The sensitivity of the subtidal mud feature to increases in SSC and associated deposition is as described in **paragraphs 1.8.3.19** and **1.8.3.20** for the construction phase assessment.

1.8.3.49 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The removal of cables in the decommissioning phase will lead to a similar, if not reduced increase in SSC and associated deposition as in the construction phase. Therefore, it is likely that the sensitivity of these communities to the impact of increased SSC and associated deposition will remain Not sensitive – Low (Natural England, 2023c). Therefore the assessment and conclusions presented in **paragraph 1.8.3.21** for the construction phase are deemed to be applicable to the decommissioning phase with regards to the effect this impact will have on **distribution: presence and spatial distribution of biological communities**, **structure and function: presence and abundance of key structural and influential species** and **structure: species composition of component communities.**

1.8.3.50 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of SSC and deposition of the impact of increases in SSC and associated sediment deposition during decommissioning, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal mud feature of the Fylde MCZ was considered to be of low vulnerability, high recoverability and national importance and therefore was considered to have an overall negligible sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.3.51 Based on the information presented in **paragraphs 1.8.3.41** to **1.8.3.50**, it can be concluded that increases in SSC and sediment deposition during the Transmission Assets decommissioning phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of cable removal however the effect will remain highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes such as an increase in SSC up to 500 mg/l however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to relocate themselves to a preferred depth in the sediment following deposition. Additionally any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

## 1.8.4 Disturbance/remobilisation of sediment-bound contaminants

### Construction phase

1.8.4.1 Disturbance/remobilisation of sediment-bound contaminants may occur during the construction phase as a result of site preparation activities such as sandwave clearance as well as the installation of the offshore export cables and the anchor placements associated with cable burial. Activities resulting in disturbance/remobilisation of sediment-bound contaminants will occur throughout the construction phase. The MDS is for the concurrent construction scenario (i.e. which could last up to 21 months) as this has the potential to result in the greatest increased in SSC. This could result in the remobilisation of potential contaminants in to the water column making them more available to the biological communities which inhabit the area. After the cessation of the activities associated with this impact a shift toward the original baseline of the environment will occur as the sediment would settle and the contaminants would be dispersed by tidal and wave currents. Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) provides further detail on the magnitude of impact and MDS assumptions with respect to cable installation.

1.8.4.2 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Transitional elements and organometal contamination: Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. The increase in transition elements levels compared with background concentrations due to their input from land/riverine sources, by air or directly at sea.

- Hydrocarbon and polycyclic aromatic hydrocarbons (PAH) contamination: Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. Increases in the levels of these compounds compared with background concentrations.
- Introduction of other substances (solid, liquid or gas): Operational and accidental discharges of chemicals, crude oil and produced water containing substances such as oil components, PAH, alkyl phenols and heavy metals (OSPAR Commission, 2009).

1.8.4.3 Sediment may be disturbed over an area of up to 2.50 km$^2$ within the Fylde MCZ during the construction phase, equating to 0.96% of the total area of the MCZ (0.72% of the subtidal sand feature and 2.13% of the subtidal mud feature). This includes 172,800 m$^3$ of spoil arising from sandwave clearance for the Morgan offshore export cables and 97,200 m$^3$ of spoil arising from sandwave clearance for the Morecambe offshore export cables.

1.8.4.4 The MDS laid out within **paragraph 1.8.4.3** considers activities to be carried out concurrently.

### Physical attributes

1.8.4.5 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the disturbance/remobilisation of sediment-bound contaminants:

- Supporting processes: sediment contaminants.
- Supporting processes: water quality – contaminants (habitat).

1.8.4.6 The results of the site-specific sediment chemistry analysis indicated that levels of contamination across the Transmission Assets survey area were generally low. None of the six sample stations within the Fylde MCZ exceeded Cefas Action Level 1 (AL1) or Action Level 2 (AL2) for any of the metals sampled for. Four of the six stations sampled within the Fylde MCZ (ENV097, ENV157, ENV160 and ENV164) marginally exceeded the Canadian threshold effect level (TEL) for arsenic, however they were below the Canadian probable effect level (PEL). Additionally, one sample station within Fylde MCZ (ENV097) (**Figure 1.7**) exceeded the Canadian TEL for mercury however was below the Canadian PEL; no other thresholds were exceeded including the Cefas AL1 for metals. Even if a metal is present at above normal concentrations, it does not necessarily follow that the metal will produce ecologically deleterious effects, particularly if it is present in an insoluble or relatively low toxicity form. Furthermore ecological impacts attributable to anthropogenic metal contamination in non-coastal marine environments are often somewhat limited in geographical range close to the point of their origin (Rygg, 1985).

1.8.4.7 Two of the sample stations within the Fylde MCZ (ENV096 and ENV097; **Figure 1.7**), both in the west of the overlap between the Fylde MCZ and the Transmission Assets, exceeded the Canadian TEL for the PAH dibenzo[a,h]anthracene but was below the Canadian PEL. Additionally one sample station within the Fylde MCZ (ENV097) (**Figure 1.7**), also in the west of the overlap of the Fylde MCZ and the Transmission Assets, exceeded the Canadian TEL for the PAH acenaphthylene but was below the Canadian PEL. Levels of all individual PAHs were below the Cefas AL1 for individual PAHs (i.e. 0.1 mg/kg).

1.8.4.8 Levels of polychlorinated biphenyls (PCBs), for all samples, were found to be below all available Cefas AL1s and no sample stations within the Fylde MCZ exceeded Cefas AL1 for the sum of ICES7 PCBs. Additionally levels of the total ICES-7 PCBs were below the relevant Cefas AL1 threshold (0.01 mg/kg) at all stations, and total PCBs were below the Cefas AL1 (0.02 mg/kg) and Cefas AL2 (0.2 mg/kg) at all stations within the Fylde MCZ.

1.8.4.9 Organotin concentrations across the survey area were below the limit of detection threshold at all sample stations. The full results of the sediment chemistry analysis for the Transmission Assets are presented in Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1).

1.8.4.10 The AoO for the Fylde MCZ does not include an assessment of the sensitivity of the subtidal sand and subtidal mud protected features to the pressures of transition elements and organo-metal (e.g. TBT) contamination as well as hydrocarbon and PAH contamination (Natural England, 2023c). The advice does however highlight that the ecological consequences of contamination could include tainting, some are acutely toxic, carcinomas, growth defects such as imposex.

1.8.4.11 Natural England (2023b) also highlights that elevated levels of transition elements and hydrocarbons compared with background concentrations can occur due to input from land/riverine sources, by air or directly at sea as well as by anthropogenic sources. Evidence for the impact of these contaminants on the relevant communities is presented in **paragraphs 1.8.4.12** and **1.8.4.13**.

1.8.4.12 The effects of disturbance/remobilisation of sediment-bound contaminants has not been widely assessed. Studies have however shown that polychaetes are likely to be tolerant to PAH contamination, for example Hiscock *et al*. (2004 and 2005) described *Glycera* sp., a characterising species of this feature, as a very tolerant taxa, found in high abundances in the transitional zone along hydrocarbon contamination gradients surrounding oil platforms. Conan (1982) investigated the long-term effects of the Amoco Cadiz oil spill in France and found polychaetes, such as *Nephtys hombergii*, were largely unaffected. Polychaetes are also likely to be tolerant of metal contamination, a study by Bryan (1989) found under no demonstrable effect on polychaetes following exposure to contaminants such as cadmium. Suchanek (1993) reviewed the effects of oil on bivalves. Overall, contact with oil resulted in less energy available for growth and reproduction. In the two years after the Amoco Cadiz oil spill, recruitment of the bivalve *Fabulina fabula* was very much reduced (Conan, 1982). Bivalves are well known for their ability to accumulate heavy metals in their tissues, far in excess of environmental levels. This exposure can however lead to some behavioural changes including siphon retraction, valve closure, disruption of burrowing behaviour, and suppressed growth (Aberkali and Trueman, 1985). The benthic communities in the Fylde MCZ have likely developed in an environment of existing contamination including elevated levels of arsenic and mercury and are therefore likely to have some tolerance to the absorption of these metals. Any release of contaminants from construction activities may therefore temporarily lead to an increase in concentration beyond the baseline however the concentration is then likely to be quickly diluted overall resulting in a minor and temporary increase in arsenic at levels which are unlikely to adversely affect the benthic communities present.

1.8.4.13 There are however examples of some species benefitting from such contamination. The characteristic species *Abra alba* was affected by the 1978 Amoco Cadiz and benefited from the nutrient enrichment caused by the oil pollution and *A. alba* remained a dominant species over the 20 year duration over which recovery of the community was monitored (Dauvin, 1998). Echinoderms are known to be efficient concentrators of heavy metals (Hutchins *et al*., 1996), furthermore a study by Deheyn and Latz (2006) in the Bay of San Diego found that heavy metal accumulation in brittlestars occurs both through dissolved metals in the water as well as through diet, and lead to accumulation in the arms and disc, respectively. Echinoderms have not been found to be resistant to the effects of oil, likely because of the large surface area of their epidermis (Suchanek, 1993). During monitoring of sediments in the Ekofisk oilfield, Addy *et al*. (1978) suggested that reduced abundance of *A. filiformis* within 2-3 km of the oilfield was related to discharges of oil from the platforms and to physical disturbance of the sediment. None of these studies however consider the effects of resuspended contaminants which may pose a more minor risk compared to the initial contamination events investigated in many of these studies.

1.8.4.14 The results of the sediment chemistry analysis also suggested that levels for organotins were below the limit of detection, which would suggest that these communities are unlikely to experience effects such as imposex which are typical of high levels of organotins.

1.8.4.15 The effects of disturbance/remobilisation of sediment-bound contaminants has not been widely assessed. The impact on polychaetes and bivalves will be the same for both the subtidal sand and subtidal mud feature as laid out in **paragraph 1.8.4.12**.

1.8.4.16 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- **Supporting processes: sediment contaminants**: The implementation of Offshore Environmental Management Plan(s) (EMP(s)) (CoT65, **Table 1.14**) will strictly limit the risk associated with the introduction of contaminants in to the water column which would lead to further contamination within Fylde MCZ. Furthermore the levels of contamination which have been identified in the site-specific sediment chemistry analysis indicate this site has experienced some very low level contamination which has not hindered the formation and existence of these subtidal sand and subtidal mud protected features. Current contaminant data from within the Fylde MCZ is sparse but infaunal data is available and inferences can be made. The mean infaunal quality Index status of subtidal mud and subtidal sand habitats in the MCZ is classified as good (Environment Agency, 2015). Therefore, it could be inferred that contaminants are low. A continuation of these conditions would therefore be in line with the target set for this attribute to restrict the contamination at this site to concentrations where they are not adversely impacting the infauna of the feature. The key taxonomic groups are bivalves and polychaetes both of which have been identified as being resilient to low level contamination making this impact unlikely to result in changes to abundance or extent of characteristic species and the overall community structure of this feature and any elevation of levels in the water column will be temporary.

- Supporting **processes: water quality – contaminants (habitat)**: As noted above from the Transmission Assets site specific survey and Environment Agency baseline survey the levels of contamination at this site are very low. Additionally following remobilisation the contaminants would be diluted and therefore unlikely to travel far beyond 5 km of the disturbance resulting in a limited area of impact, should there be any effects at all.

1.8.4.17 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of contamination associated with the site and likelihood of recovery to the impact of remobilisation of sediment bound contamination during construction, and the relatively small proportion of the subtidal sand and subtidal mud protected features to be affected, the magnitude of the impact on the features of the Fylde MCZ was negligible. The subtidal sand and subtidal mud features of the Fylde MCZ are considered to be of low vulnerability, high recoverability and national importance and therefore they were considered to have a low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.4.18 Based on the information presented in **paragraphs 1.8.4.6** to **1.8.4.17**, it can be concluded that the disturbance of sediments resulting in the potential remobilisation of sediment-bond contaminants during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- Whist there is potential for very low levels of contaminants to be remobilised as a result of the cable installation for the Transmission Assets, impacts on the **water quality** will be temporary (i.e. diluting and rapidly dispersing with the tide) and will only impact the communities in the immediate vicinity of the disturbance. The levels of **sediment contamination** are also unlikely to change due to the measures implemented in the Offshore EMP(s) (CoT65, **Table 1.14**). Overall the construction phase will not lead to a significant risk to the supporting processes or the communities which characterise the subtidal sand and subtidal mud features.

### Operation and maintenance phase

1.8.4.19 Disturbance/remobilisation of sediment-bound contaminants may occur during the operation and maintenance phase as a result of maintenance activities associated with offshore export cables including replacement and reburial. Activities potentially resulting in disturbance/remobilisation of sediment-bound contaminants will be highly localised and intermittent throughout the operation and maintenance phase and of a much lower magnitude than during the construction phase. **Paragraphs 1.8.2.37**, **1.8.2.41** and **1.8.2.42**, as well as **Table 1.17** provides further detail on the magnitude of impact and MDS assumptions with respect to cable maintenance.

1.8.4.20 As detailed in **Table 1.17**, the MDS associated with maintenance activities is for up to 0.83 $km^2$ of temporary habitat disturbance within the Fylde MCZ (equating to 0.32% of the total area of the MCZ, 0.24% of the subtidal sand and 0.71% of the subtidal mud feature) over the 35 year lifetime.

1.8.4.21 The relevant MarESA pressures and associated benchmarks which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are as listed for the construction phase (**paragraph 1.8.4.2**).

### Physical attributes

1.8.4.22 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the disturbance/remobilisation of sediment-bound contaminants.

- Supporting processes: sediment contaminants.
- Supporting processes: water quality – contaminants (habitat).

1.8.4.23 The results of the sediment chemistry analysis are as detailed in **paragraph 1.8.4.6**. In summary, levels of contamination within sediments within the Fylde MCZ are low. The full results of the sediment chemistry analysis for the Transmission Assets is presented in Volume 2, Annex 2.1: Benthic subtidal and intertidal technical report of the ES (document reference F2.2.1).

1.8.4.24 The sensitivity of the subtidal sand and subtidal mud features of the Fylde MCZ are as presented in **paragraphs 1.8.4.11** and **1.8.4.12**.

1.8.4.25 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Supporting processes: sediment contaminants**: As in the construction phase the implementation of the Offshore EMP(s) (CoT65, **Table 1.14**) will strictly limit the risk associated with the introduction of contaminants in to the Fylde MCZ. As in the construction phase it is likely there will be no change or very little change to the sediment contamination conditions based on the limited pathways for contamination introduction and minimal contamination already described at the site (see **paragraph 1.8.4.16**). This would therefore be in line with the target set for this attribute to restrict the contamination in the Fylde MCZ to concentrations where they are not adversely impacting the infauna of the features. The key taxonomic groups are bivalves, polychaetes and echinoderms, which have varying levels of tolerance to contaminants, however all groups are likely be tolerant of the low level contamination which has been recorded within the Fylde MCZ. Additionally, the activities which will result in remobilisation will occur over a longer time period in the operation and maintenance phase and are of a much more intermittent nature. The communities will therefore be exposed to shorter period of elevated contamination in the water column followed by periods where the baseline is resorted enabling recovery if necessary. Therefore, this impact is unlikely to result in changes to the species composition of component communities or the presence and spatial distribution of biological communities of this feature.
- **Supporting processes: water quality – contaminants (habitat)**: Based on the very low levels of contaminants which have been identified in the site-specific and baseline surveys (**paragraph 1.8.4.16**), remobilisation by cable repair and reburial activities is unlikely to result in any adverse impacts upon the communities in the subtidal sand and subtidal mud protected features. Additionally following remobilisation the contaminants would be diluted and therefore unlikely to travel far beyond the immediate area of disturbance resulting in a limited area of impact, should there be any effects at all.

1.8.4.26 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of contamination associated with the site and likelihood of recovery to the impact of remobilisation of sediment bound contamination during operation and maintenance, and the relatively small proportion of the subtidal sand and subtidal mud protected features to be affected, the magnitude of the impact on the features of the Fylde MCZ was negligible. The subtidal sand and subtidal mud features of the Fylde MCZ are considered to be of low vulnerability, high recoverability and national importance and therefore they were considered to have a low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

#### Summary

1.8.4.27 Based on the information presented in **paragraphs 1.8.4.23** to **1.8.4.26**, it can be concluded that the disturbance of sediments resulting in the remobilisation of sediment-bond contaminants during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- Whist there is potential for very low levels of contaminants to be remobilised as a result of maintenance activities associated with offshore export cables including replacement and reburial, any impacts on the **water quality** will be temporary and impact only a small area. The levels of **sediment contamination** are also unlikely to change due to the measures implemented in the Offshore EMP(s) (CoT65, **Table 1.14**). Overall the operation and maintenance phase will not lead to a significant risk to the supporting processes or the communities which characterise the subtidal sand and subtidal mud features.

### Decommissioning phase

1.8.4.28 Disturbance/remobilisation of sediment-bound contaminants may occur during the decommissioning phase as a result of the removal of offshore export cables, cable protection and the cable crossing. The MDS assumes that the magnitude of the seabed disturbance during the decommissioning phase could be the same as during the construction phase (see **Table 1.16**), however in reality this is likely to be over precautionary and disturbance will be less as site preparation works are unlikely to be required.

1.8.4.29 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) provides further detail on the magnitude of impact and MDS assumptions with respect to cable removal. As outlined in **paragraph 1.8.2.55**, potential habitat distance associated with the removal of cables alone within the MCZ could disturb up to 1.76 $km^2$ of seabed (0.68% of the total MCZ area).

1.8.4.30 The relevant MarESA pressures and associated benchmarks which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are as listed for the construction phase (**paragraph 1.8.4.2**).

#### Physical attributes

1.8.4.31 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the disturbance/remobilisation of sediment-bound contaminants.

- Supporting processes: sediment contaminants.
- Supporting processes: water quality – contaminants (habitat).

1.8.4.32 The results of the sediment chemistry analysis are as detailed in **paragraph 1.8.4.6**. In summary, levels of contamination within sediments within the Fylde MCZ are low. The full results of the sediment chemistry analysis for the Transmission Assets is presented in Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the ES (document reference F2.2.1).

1.8.4.33 The sensitivity of the subtidal sand and subtidal mud features of the Fylde MCZ are as presented in **paragraphs 1.8.4.11** and **1.8.4.12**.

1.8.4.34 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud protected features of the Fylde MCZ.

- The impact of the decommissioning activities on the communities associated with the subtidal sand and subtidal mud features is likely to be similar to the impact as described for the construction phase. The impact will be much more intermittent, across the decommissioning phase the Transmission Assets. Therefore, the assessment and conclusions presented in **paragraph 1.8.4.16** for the construction phase are deemed to be applicable to the operation and maintenance phase. Overall, the short-term nature of this disturbance is unlikely to change the levels of contamination in the water column or sediment other than temporarily and over a small area. This is consistent with the 'reduce and maintain' objective of the structure and function attribute for this feature.

1.8.4.35 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of contamination associated with the site and likelihood of recovery to the impact of remobilisation of sediment bound contamination during decommissioning, and the relatively small proportion of the subtidal sand and subtidal mud protected features to be affected, the magnitude of the impact on the features of the Fylde MCZ was negligible. The subtidal sand and subtidal mud features of the Fylde MCZ are considered to be of low vulnerability, high recoverability and national importance and therefore they were considered to have a low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.4.36 Based on the information presented in **paragraphs 1.8.4.28** to **1.8.4.35**, it can be concluded that the disturbance of sediments resulting in the remobilisation of sediment-bond contaminants during the Transmission Assets decommissioning phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- Whist there is potential for very low levels of contaminants to be remobilised as a result of the cable removal for the Transmission Assets, any impacts on the **water quality** will be temporary and impact only a small area. The baseline levels of **sediment contamination** are also unlikely to change over the lifetime of the Transmission Assets due to the measures implemented in the Offshore EMP(s) (CoT65, **Table 1.14**) which includes a marine pollution contingency plan to address the risks, methods and procedures to deal with any spills and collision incidents during the construction and operation and maintenance phase. Overall the decommissioning phase will not lead to a significant risk to the supporting processes or the communities which characterise the subtidal sand and subtidal mud features.

## 1.8.5 Long term habitat loss

### Construction and operation and maintenance phase

1.8.5.1 Long term subtidal habitat loss, resulting in a localised physical change from a predominantly soft sediment environment to one which includes areas of hard substrate, may occur within the Fylde MCZ during the operation and maintenance phase in the event that cable protection due to ground conditions and cable protection for asset crossings are required within the MCZ. As outlined in the Outline Offshore CSIP (document reference J15), slightly gravelly seabed sediment has been identified within the sediment interpretation within the Fylde MCZ. Whilst slightly gravelly clay or slightly gravelly sand sediments are currently not anticipated to hinder cable burial via trenching techniques under consideration, more dense areas of gravel, if present, could present a risk of reduced burial depth, leading to the need for cable protection. Based on the initial survey results, the use of additional cable protection for ground conditions within the Fylde MCZ is not envisaged; however, limited vibrocore data has been used to extrapolate seabed conditions across the MCZ and isolated disparate ground conditions could still be present. As such, the project design allows for 3% cable protection for ground conditions within the Fylde MCZ as a contingency only (CoT47, **Table 1.14**) should later surveys indicate discrete areas of harder seabed where cable burial to the minimum target depth cannot be reached.

1.8.5.2 As also outlined in the Outline Offshore CSIP (document reference J15), the Morgan offshore export cables need to cross Vodafone's Lanis 1 Telecom Cable within the Fylde MCZ. As discussed in **Table 1.13**, whilst this cable crossing cannot be avoided within the Fylde MCZ, the amount of cable protection required at this specific crossing has been reduced.

1.8.5.3 Long term habitat loss may commence in the construction phase with the gradual installation of cable protection (if required) however the MDS could only be realised once all the infrastructure is fully installed. **Table 1.18** presents MDS for long term habitat loss and habitat alteration within the Fylde MCZ. The Applicants consider that cable protection will only be used as a last resort within the Fylde MCZ, in the event that cable burial is unsuccessful, to ensure the integrity of the offshore export cables are maintained (CoT54; **Table 1.14**).

1.8.5.4 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Physical change (to another seabed type): the benchmark for which is change in sediment type by one Folk class (based on UK SeaMap simplified classification (Long, 2006)) and change from sedimentary or soft rock substrata to hard rock or artificial substrata or vice-versa.
- Physical change (to another sediment type): The permanent change of one marine habitat type to another marine habitat type, through the change in the substratum, including to artificial substrate. Habitats may be changed to steel, concrete, rock or other substances depending on the type of foundation or scour protection. This, therefore, involves the permanent loss of one marine habitat type but has an equal creation of a different marine habitat type.

1.8.5.5 On the basis of the assumptions outlined in **Table 1.18**, there may be up to 0.0304 km$^2$ of long term habitat loss within the Fylde MCZ during the construction and operation and maintenance phases, equating to 0.01% of the total area of the MCZ. The maximum design scenario is for the sequential construction scenario (i.e. construction will take place over a maximum of 30 months, noting that there is potential for a gap between the construction periods for Morgan and Morecambe) as this equates to the greatest time over which long term habitat loss may occur. Although it should be noted that the total extent of long term habitat loss is the same for both the concurrent and sequential scenarios.

1.8.5.6 The amount of long term habitat loss within the Fylde MCZ has decreased following post-PEIR refinements made to the project design primarily as a result of a reduction in the amount of cable protection that may be required in the Fylde MCZ, from 20% to 3% for the Morgan offshore export cables and from 15% to 3% for the Morecambe offshore export cables (CoT47, **Table 1.14**). This has led to a decrease in long term habitat loss associated with this activity. Overall the extent of long term habitat loss which may occur as a result of the Transmission Assets has reduced by approximately 81% from 159,580 m$^2$ to 30,400 m$^2$.

### Table 1.18: MDS for long term habitat loss/alteration within the Fylde MCZ

| Project element | Long term habitat loss ($km^2$) | Justification |
|---|---|---|
| Cable protection | 0.0264 | Long term habitat loss/habitat alteration of up to **26,400 m²** associated with cable protection for:<br>• 3% of the 64 km of Morgan offshore export cables (i.e. four cables each up to 16 km) within the MCZ, affecting a width of 10 m (equating to a total of 19,200 m²); and<br>• 3% of the 24 km of Morecambe offshore export cables (i.e. two cables each up to 12 km) within the MCZ, affecting a width of 10 m (equating to a total of 7,200 km²). |
| Cable protection due to asset crossing | 0.004 | Long term habitat loss/habitat alteration of up to **4,000 m²** associated with cable crossings for:<br>• One cable crossing may be needed for each of the four Morgan offshore export cables within the MCZ, each with a width of 20 m and length of 50 m (equating to a total of 4,000 m²); and<br>• There will be no cable crossings for the Morecambe offshore export cables. |
| **Total** | **0.0304 km² (0.012% of the total MCZ area)**<br>**Subtidal sand: 0.0304 km² (0.014% of the area of this feature in the MCZ)[1]**<br>**Subtidal mud: 0.0304 km² (0.069% of the area of this feature in the MCZ)[1]** | |

[1] As outlined in **paragraph 1.8.5.8**, the MDS for each protected feature assumes that all of the potential long term habitat loss (for both ground conditions and the cable crossing) could occur wholly within either the subtidal sand or the subtidal mud features.

#### Physical attributes

1.8.5.7 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to long term habitat loss.

- Extent and distribution.
- Structure: sediment composition and distribution.
- Supporting processes: energy/exposure.
- Supporting processes: sediment movement and hydrodynamic regime (habitat).

1.8.5.8 As the requirement for, and potential locations of, any cable protection due to ground conditions within the Fylde MCZ are not yet known, the MDS for the subtidal sand feature of the Fylde MCZ assumes that all of the potential long term habitat loss associated with cable protection for ground conditions could occur exclusively within this feature. A precautionary approach has also been for the assessment which assumes that the cable protection material for the cable crossing (location as shown in **Figure 1.8**) could occur wholly within either the subtidal sand or the subtidal mud features. The MDS for the subtidal sand feature is, therefore, for up to 0.0304 km² of long term habitat loss within this feature during the construction and operation and maintenance phases (**Table 1.18**) equating to 0.014% of the total extent of the subtidal sand feature.

1.8.5.9 As the requirement for, and potential locations of, any cable protection for ground conditions are not yet known, the MDS for the subtidal mud feature of the Fylde MCZ assumes that all of the long term habitat loss associated with cable protection for ground conditions and cable protection for asset crossings within the MCZ could occur exclusively within this feature. Therefore the MDS for the subtidal mud feature is for up to 0.0304 km$^2$ during the construction and operation and maintenance phases (**Table 1.18**) equating to 0.069% of the total extent of the subtidal mud feature.

1.8.5.10 The installation of infrastructure resulting in long term habitat loss will commence during the six year construction phase and will continue for the full 35-year operation and maintenance phase.

1.8.5.11 The physical attributes, supporting processes: energy/exposure and supporting processes: sediment movement and hydrodynamic regime (habitat), which are key to the sedimentary composition of the feature, may be altered by the installation of cable protection which will also cause long term habitat loss. The MDS assumes that any cable protection required for ground conditions may protrude up to 2 m vertically in to the water column and therefore may interfere with tidal flow and sediment transport. These attributes however will be fully addressed in **section 1.8.8** where changes in physical processes are assessed.

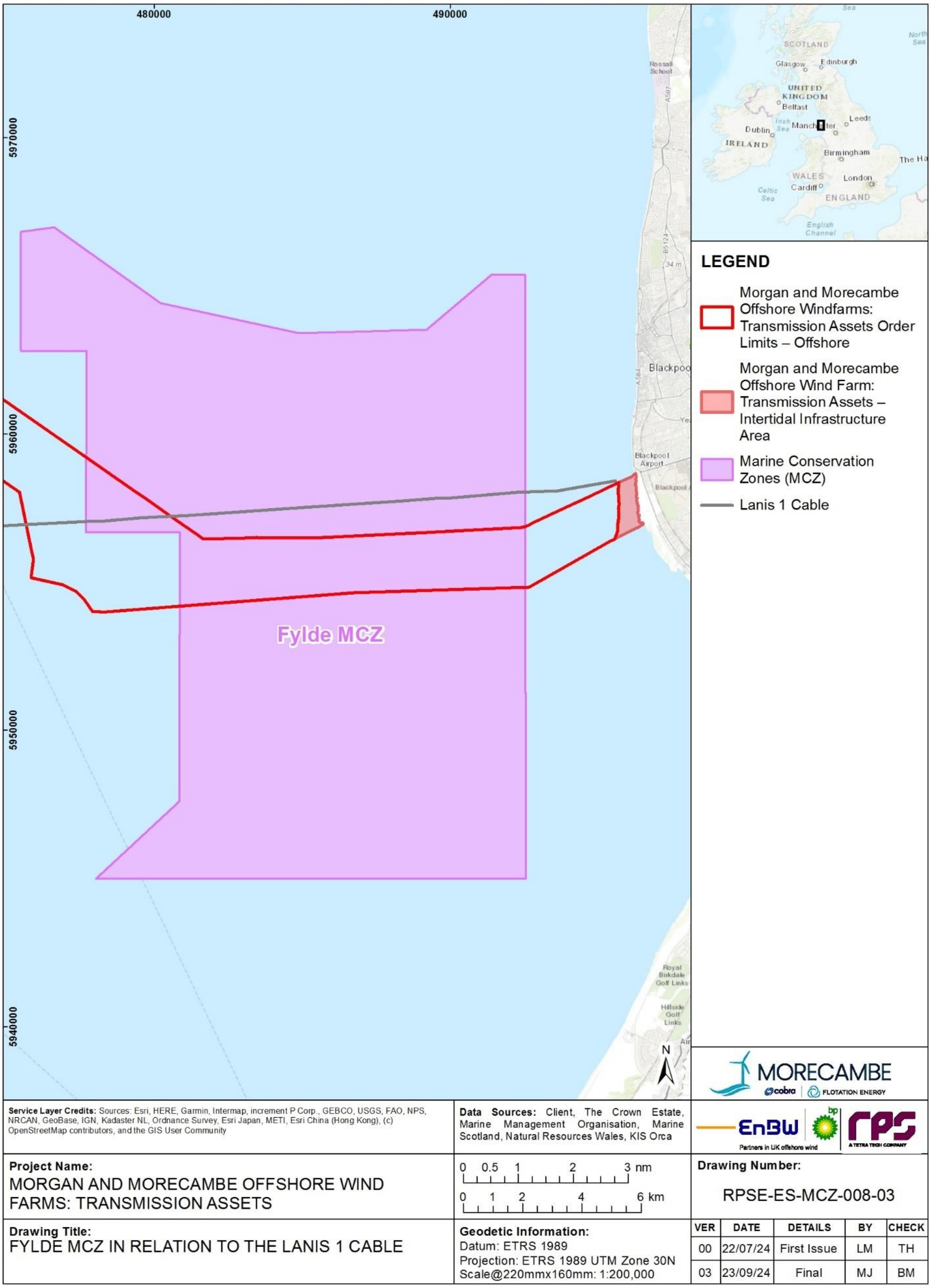



**Figure 1.8: Fylde MCZ in relation to the Lanis 1 cable**

1.8.5.12 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Extent and distribution**: The extents of the subtidal mud and subtidal sand feature will be largely maintained within the MCZ with <0.1% of each feature affected by long term habitat loss (0.07% and 0.01% respectively). The effect of long term habitat loss will be highly localised and limited to discrete areas which require cable protection.
- **Structure: sediment composition and distribution**: Where cable protection is installed, this will result in the replacement of the sedimentary habitat with a new hard substrate which is unsuitable of the current community. However, as noted in the extent and distribution attribute, this represents a very small proportion of the total extent of the features within the MCZ (<0.1% of the extent of each feature). This may however lead to the introduction of other beneficial communities; this is discussed further in **section 1.8.6**.

### Ecological attributes

1.8.5.13 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to long term habitat loss.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

#### Subtidal sand

1.8.5.14 Natural England's AoO identifies 11 biotopes that may be represented within the subtidal sand feature. The sensitivity of the component biotopes to the relevant pressure is high (see **Appendix A**: Biotope Sensitivity Ranges) (Natural England, 2023c). This conclusion has been reached as this pressure involves the loss of one marine habitat type but has an equal creation of a different marine habitat type, this includes activities such as protection of pipes and cables using rock dumping and mattressing techniques.

1.8.5.15 The biotopes identified in association with the subtidal sand feature, as described previously in **paragraphs 1.7.2.1** and **1.7.2.1**, have a high sensitivity to the pressure of 'physical change to another substratum'. As these biotopes are typically characterised by infaunal species the physical change to another substrate type, i.e. the hard surface of cable protection for cables, would not allow for the continued presence of these communities at those locations. The total long term habitat loss within the subtidal sand feature, however, represents only 0.014% of the total extent of this feature within the Fylde MCZ. Therefore, the impact on this feature within the regional ecosystem will be small, representing a highly localised change in community.

1.8.5.16 Although the initial installation of cable protection will result in a decrease in sedimentary habitat, over time there is potential for the sedimentary habitat to recover, following placement of cable protection. As detailed in **section 1.8.8**, bedload sediment transport would likely be minimally affected by the installation of cable protection however this would depend on the site conditions. There is potential for a short term interruption in sediment movement as sediment accumulates against the leeward side of the cable protection. Depending on the location and design of the cable protection, there could be areas where the sediment reaches the top of the cable protection, particularly in shallow areas where there is a commitment that no more than a 5% reduction in water depth would occur without prior approval from the MMO (CoT45, **Table 1.14**) meaning that cable protection could be installed below the maximum height of 2 m, after which sediment transport patterns could then continue as before the installation. Cable protection may affect natural seabed morphology and bedforms, although any such effects will be highly localised, affecting a very small proportion of the MCZ and natural sediment transport patterns will only be temporarily disrupted in highly discreet locations.

1.8.5.17 The following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: Based on the very small percentage of the subtidal sand features area which may be affected (0.014%) it is highly unlikely that this would have an impact on the overall presence or distribution of the biological community associated with this feature. There would be a small reduction in the sandy sediment which characterises this habitat and defines this community as this would be lost beneath the cable protection. However, as discussed in **paragraph 1.8.5.16**, the sand could, in time, over top the cable protection allowing the feature to re-establish in these areas. This is however likely to be highly site and design specific.
- **Structure: species composition of component communities**: The installation of cable protection would lead to a change in community from sedimentary based to hard substrate based. This would lead to a complete change in species composition in favour of more epifaunal organisms. As noted above however there is a possibility of the subtidal sand community re-establishing in these areas should the sediment over-top the cable protection. Considering the small area affected however this would not change the overall component community associated with the subtidal sand feature.
- **Structure and function: presence and abundance of key structural and influential species**: The influential species which define the community within this feature will be minimally impacted by the very loss of a small proportion of their habitat and are likely to maintain their populations within the MCZ as a whole throughout

the construction and operation and maintenance phases of the Transmission Assets. The majority (i.e. 99.99%) of this subtidal sand protected feature within the Fylde MCZ will be unaffected by long term habitat loss. The biological productivity of this feature as a feeding ground for fish will not be affected by long term habitat loss and habitat alteration largely due to the small scale and localised nature of the impact.

1.8.5.18 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the small area affected in relation to the impact of long term habitat loss during construction and operation and maintenance, and the relatively small proportion of the subtidal sand protected feature to be affected, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal sand feature of the Fylde MCZ is considered to be of high vulnerability, low recoverability and national importance and therefore was considered to have a high sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms.

### Subtidal mud

1.8.5.19 Natural England's AoO identifies six biotopes that may be represented within the subtidal mud feature. The sensitivity of the component biotopes to the relevant pressures ranges is high (see **Appendix A**: Biotope Sensitivity Ranges) (Natural England, 2023c). This conclusion has been reached as this pressure involves the loss of one marine habitat type but has an equal creation of a different marine habitat type, this includes activities such as protection of pipes and cables using rock dumping and mattressing techniques.

1.8.5.20 The biotopes identified in the Transmission Assets site specific survey and the baseline survey (Environment Agency and Natural England, 2015) for the subtidal mud feature, as described previously in **paragraph 1.7.2.3** and **1.7.2.5**, have a high sensitivity to the pressure of 'physical change to another substratum'. As these biotopes are typically characterised by predominantly infaunal species of bivalves and polychaetes the physical change to another substrate type, i.e. the hard surface of cable protection for cables and cable crossing, would not allow for the continued presence of these communities at those locations. The long term habitat loss, however, represents only 0.069% of the subtidal mud feature therefore the impact on this feature within the regional ecosystem will be small, representing a highly localised change in community.

1.8.5.21 The following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: A very small percentage of the subtidal mud features area may be affected by long term habitat loss (0.069%). It is considered highly unlikely that this would have an impact on the overall presence or distribution of the biological community associated with this feature across the Fylde MCZ.

- **Structure: species composition of component communities**: The installation of cable protection and cable crossings would lead to a change in community from sedimentary based to hard substrate based. This would lead to a complete change in species composition in favour of more epifaunal organisms compared to the soft substrate based infaunal communities currently characterising this area. As noted previously this however have a highly limited impact on the over species composition of the component community by affecting <0.1% of the total extent of this feature.
- **Structure and function: presence and abundance of key structural and influential species**: The influential species which define the community within this feature will be minimally impacted by the very loss of a small proportion of their habitat and are likely to maintain their populations throughout the construction and operation and maintenance phases of the Transmission Assets. The majority (i.e. 99.93%) of this subtidal mud protected feature within the Fylde MCZ will be unaffected by long term habitat loss. The biological productivity of this feature as a feeding ground for fish will not be affected by long term habitat loss and habitat alteration largely due to the small scale and localised nature of the impact.

1.8.5.22 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the small area affected in relation to the impact of long term habitat loss during construction and operation and maintenance, and the relatively small proportion of the subtidal mud protected feature to be affected, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal mud feature of the Fylde MCZ is considered to be of high vulnerability, low recoverability and national importance and therefore was considered to have a high sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms.

### Summary

1.8.5.23 Based on the information presented in **paragraphs 1.8.5.8** to **1.8.5.22**, it can be concluded that long term habitat loss during the Transmission Assets construction and operation and maintenance phases **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **The extent and distribution** of the subtidal mud and subtidal sand feature will be largely maintained within the MCZ with <0.1% of each feature affected by long term habitat loss. This ensures that the **sediment composition and distribution** is maintained throughout the Fylde MCZ.
- The **presence and spatial distribution of biological communities** will also be preserved by the very small percentage

of the subtidal mud and subtidal sand features affected by long term habitat loss (<0.1%). The **species composition of component communities** would change with the cable protection being colonised by hard substrate adapted species however this will be highly localised only impacting the immediate area of the cable protection. The **presence and abundance of key structural and influential species** would be altered slightly by the small reduction in extent of sedimentary habitat however the overall presence and abundance of key species through the Fylde MCZ would be unaffected.

#### Decommissioning phase

1.8.5.24 As outlined in **Table 1.14,** the project has committed to ensuring that all external cable protection used within the Fylde MCZ (should any be required) will be designed to be removable on decommissioning (CoT108, **Table 1.14**). The requirement for removal of cable protection within the Fylde MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). These measures ensure that following the 35 year operational lifetime of the Transmission Assets the subtidal sands and subtidal mud communities of the Fylde MCZ are provided the opportunity to recolonise these areas following the exposure of the sediment from beneath the cable protection and cable crossing. There will therefore be no permanent habitat loss within the MCZ, and no further assessment is required.

### 1.8.6 Introduction of artificial structures

#### Operation and maintenance phase

1.8.6.1 The introduction of artificial structures during the operation and maintenance phase of the Transmission Assets within the Fylde MCZ may occur due to the presence of any cable protection required for ground conditions and cable protection for the asset crossing. The colonisation of these artificial structures is likely to occur resulting in the development of hard-substrate communities in previously soft-sediment environments. The MDS for the introduction of artificial structures within the MCZ is assumed to be equivalent to the MDS detailed in **Table 1.18** for long term habitat loss associated with cable protection and cable protection for the crossing.

1.8.6.2 The environmental pressures associated with this potential impact are the same as those associated with long term subtidal habitat loss because the physical change (to another substratum type) pressure involves the permanent loss of one marine habitat type but has an equal creation of a different marine habitat type component. The pressure is described for the MarESA in **paragraph 1.8.5.4**.

1.8.6.3 On the basis of the assumptions outlined in **Table 1.18**, there may be up to 0.0304 km$^2$ of artificial structures installed within the Fylde MCZ during the operation and maintenance phase, equating to 0.012% of the total area of the MCZ. The infrastructure resulting in the colonisation of hard substrates will remain in place throughout the operation and maintenance phase of up to up to 35 years.

1.8.6.4 The physical attributes associated with the introduction of artificial structures and the adverse effects of the long term habitat loss associated with the presence of artificial structures have been fully assessed in **section 1.8.5** where the extent and distribution as well as the impact on sediment composition have been considered. The assessment of the impact of the introduction of artificial structures is therefore undertaken separately and does not detract from the assessment of the same infrastructure in relation to other impacts (i.e. long term habitat loss).

### Ecological attributes

1.8.6.5 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the introduction of artificial structures.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

1.8.6.6 The MDS for the subtidal sand feature is, as describes in **paragraph 1.8.5.8** for the long term habitat loss impact, for up to 0.0304 $km^2$ of new artificial structures within the subtidal sand protected feature affecting 0.014% of the total area of the feature.

1.8.6.7 The MDS for the subtidal mud feature is, as described in **paragraph 1.8.5.9**, for up to 0.0304 $km^2$ of new hard habitat within the subtidal mud protected feature affecting 0.069% of the total area of the feature.

1.8.6.8 Any cable protection required for ground conditions and the cable protection required for the asset crossing will, in time, likely become colonised by common epifaunal species and communities associated with areas of coarser sediment within the MCZ (i.e. noting that the baseline surveys for the MCZ recorded the presence of coarse sediments; see **paragraph 1.7.2.1**) which are local to the Fylde MCZ. This may have indirect adverse effects on the surrounding baseline communities within the subtidal sand feature due to increased predation on, and competition with, the existing soft sediment species. These effects are difficult to predict or quantify, especially as monitoring to date has focused on the colonisation and aggregation of species close to the hard substrate, such as foundations, rather than broad scale studies.

### Subtidal sand and subtidal mud

1.8.6.9 The biotopes which characterise this subtidal sand feature (i.e. SS.SCS.ICS.MoeVen, SS.SCS.ICS.Glap and SS.SSa.CMuSa.AalbNuc) are sand-based communities. Similarly, the biotopes which characterise the subtidal mud feature (i.e. SS.SMu.CSaMu.AfilKurAnit and SS.SSa.IMuSa.EcorEns) are also sand and mud based communities. The introduction of new hard substrate will represent localised shifts from the baseline conditions from soft substrate areas to hard substrate in the areas where infrastructure is present. The impacts associated with the long term loss of sedimentary habitat is considered in full in **section 1.8.5**. This impact is discussed in **paragraphs 1.8.4.15** to **1.8.4.18** and **paragraphs 1.8.4.20** and **1.8.4.21**, and concludes that the sensitivity of these communities to the associated pressures is high. The introduction of these artificial structures can however extend beyond the loss of habitat, potentially influencing the community composition of the area which is discussed in the following sections.

1.8.6.10 Some studies have shown that the installation and operation of offshore wind farms have had no significant impact on the wider soft sediment environments beyond the immediate impact of the loss of habitat. De Backer *et al*. (2021) found that eight to nine years after the installation of C-power and Belwind offshore wind farms (offshore Belgium) that the soft sediment epibenthos underwent no drastic changes; and the species originally inhabiting the sandy bottom were still present and remained dominant in both wind farms. This supported by a review by Rezaei *et al*. (2023) which reviewed the lessons learnt from the monitoring of fixed-bottom offshore wind farms including examples such as the Nysted and Horns Rev offshore windfarm sites in Denmark. This review concluded that although the possible impacts of offshore windfarm impacts at the population level are still unclear, monitoring of offshore windfarms has shown very little impacts on the environment (Rezaei *et al*., 2023). The likely effect of cable protection and cable protection for the crossing is likely to have an even more minor impact on the subtidal sand habitat. Recent benthic post-construction monitoring data of wind turbine foundations from Beatrice offshore wind farm (APEM, 2021) found that the colonisation of wind turbines foundations had little influence on the sedimentary habitat below. In the immediate vicinity of the jacket foundation legs mobile species were present such as hermit crab *Pagurus bernhardus*, flatfish and the common sea urchin *Echinus esculentus*, which suggests the availability of food although no biological material was recorded on the seabed (this material may have been rapidly consumed or relocated due to tidal currents) (APEM, 2021). The same surveys also recorded gadoids and flatfish in the ROV footage but they could not be identified to species level, however, there is potential that some of the gadoids seen were Atlantic cod *Gadus morhua*, and European plaice *Pleuronectes platessa* may have been present (flatfish could not be recorded to species level) (APEM, 2021).

1.8.6.11 Lefaible *et al.* (2023) also found that benthic species richness and abundance were both elevated in the immediate vicinity of wind turbine foundations (37 m from the foundations), but the effect was absent at a distance (350-500 m from the foundations). Furthermore Li *et al*. (2023) concluded there are no net adverse impacts during offshore wind farm operation phase (assuming 25-year operation) on benthic communities inhabiting the original sand bottom within offshore wind farm.

1.8.6.12 There may however be increases in biodiversity and individual abundance of reef species and total number of species over time in association with the protection for cables and the cable crossing. Studies have shown that there is potential for reef effects to occur in association with hard structures such cable protection. For example, the likely increase in biodiversity and individual abundance of reef species and total number of species over time, has been observed at the foundations installed at Lysekil research site (a test site for offshore wind-based research, north of Gothenburg, Sweden) (Bender *et al.*, 2020). The structural complexity of the substrate may provide refuge as well as increasing feeding opportunities for larger and more mobile species such as the commercially valuable sole *Solea solea*, plaice *Pleuronectes platessa* and whiting *Merlangius merlangus*. The presence of mobile benthic organisms is thought to be dependent on sufficient food sources, cover of epibenthic communities and appropriate habitat with shelter opportunities to hide from predators (Langhamer, and Wilhelmsson, 2009). A study by Mavraki *et al*. (2020) of gravity-based foundation in the Belgian part of the North Sea found that higher food web complexity was associated with zones where high accumulation of organic material such as soft substrate or scour protection, suggesting potential reef effect benefits from the presence of the hard structures. Providing a productive habitat for these species to feed in is part of the functional role of the subtidal sand habitat within the Fylde MCZ. Although the introduction of hard substrate would result in a decrease in the overall extent of the subtidal sand feature of the Fylde MCZ, the hard substrate introduced may still be able to contribute to achieving the functional role of this habitat.

1.8.6.13 In summary, the installation of hard structures will result in the loss of some sedimentary habitat directly below it however the remaining sedimentary habitat will not be continually degraded and will largely remain unchanged, at a MCZ site level, as a result of the introduction and colonisation of hard substrate.

1.8.6.14 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: Studies and monitoring of offshore windfarm sites to date have demonstrated that the abundance and diversity of the characterising species of the subtidal sand and subtidal mud protected features are unlikely to be affected by the biological communities which may colonise the hard structures of the Transmission Assets. The communities which will colonise the hard structures will be adapted to hard substrates and therefore are unlikely to colonise the sedimentary habitat which is occupied by the characterising species, this is supported by the examples provided in **paragraph 1.8.6.10** which provide evidence to support the prediction that soft sediment species are not affected by the colonising communities at offshore wind farms (De Backer *et al*., 2021; APEM, 2021).

- **Structure: species composition of component communities**: As above, the characteristic communities within the subtidal sand and subtidal mud protected features will be adapted to the sand and mud-based sediments, resulting in no cross over of habitat and therefore no competition between them and the colonising communities.
- **Structure and function: presence and abundance of key structural and influential species**: For both of the designated features their bivalve populations are highlighted as their key species (Natural England, 2023a). The presence and abundance key structural and influential species will only be minor affected as the extent of habitat available will be reduced due to the installation of the artificial structures (i.e. cable protection). They may also benefit from the increase in food availability provided by debris from the hard substrate communities (**paragraphs 1.8.6.10** and **1.8.6.12**). The function of the subtidal sand and subtidal mud protected features is unlikely to be affected by the colonisation of hard structures. As it is likely there will be a very minor impact on the physical attribute of this feature, namely the extent, and only small impact on the characteristic communities species it is unlikely there will be an adverse impact on the ability of the subtidal sand and subtidal mud features to provide food for commercially valuable fish species. As discussed in **paragraph 1.8.6.12** there is also potential for the new hard substrate communities to also contribute to the productivity of the Fylde MCZ. This is consistent with the 'recover and maintain' objectives of this feature.

1.8.6.15 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference 2.2) concluded that due to the strength of the research suggesting a minimal impact on sedimentary environments, and the relatively small proportion of the subtidal sand and subtidal mud protected features to be affected, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal sand and subtidal mud protected features of the Fylde MCZ were considered to be of high vulnerability, low recoverability and national importance and therefore was considered to have a high sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms.

### Summary

1.8.6.16 Based on the information presented in **paragraphs 1.8.6.6** to **1.8.6.16**, it can be concluded that the introduction of artificial structures during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The **presence and spatial distribution of biological communities** will be preserved by the very small percentage of the subtidal mud and subtidal sand features affected by the installation of artificial structures (<0.1%). The **species composition of component communities** is unlikely to be affected by the installation of artificial structures as the communities which colonise the structures as the communities colonise very different niches and are unlikely to overlap. The **presence and abundance of key structural and influential species** would be altered slightly by the small reduction in extent however the overall presence and abundance through the Fylde MCZ would be unaffected.

## 1.8.7 Increase risk of introduction and spread of invasive non-native species

### Construction and operation and maintenance phase

1.8.7.1 Increased risk of introduction and spread of INNS may occur within the Fylde MCZ during the construction and operation and maintenance phases as a result of the introduction of artificial structures (i.e. any cable protection required for ground condition and the cable protection for the asset crossing), as well as vessel activity occurring within these phases. The majority of this risk is associated with the operation and maintenance phase as in this phase the full extent of any cable protection within the MCZ will have been installed.

1.8.7.2 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Introduction or spread of invasive non-indigenous species (INIS): The benchmark for which is the introduction of one or more INIS.

1.8.7.3 The MDS for increased risk of introduction and spread of INNS within the Fylde MCZ is as described in **Table 1.18** for the artificial structures, and also includes up to 286 vessel round trips during the construction phase and up to 77 vessel round trips per year over the operation and maintenance phase. It should, however, be noted that these vessel trips are associated with the Transmission Assets as a whole and will not all occur or overlap with the Fylde MCZ. The extent of vessel activity within the MCZ is anticipated to be much less. The maximum design scenario is for the sequential construction scenario (i.e. construction will take place over a maximum of 30 months, noting that there is potential for a gap between the construction periods for Morgan and Morecambe) as this equates to the greatest time over which an increased risk of introduction and spread of INNS may occur. Although it should be noted that the total extent of artificial substrate is the same for both the concurrent and sequential scenarios.

1.8.7.4 Activities resulting in a potential increased risk of introduction and spread of INNS will occur throughout the maximum 30 months of the construction phase as well as the operation and maintenance phase of up to 35 years. Vessel movements are likely to be concentrated on discrete locations within the Fylde MCZ, where cable and cable protection may be installed, or maintenance may be required. In both the construction phase and operation and maintenance phase, the vessel movement will occur in all sections of the MCZ which overlap with the Offshore Order Limits but will be specific to the location of infrastructure. It should be noted that the existing baseline of vessel activity includes cargo, fishing, passenger, tanker, tug and service vessels which were recorded in both summer and winter vessel traffic surveys (Volume 2, Chapter 7: Shipping and navigation of the ES (document reference F2.7)).

#### Ecological attributes

1.8.7.5 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the introduction and spread of INNS.

- Structure: non-native species and pathogens (habitat).
- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

1.8.7.6 As outlined in **Table 1.14**, measures adopted as part of the Transmission Assets include the development of, and adherence to, an Offshore EMP(s) (including measures to minimise the potential spread of INNS) which will aim to manage and reduce the risk of potential introduction and spread of INNS (CoT65, **Table 1.14**). The Offshore EMP(s) will outline measures to ensure vessels comply with the International Maritime Organisation (IMO) ballast water management guidelines. It will include specific measures to be adopted in the event that a high alert species is recorded (e.g. carpet sea squirt *D. vexillum*). This will ensure that the risk of potential introduction and spread of INNS will be minimised.

#### Subtidal sand and subtidal mud

1.8.7.7 Natural England’s AoO identifies 11 biotopes that may be represented within the subtidal sand feature and six biotopes within the subtidal mud feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to High (see **Appendix A**: Biotope Sensitivity Ranges). A high sensitivity was determined as a result of the potential effects of the introduction of *Crepidula fornicata* which have the greatest potential to colonise these habitats by altering the sediment through the deposition of shell material (Tillin and Watson, 2023b).

1.8.7.8 The sedimentary and high energy nature of the environment is thought to be challenging for most INNS with very few species able to colonise mobile sands due to the high levels of sediment disturbance (Tillin and Budd, 2023; Tillin and Watson, 2023a; Tillin and Watson, 2023b). The characteristic biotopes of the subtidal sand feature (i.e.

SS.SCS.ICS.MoeVen, and SS.SCS.ICS.Glap) are most at risk from two species flagged in the MarESA sensitivity assessment as being of potential concern for sandy habitats. The slipper limpet *C. fornicata* is known to settle on surface such as bivalve shells which can in time grow to form a dense aggregation which can smother bivalves and alter the habitat. *C. fornicata* have been recorded in a variety of habitats including sands with moderately strong tidal streams (De Montaudouin and Sauriau, 1999) and where they are present few other bivalves are known to live amongst them (Blanchard, 1997). NBN Atlas data indicates that *C. fornicata* have been found at few locations in the east Irish Sea, with one accepted identification near Liverpool and four identifications in the Menai Strait. Furthermore, the colonial ascidian *Didemnum vexillum* is also highlighted as of risk as it is known to colonise artificial surfaces (Tillin and Budd, 2023; Tillin and Watson, 2023a; Tillin and Watson, 2023b). Valentines *et al.* (2007) however noted that areas of mobile sand bordering communities of *Didemnum* sp. were not affected by its presence and therefore concluded that this was not an appropriate habitat for this species. NBN Atlas data indicates that *D. vexillum* has been identified in a few locations, all within Holyhead port on Anglesey. Should INNS introduction occur within the Fylde MCZ, any effects are likely to be limited to the immediate vicinity of the cable protection and are unlikely to result in changes to the species composition of communities associated with the subtidal sand feature across the wider MCZ. Recent monitoring from Beatrice offshore wind farm, off of the north west coast of Scotland, found no evidence of INNS colonisation on hard substrate such as foundations (APEM, 2021).

1.8.7.9 Regarding the subtidal mud feature the MarESA highlights that the sedimentary nature of the environment may be at risk from the introduction of INNS due to the potential for establishment and difficulty removing them once they enter a habitat (De-Bastos and Hill, 2023b) however the MarESA does not have any evidence regarding the potential impact. A report by Tillin *et al.* (2020) for Natural Resources Wales conducted an evidence assessment for 16 INNS species that are either present or likely to arrive in Wales and may cause medium to high risk to marine ecosystems. The report assessed the risk to 41 Welsh MPAs, including MPAs with sublittoral mud features. The report identified a number of INNS which would find sublittoral mud to be potentially suitable habitat including *Eriocheir sinensis, Watersipora subatra, Bonnemaisonia hamifera* and *Magallana gigas*. This report does not however provide evidence for any potentially negative impacts once such species are introduced to a subtidal mud habitat. Should INNS introduction occur, any effects are likely to be limited to the immediate vicinity of offshore structures, the preferred habitat of many INNS, and are unlikely to result in changes to the species composition of communities associated with the subtidal sand feature across the wider MCZ.

1.8.7.10 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Structure: non-native species and pathogens (habitat)**: The measures which will be included in the Offshore EMP(s) (CoT65, **Table 1.14**), as detailed in **paragraph 1.8.1.6** and **Table 1.14**, will include measures to minimise the risk of introduction and therefore colonisation of INNS. These habitats are composed of sedimentary substrate which most INNS are not adapted for limiting the opportunity for spread should any be introduced. This is an offshore site and no subtidal invasive species records have been identified following an evidence review, nor were any INNS recorded during baseline survey (Environment Agency and Natural England, 2015). As a result it is unlikely that the addition of cable protection would facilitate the spread of/act as stepping stones for any INNS already there. Additionally, as this area is already in an area frequented by shipping traffic it is unlikely any new INNS will be introduced to the area by construction or operation and maintenance activities.
- **Distribution: presence and spatial distribution of biological communities**: On the basis of the measures that will be included in the Offshore EMP(s) (CoT65, **Table 1.14**), as detailed in **paragraph 1.8.1.6** and **Table 1.14**, which will limit the potential for the introduction and spread of INNS it is unlikely that any INNS will establish. It is, therefore, unlikely that there will be an impact upon the presence or spatial distribution of biological communities. The majority of the INNS identified with the potential to spread are most commonly found at the coast and on hard substrates which would suggest minimal suitability for introduction to subtidal sand and mud. Should they be introduced it is likely they would be confined to any introduced hard substrate (i.e. the cable protection is unlikely to act as a stepping stone to the wider spread of such species).
- **Structure: species composition of component communities**: The introduction of an INNS into either of the protected features would be highly unlikely to change the component community of either protected feature. This is because the majority of relevant INNS in this region are hard substrate based with a limited ability to adapt to the conditions provided by the subtidal sand and subtidal mud feature.
- **Structure and function: presence and abundance of key structural and influential species**: The key and influential species of the subtidal sand and subtidal mud protected feature include a variety of bivalves such as *N. nitidosa, P. legumen* and *A. alba* which live buried, shallowly, in the sediment. Their sensitivity to INNS has not been assessed by the MarESA however their ability to reproduce quickly makes the abundance and distribution of these species unlikely to be affected negatively by INNS species. The key and influential species of the subtidal mud feature include a variety of echinoderms and bivalves, namely *A. Filiformis* and *K. bidentata*. Their sensitivity to INNS has also not been assessed by the MarESA however both are slow to grow and mature, *A. filiformis* reaches maturity after two years, therefore there is potential for them to be negatively impacted by the introduction of aggressive INNS species. The INNS of the region are however largely adapted

to coarse sediments and hard substrates and therefore do not overlap with the same ecological niche as the key species for subtidal sand or subtidal mud. The physical functions of this feature, as a food source for commercially and ecologically valuable fish stocks is unlikely to be impacted by increased risk of INNS introduction or spread as the representative processes will be unaffected by relatively small-scale ecological change. This is consistent with the 'maintain and recover' objective of the structure and function attribute for this feature.

1.8.7.11 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the measures included in the Offshore EMP(s) (CoT65, **Table 1.14**) which will limit the potential for the introduction and spread of INNS, and the relatively small proportion of vessels and hard substate to enter or be installed in the Fylde MCZ during construction and operation and maintenance phases, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal sand and subtidal mud features of the Fylde MCZ is considered to be of high vulnerability, low recoverability and national importance and therefore they are considered to have a high to medium sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

#### Summary

1.8.7.12 Based on the information presented in **paragraphs 1.8.7.3** to **1.8.7.11**, it can be concluded that the introduction and spread of INNS during the Transmission Assets construction and operation and maintenance phases **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The introduction of **non-native species** is unlikely to present as a risk to the subtidal sand and subtidal mud features due to the measures to be adopted as part of the Transmission Assets (CoT65, **Table 1.14**).
- The **presence, distribution and composition of component communities** is unlikely to be affected as the majority of relevant INNS in this region are hard substrate based with a limited ability to adapt to the conditions provided by these sedimentary features. The impact on **key structural and influential species** varies depending on the species however their presence and abundance is unlikely to be affected as they occupy separate ecological niches to most INNS species.

### Decommissioning phase

1.8.7.13 As outlined in **Table 1.14**, the project has committed to ensuring that all external cable protection used within the Fylde MCZ will be designed to be removable on decommissioning (CoT108, **Table 1.14**). The requirement for removal of cable protection from within the MCZ will be agreed with stakeholders and regulators at the time of decommissioning (CoT109, **Table 1.14**). Additionally any vessel traffic in the MCZ will only be passing through and therefore unlikely to contribute the introduction of INNS in the MCZ. There will therefore be no route to impact for the introduction and spread of INNS during the decommissioning phase and no further assessment is required.

### 1.8.8 Changes in physical processes

#### Operation and maintenance phase

1.8.8.1 Changes in physical processes may arise from the installation of infrastructure (i.e. any cable protection required for ground conditions and the cable protection for the asset crossing) into the water column within the Fylde MCZ, including scour effects and changes in the sediment transport and wave regimes resulting in potential effects on the subtidal sand and subtidal mud protected features. The project includes a number of commitments which will specify cable protection requirements (see **Table 1.14**); most notably commitment CoT47 (**Table 1.14**) highlights the commitment to limit the extent of cable protection within the Fylde MCZ "…Within the Fylde MCZ, external cable protection will only be used where deemed to be essential, e.g. for cable crossings or in the instance that adequate burial / reburial is not possible for any section of the route through the Fylde MCZ…". Whilst the preferred option for cable installation is cable burial with no additional surface cable protection, as detailed in commitment CoT54 (**Table 1.14**), which will minimise changes to the physical processes, particularly in nearshore areas. Furthermore, as detailed in commitment CoT45 (**Table 1.14**), the Outline Offshore CSIP includes a requirement for no more than 5% reduction in water depth (referenced to Chart Datum) at any point on the offshore export cable corridor route plan without prior written approval from the MCA which will further minimise changes to the physical processes.

1.8.8.2 As discussed in **paragraph 1.8.5.1**, the Applicants consider that cable protection will only be used as a last resort within the Fylde MCZ, in the event that cable burial is unsuccessful, to ensure the integrity of the offshore export cables are maintained. Further detail on cable protection is discussed in the Outline Offshore CSIP (document reference J15).

1.8.8.3 Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1) provides a full description of the desk-based analysis used to inform this assessment.

1.8.8.4 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- **Water flow (tidal current) changes, including sediment transport considerations:** Structures placed in the marine environment immediately interact with the local current regime. The physical presence of infrastructure such as cable protection and the cable crossing could lead to diffraction or funnelling of currents between the turbines. This may lead to the development of scour pits adjacent to turbine foundations (the Transmission Assets however does not include any turbine foundations) or secondary scour around scour protection (DECC, 2016).

- **Wave exposure changes:** The physical presence of a cable protection could lead to diffraction or funnelling of waves and currents between the turbines, reductions in the wave energy reaching the coast and changes in local wave patterns (Metoc Plc, 2010).

1.8.8.5 The MDS assumes that up to 3% of the length of Morgan offshore export cables within the Fylde MCZ may require cable protection for ground conditions, with a height of up to 2 m and up to 10 m in width. Additionally, one cable crossing, for all four Morgan offshore export cables, will be required within the Fylde MCZ, with a height of up to 2 m, a width of up to 20 m and a length of up to 50 m. The MDS also assumes that up to 3% of the Morecambe offshore export cables within the Fylde MCZ may require cable protection for ground conditions, with a height of up to 2 m and up to 10 m width. No cable crossings will be required for the Morecambe offshore export cables.

#### Physical attributes

1.8.8.6 The following physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to changes in physical processes during the operation and maintenance phase.

- Supporting processes: energy/exposure
- Structure: sediment composition and distribution; and
- Supporting processes: sediment movement and hydrodynamic regime (habitat).

1.8.8.7 Although cable protection was included in the Morgan Offshore Wind Project: Generation Assets ES modelling its impact on physical processes is not able to be readily isolated from the infrastructure as a whole. However, as part of the Mona Offshore Wind Project ES modelling it was provided along sections of the offshore export cable as discussed in Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1), this modelling is applicable to the Transmission Assets as it provides information on the potential impact of cable protection on wave climate.

1.8.8.8 In the case of wave climate, where the cable protection height was less than circa 15% of the water depth there was no change in wave climate whilst in shallower water the change was 0.5 – 1% of background levels at the site of cable protection reducing rapidly with distance and indistinguishable from background levels within 1 km of the site.

1.8.8.9 Additionally, within the context of the modelling of offshore export cable protection modelling undertaken for Mona Offshore Wind Project ES (Mona Offshore Wind Ltd., 2024) and Morgan Offshore Wind Project:

Generation Assets ES (Morgan Offshore Wind Ltd., 2024a), when cables were perpendicular to tidal currents and continuous length of cable protection was provided there was a highly localised increase in current speed of circa 1% as flow is accelerated over and around the structure due to the depth reduction. The area influenced extended circa 500 m from the structure however the influence diminished rapidly within this zone.

1.8.8.10 The magnitude of the impact of cable protection on the sediment transport regime would be highly dependent on the length and orientation. Baseline sediment transport, driven by residual tidal currents, runs in an east direction offshore and therefore largely parallel to the cable routes. Sediment transport in the nearshore environment runs parallel to the coast, however despite this meaning cable protection would be perpendicular to these pathways, if and where cable protection is required in shallow subtidal conditions the measures used will be of sufficiently low profile to cause minimal interruption to sediment transport (further detail regarding cable protection can be found in the Outline Offshore CSIP (document reference J15)). Descriptions of the possible types of cable protection to be utilised can be found in Volume 1, Chapter 3: Project description of the ES (document reference F1.3) with the detail of design to be outlined within the Outline Offshore CSIP to ensure that the most suitable protection is applied in line with the project commitments (CoT45, **Table 1.14**).

1.8.8.11 The detail of cable protection design and construction is presented within the Outline Offshore CSIP. Detailed CSIP(s) and CBRA(s) will be developed in accordance with the Outline Offshore CSIP (document reference J15) and Outline CBRA (document reference J14) which would also determine the likely extent of any potential scour and would aim to mitigate this through site specific detailed design of cable protection measures. It is therefore likely that any secondary scour effects associated with cable protection within the Fylde MCZ (if required) would be confined to within a few meters of the direct footprint of that cable protection material.

1.8.8.12 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Supporting processes: energy/exposure:** Based on modelling undertaken for the Morgan Offshore Wind Project: Generation Assets (Morgan Offshore Wind Ltd., 2024a) and Mona Offshore Wind Project (Mona Offshore Wind Ltd., 2024) the effect of the cable protection on the Fylde MCZ will be minimal. Cable protection will result in localised changes which will affect the immediate area of cable protection. Changes to the wave regime will reduce rapidly with distance and will be indistinguishable from background levels within 1 km of the site of the cable protection. Changes to tidal currents may extend up to 500 m but the influence is predicted to rapidly diminish within this zone.
- **Structure: sediment composition and distribution:** Due to the immediate spatial nature of these pressures it is unlikely that

sediment will be removed from the relevant sediment transport cell. This will ensure that the sedimentary characteristics of the subtidal sand and subtidal mud features will be maintained within the MCZ.

- **Supporting processes: sediment movement and hydrodynamic regime:** The baseline sediment transport, driven by residual tidal currents, runs in an east direction offshore, however despite this meaning cable protection would be perpendicular to these pathways, if and where cable protection is required in the MCZ the measures proposed in **Table 1.14** will ensure the cable protection will be of sufficiently low profile to cause minimal interruption to sediment transport.

#### Ecological attributes

1.8.8.13 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to increases in SSC and associated sediment deposition during the operation and maintenance phase.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

#### Subtidal sand

1.8.8.14 Natural England's AoO identifies 11 biotopes that may be represented within the subtidal sand feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Low (see **Appendix A**: Biotope Sensitivity Ranges) (Natural England, 2023c). Natural England's AoO also highlights the potential exists for profound changes (e.g. coastal erosion/deposition) to occur at long distances from the infrastructure itself if an important sediment transport pathway was disrupted.

1.8.8.15 The component biotopes of the subtidal sand Important Ecological Feature (IEF) of the Fylde MCZ (i.e. SS.SCS.ICS.MoeVen, SS.SCS.ICS.Glap and SS.SSa.CMuSa.AalbNuc are found in strong to moderately strong tidal currents (3.0 m/s to 0.5 m/s), however an increase beyond the established conditions could result in the erosion of sediment changing the structure and topography of this feature (Tillin and Budd, 2023; Tillin and Watson, 2023a; Tillin and Watson, 2023b). Many of the species which characterise the communities in these habitats inhabit a variety of sediment types which would suggest they would not be sensitive to the potential effects of changes to physical processes. Furthermore species such as the polychaetes *Owenia fusiformis* and *L. conchilega* build tubes out of sediment which can act to stabilise the sediment (Somaschini, 1993). Wave exposure can also lead to erosion of the sediment, however, as a subtidal habitat the features of the Fylde MCZ would only be affected indirectly. The indirect effects may include changes to food and larvae supply however these effects are likely to be negligible based on the conditions experienced in this habitat.

1.8.8.16 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: As both the hydrological and sedimentary processes which support the physical attributes of the subtidal sand feature will be maintained in the operation and maintenance phase the distribution of the biological communities will also be maintained.
- **Structure: species composition of component communities**: The species composition of the subtidal sand feature will also likely be maintained as result of the maintenance of the sediment transport regime and hydrological conditions associated with the subtidal sand feature.
- **Structure and function: presence and abundance of key structural and influential species**: The key structural and influential species of the subtidal sand feature will also likely be maintained as result of the maintenance of the sediment transport regime and hydrological conditions which create their characteristic habitat and enable them to continue enacting their function in the ecosystem.

1.8.8.17 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of change to physical processes during the operation and maintenance phase, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal sand feature of the Fylde MCZ was considered to be of low vulnerability, high recoverability and national importance and therefore was considered to have an overall negligible sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Subtidal mud

1.8.8.18 Natural England's AoO identifies six biotopes that may be represented within the subtidal mud feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Medium (see **Appendix A**: Biotope Sensitivity Ranges) (Natural England, 2023c).

1.8.8.19 The subtidal mud IEF of the Fylde MCZ has a specific sediment composition which could be altered by changes in physical processes such as tidal currents and wave exposure. An increase in flow rate could lead to the erosion of sediment which could leave behind coarse sediments which are unsuitable for the burrowing communities which inhabit this feature. A decrease in flow would lead to an increase in the fine sediment component of the substrate which would also lead to a shift in some of the characterising species of this community such as

*Ensis* sp. and *E. cordatum* but would benefit other species by increasing food availability. The effects of wave exposure change would be minimal on this habitat based on the depth at which it is found within the Fylde MCZ. Some species in this community have been found to be resistant to such changes including *E. cordatum* which has been recorded at a range of wave exposures (De-Bastos *et al*., 2023b). Other species however would be damaged by an increase in wave exposure such as *A. filiformis* which would be likely to be broken up by strong wave exposure (De-Bastos *et al*., 2023a). This would however require a sustained sizable increase in wave exposure which is greater than the predicted small scale changes predicted as a result of the Transmission Assets within the Fylde MCZ.

1.8.8.20 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: As a both the hydrological and sedimentary processes which support the physical attributes of the subtidal mud feature will be maintained in the operation and maintenance phase the distribution of the biological communities will also be maintained.
- **Structure: species composition of component communities**: The species composition of the subtidal mud feature will also likely be maintained as result of the maintenance of the sediment transport regime and hydrological conditions associated with the subtidal sand feature.
- **Structure and function: presence and abundance of key structural and influential species**: The key structural and influential species of the subtidal mud feature will also likely be maintained as result of the maintenance of the sediment transport regime and hydrological conditions. These processes create this characteristic habitat and enable them to continue enacting their function in the ecosystem.

1.8.8.21 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the low levels of change to physical processes during the operation and maintenance phase as a result of the presence of cable protection, the magnitude of the impact on the features of the Fylde MCZ was assessed as low. The subtidal mud feature of the Fylde MCZ was considered to be of low vulnerability, high recoverability and national importance and therefore was considered to have an overall negligible sensitivity. Therefore, the significance of effect was considered to be **minor adverse**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.8.22 Based on the information presented in **paragraphs 1.8.3.15** to **1.8.3.23**, it can be concluded that changes in physical processes during the

Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The **energy and exposure** at the Fylde MCZ, based on modelling undertaken for the Morgan Offshore Wind Project: Generation Assets, will be minimally impacted by operational infrastructure. The effect of the infrastructure will be highly localised and will keep sediment within the relevant sediment transport cells ensuring maintenance of the **sediment composition and distribution** for the designated features.
- The baseline **sediment movement and hydrodynamic regime** would not be affected by the introduction of cable protection or cable crossings as the area affected would be minimal and would not impede the movement of material.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by changes in physical processes as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** are highly unlikely to be impacted by changes in physical processes as this pressure is unlikely to result in a change to the sediment composition of these habitats and therefore will not affect elements such as the suitability of the habitat or the abundance of nutrients.

## 1.8.9 Impacts to benthic invertebrates due to EMF

### Operation and maintenance phase

1.8.9.1 The presence of offshore export cables during the operation and maintenance phase may result in impacts to benthic invertebrates from EMF.

1.8.9.2 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Electromagnetic changes: Local electric field of 1 V/m. Local magnetic field of 10 µT. Localised electric and magnetic fields associated with operational power cables. Such cables may generate electric and magnetic fields that could alter the behaviour and migration patterns of sensitive species.

1.8.9.3 The MDS is for up to 88 km of active cables within the Fylde MCZ during the operation and maintenance phase. The effects of EMF on benthic receptors are not yet well known, therefore there is very little evidence to separate the impact on the subtidal sand and subtidal mud feature therefore they have been assessed together.

1.8.9.4 EMF comprise both the electrical fields, measured in volts per metre (V/m), and the magnetic fields, measured in microtesla (µT) or milligauss (mG). Background measurements of the magnetic field are approximately 50 µT for example in Ireland (EIR Grid Group, 2015). It is common practice to block the direct electrical field using conductive sheathing, meaning that the only EMFs that are emitted into the marine environment are the magnetic field and the resultant induced electrical field. It is generally considered impractical to assume that cables can be buried at depths that will reduce the magnitude of the magnetic field, and hence the sediment-sea water interface induced electrical field, to below that at which these fields could be detected by certain marine organisms on or close to the seabed (Gill *et al*., 2005; Gill *et al*., 2009). By burying a cable, the magnitude of the magnetic field at the seabed is reduced due to the distance between the cable and the seabed surface as a result of field decay with distance from the cable (CSA, 2019). Burial does not however necessarily reduce the ability of organisms to detect the EMF.

1.8.9.5 A variety of design and installation factors affect EMF levels in the vicinity of the cables. These include current flow, distance between cables, cable insulation, number of conductors, configuration of cable and burial depth. The flow of electricity associated with an alternating current (AC) cable (proposed for the Transmission Assets) changes direction (as per the frequency of the AC transmission) and creates a constantly varying electric field in the surrounding marine environment (Huang, 2005).

1.8.9.6 The strength of the magnetic field (and consequently, induced electrical fields) decreases rapidly horizontally and vertically with distance from source. A recent study conducted by CSA (2019) found that inter-array and offshore export cables buried between depths of 1 m to 2 m reduces the magnetic field at the seabed surface four-fold. The effect is similar for cables which are protected by thick concrete mattresses or rock berms.

1.8.9.7 CSA (2019) investigated the link relationship between voltage, current, and burial depth, the results of which are presented in **Table 1.19** which shows the magnetic and induced electric field levels expected directly over the undersea power cables and at distance from the cable for varying cable types. Directly above the cable, EMF levels decrease as the distance increases from the seafloor to 1 m above the cable, while as the distance increases laterally away from the cable (at distances greater than 3 m), the magnetic fields at the seafloor and at 1 m above the seafloor are comparable.

### Table 1.19: Typical EMF levels over AC undersea power cables from offshore wind energy projects (CSA, 2019)

| Power Cable Type | Magnetic Field Levels (mG) | | | |
|---|---|---|---|---|
| | Directly Above Cable | | 3 to 7.5 m Laterally away from | |
| | 1 m above | At Seafloor | 1 m above | At Seafloor |
| Offshore Wind Energy Projects export cable | 10 to 40 | 20 to 165 | <0.1 to 12 | 1 to 15 |
| **Power Cable Type** | **Induced Electric Field Levels (mV/m)** | | | |
| | **Directly Above Cable** | | **3 to 7.5 m Laterally away from** | |
| | **1 m above** | **At Seafloor** | **1 m above** | **At Seafloor** |
| Offshore Wind Energy Projects export cable | 0.2 to 2.0 | 1.9 to 3.7 | 0.02 to 1.1 | 0.04 to 1.3 |

#### Ecological attributes

1.8.9.8 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the impact of EMF on benthic invertebrates.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

#### Subtidal sand and Subtidal mud

1.8.9.9 Natural England's AoO identifies 11 component biotopes for the subtidal sand feature and six component biotopes for the subtidal mud feature. The AoO states that there is insufficient evidence to provide a sensitivity rating to this pressure (see **Appendix A**: Biotope Sensitivity Ranges). It does however highlight that cables may generate electric and magnetic fields that could alter behaviour and migration patterns of sensitive species (Natural England, 2023c).

1.8.9.10 Gill and Desender (2020) summarised current research on the impact of EMF emissions on organisms and also acknowledged that relatively little is known about the effects of EMF on invertebrates such as those common in these benthic communities. This is supported by a recent evaluation of knowledge of the impacts of EMF on invertebrates which concluded, globally, no direct impact on survival has been identified in the literature (Hervé, 2021). Furthermore, there is no standardisation of the methods used to assess the effects of EMF on benthic invertebrates, therefore results which are difficult to compare and contradiction (Hutchinson *et al*., 2020b).

1.8.9.11 A number of marine invertebrates have been shown to detect EMF, a study by Normandeau (2011) demonstrated magnetoreception in marine molluscs and arthropods and biogenic magnetite has been known to occur in marine molluscs for over five decades. Magneto-receptive and electro-receptive species have evolved to respond to small changes in the Earth's geomagnetic fields (Hutchinson *et al*., 2020b). Reported sensitivities to electric fields for invertebrates range from around 3 mV/cm to 20 mV/cm (Steullet *et al*., 2007). The potential impacts on marine invertebrates would depend on the sensory capabilities of a species, the life functions that its magnetic or electric sensory systems supports, and the natural history characteristics of the species.

1.8.9.12 Experimental evidence has demonstrated that exposure to EMF did not change the distribution of the ragworm *Hediste diversicolor* however more vertical migration was associated with conditions where individuals were exposed to a magnetic field (Jakubowska *et al*., 2019). Bochert and Zettler (2004), examined the effects of magnetic fields on the survival rates of various marine invertebrates (North Sea prawn *Crangon crangon*, two isopod species *Saduria entomon* and *Sphaeroma hookeri*, round crab *Rhithropanopeus harrisii*, and blue mussel *Mytilus edulis*) and identified no changes in the survival rates after long-term exposure to 3.7 mT static fields. Stankevičiūtė *et al*. (2019) obtained similar results with H. *diversicolor* and Baltic clam *Limecola balthica* after 12 days under an alternating field (i.e., 50 Hz, from 0.85 to 1.05 mT). Some studies found that benthic communities which grow along cable routes were generally similar to those in the nearby area (Gill and Desender, 2020). These communities however are not exposed to the maximum EMF emissions due to cable burial creating a physical distance between the cable and the seabed surface. The EMF which reaches the surface however is measurable at biologically relevant scales at the seabed and in the water column (Hutchinson *et al*., 2020). Although whether these levels are detectable by benthic species is a topic of research.

1.8.9.13 Magnetic fields however were found to delayed embryo growth and increased developmental abnormalities in invertebrate sea urchins *Lytechinus pictus* and *Strongylocentrotus purpuratus* (Levin and Ernst, 1997; Zimmerman *et al*., 1990). Normandeau (2011) summarises that despite these sensitivities which have been detected in lab settings no direct evidence of impacts to invertebrates from undersea cable EMFs exists. A study by Gill and Desender (2020) found that benthic communities which grow along cable routes were generally similar in composition to those in the surrounding area.

1.8.9.14 Research regarding the impact of EMF on invertebrates still has a number of knowledge gaps which hinder the ability to fully understand the effects. Hervé (2021) identified that establishing the impact on groups such as molluscs is highly underdeveloped, the impact on species relative to the strength of the EMF as well as the impact of different types of cable are key knowledge gaps.

1.8.9.15 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities**: The biological communities associated with the subtidal sand and subtidal mud features are polychaetes, bivalves and echinoderms. Although here has been minimal research in this area some studies presented in **paragraphs 1.8.9.10** to **1.8.9.14** indicate the distribution and survival of some polychaetes and bivalves are unaffected by the presence of EMF. Little research has been conducted on echinoderms however they have not been as identified as an EMF sensitive group.
- **Structure and function: presence and abundance of key structural and influential species:** With respect to the presence and abundance of key structural and influential species of the subtidal sand and subtidal mud features, current research (**paragraphs 1.8.9.10** to **1.8.9.14** would suggest that the presence of EMF, should it be detectable, would likely have a minimal impact on characterising species such as *Glycera lapidum, Moerella sp., A. filiformis, K. bidentata, N. nitidosa* and *P. baltica*.
- **Structure: species composition of component communities**: The species composition of the component communities of these features will be maintained across the Fylde MCZ. As discussed in **paragraph 1.8.9.12**, benthic communities have been found to grow along cable corridors which are similar to those of the surrounding environment which would support the conclusion that characteristic communities are likely to maintain their distribution within the MCZ. Should any species not yet known to be sensitive to EMF be affected the impact is likely to be highly localised and limited in extent by the burial of the cables (as demonstrated in **Table 1.19**).

1.8.9.16 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary and reversible nature of the impact of EMF on benthic invertebrates during the operation and maintenance phase, the magnitude of the impact on the features of the Fylde MCZ was low. The subtidal sand and subtidal mud features of the Fylde MCZ is considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have a low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms, as the sediments and communities are predicted to recover.

### Summary

1.8.9.17 Based on the information presented in **paragraphs 1.8.9.3** to **1.8.9.16**, it can be concluded that impacts to benthic invertebrates due to EMF during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- Based on the current research, the **presence and spatial distribution of biological communities** and **key structural and**

**influential species** are unlikely to be significantly impacted by EMF at a community level.

## 1.8.10 Heat from subsea electrical cables

### Operation and maintenance phase

1.8.10.1 The presence and operation of offshore export cables within the Transmission Assets Offshore Cable Corridor may lead to localised heating of the seabed resulting in effects on benthic subtidal receptors.

1.8.10.2 The relevant pressures and associated benchmarks relevant to these activities which have been used to inform this impact assessment, as identified by Natural England's AoO for the Fylde MCZ (Natural England, 2023c), are listed below.

- Temperature increase: An increase of 5 °C for one month, or 2 °C for one year.

1.8.10.3 The MDS is for up to 88 km of active cables within the Fylde MCZ during the operation and maintenance phase.

1.8.10.4 Submarine power cables such as those to be installed for the Transmission Assets generate heat through resistive heating. It is caused by energy loss as electrical currents flow and leads to the heating of the cable surface and the warming of the surrounding environment. High voltage cables are used to minimise the amount of energy lost as heat which in turn minimises the environmental warming effect.

1.8.10.5 Where submarine power cables are buried, the surrounding sediment may be heated. The cables, however, have negligible capability to heat the overlying water column because of the very high specific heat capacity of water (the amount of energy needed to raise the temperature of 1 kg of water by 1 °C). There is little research on the heat dissipation effect resulting from subsea cables in the field as well as its effect on benthic receptors. Meißner *et al*. (2007) conducted a field study at Nysted Offshore Windfarm in Denmark. This study tested the difference in sediment temperature between a control site and a site 25 cm away from the cable. Results showed a 2 °C maximum difference between sites with a mean difference of 1 °C, with similar results for a HVAC 33 kV cable and HVAC 132 kV cable (low and high voltage cables respectively). Additionally, the impact of seabed temperature rise as a result of buried cables has been considered during a project to bury a submarine HVDC cable between New England and Long Island, New York. The project estimated that the rise in temperature at the seabed immediately above the buried cable to be just 0.19 °C (BERR, 2008).

1.8.10.6 The seasonal temperature range in the Irish Sea is 11 °C – 5 °C (Howarth, 2004), therefore any change similar to those observed by the previously described studies would fall within the natural seasonal variation of this region. Furthermore, the effects of climate change are likely to result in higher average temperatures being the norm.

1.8.10.7 A number of environmental factors have been identified which change the way that heat from subsea cables will dissipate. One of them being the nature of sediment that the cable is buried in. A lab-based study by Emeana *et al*. (2016) investigated the thermal regime around high voltage submarine cables using a heat source in a large tank to simulate seafloor conditions. Research has identified that when the heat source was buried in fine clay/silt sediments it has a conductive heat transfer mode, only raising temperatures in the immediate radius of the cable. When the heat source was buried in fine permeable sands, they observed convective heat transfer when the heat sources surface temperature reached over 20 °C above the ambient temperature resulting in temperature change up to 1 m above the heat sources surface (when the heat source was buried at 1 m). In coarse sands convection occurred at a lower temperature (>9 °C) and increases in fluid temp were detectable over 1 m above the heat sources surface. This study however was conducted in a laboratory without the influence of water flow which, in an offshore environment, would quickly dissipate any heat emissions (Worzyk, 2009).

### Ecological attributes

1.8.10.8 The following ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ are relevant to the impact of heat from subsea cables.

- Distribution: presence and spatial distribution of biological communities.
- Structure and function: presence and abundance of key structural and influential species.
- Structure: species composition of component communities.

#### Subtidal sand

1.8.10.9 Natural England’s AoO identifies 11 component biotopes for the subtidal sand feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Low (see **Appendix A**: Biotope Sensitivity Ranges).

1.8.10.10 For the component biotopes of the subtidal sand feature, the MarESA includes little evidence on the sensitivity to the pressure of temperature increase (local) which has a benchmark of an increase in 5 °C for one month, or 2 °C for one year. For the SS.SCS.ICS.MoeVen and SS.SSa.CMuSa.AalbNuc biotopes however it was, however, noted that these biotopes occur in the Mediterranean (Tillin and Budd, 2023; Tillin and Watson, 2023b). Therefore they are likely to regularly experience temperatures higher than those in the UK, making it unlikely that they will be adversely impacted by the comparatively small temperature increase associated with subsea electrical cables. A similar assessment is made for the SS.SCS.ICS.Glap biotope as although the biotope as a whole doesn’t appear in warmer climates, many of the characterising species do (Tillin and Watson, 2023a). It is therefore unlikely that they will be adversely impacted by the comparatively small temperature increase associated with subsea electrical cables.

1.8.10.11 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities:** Based on the research presented in **paragraphs 1.8.10.9** it is unlikely that the increases in temperature associated with subsea cables would affect the presence or distribution of subtidal sand communities. This is based on the range of temperatures experiences by these communities on a seasonal basis.
- **Structure: species composition of component communities**: The species composition of the component communities of these features will be maintained across the Fylde MCZ. As discussed in **paragraph 1.8.10.9**, the relevant benthic communities have been found to be prevalent in climates warmer than those found in the UK. This would suggest that the increase in temperature associated with subsea electrical cables is unlikely to result in an adverse impact.
- **Structure and function: presence and abundance of key structural and influential species**: With respect to the presence and abundance of key structural and influential species associated with the subtidal sand feature, the current evidence supports their resilience to local temperature increases. One such example is *G. lapidum*, which is a characterising species for this feature, is found to have a broad distribution including in the north east Atlantic and Mediterranean suggesting that this species can thrive in a variety of temperature regimes (Tillin and Watson, 2023a). Other species, such as *N. nitidosa* and *A. alba*, also have a wide geographic range including waters to the south of the British Isles, therefore they are likely to be tolerant of higher temperatures than could be experienced as a result of electrical subsea cables (Tillin *et al*., 2023).

1.8.10.12 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary and reversible nature of the impact of heat on benthic invertebrates during operation and maintenance phase, the magnitude of the impact on the features of the Fylde MCZ was negligible. The subtidal sand feature of the Fylde MCZ is considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have a low sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms.

### Subtidal mud

1.8.10.13 Natural England's AoO identifies six component biotopes for the subtidal mud feature. The sensitivity of the component biotopes to the relevant pressures ranges from Not Sensitive to Low (see **Appendix A**: Biotope Sensitivity Ranges).

1.8.10.14 The component biotopes of the subtidal mud feature include SS.SMu.CSaMu.AfilKurAnit and SS.SSa.IMuSa.EcorEns. The characterising species of SS.SSa.IMuSa.EcorEns biotope *E. cordatum* and *E. ensis* are widely distributed globally and in north west Europe respectively. Both species are therefore likely to experience seasonal changes in water temperatures by as much as 10 °C from summer to winter (De-Bastos *et al*., 2023b). Furthermore some benefits have been recorded for these species when they experience warmer conditions. For example, results presented by Kirby *et al*. (2007), suggested that the increased abundance and spatial distribution in the North Sea of the larvae of *Echinocardium cordatum*, could have been caused by an increase in sea temperature after 1987, however the scale of temperature increase associated with subsea electrical cables is highly unlikely to result in this kind of change. Regarding SS.SMu.CSaMu.AfilKurAnit, one of the key species *A. filiformis* has been found to experience annual variations in temperature of about 10 °C in Galway bay where they occur in dense aggregations (O'Connor *et al*., 1983). *K. bidentata* is also known to experience a wide range of temperatures within their natural range for example in Kinsale Harbour, in the south of Ireland, temperatures range from 7.7-18.8 °C (O'Brien and Keegan, 2006). Elevated temperatures may affect growth of some of the characterising species of this biotope, but no mortality is expected. It is therefore likely that the characterising species are able to resist a long-term increase in temperature of 2 °C which is at the upper end of what they may experience as a result of operational subsea electrical cables.

1.8.10.15 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- **Distribution: presence and spatial distribution of biological communities:** Based on the research presented in **paragraphs 1.8.10.14** it is unlikely that the increases in temperature associated with subsea cables would affect the presence or distribution of subtidal mud communities. This is based on the range of temperatures experiences by these communities on a seasonal basis.
- **Structure: species composition of component communities:** The species composition of the component communities of these features will be maintained across the Fylde MCZ. As discussed in **paragraph 1.8.10.14**, the relevant benthic communities have been found to be prevalent in climates warmer than those found in the UK. This would suggest that the increase in temperature associated with subsea electrical cables is unlikely to result in an adverse impact.
- **Structure and function: presence and abundance of key structural and influential species:** With respect to the presence and abundance of key structural and influential species subtidal

mud feature, current evidence is available to support the conclusion that key species would be resilience to local temperature increases. One such example is *A. filiformis and K. bidentat*a which are discussed in **paragraph 1.8.10.14**. Overall the small increases in temperature over a small area which may be associated with the operation of subsea electrical cables is unlikely to result in adverse effects compared to the broad seasonal temperature changes experienced by these species on a yearly basis.

1.8.10.16 Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) concluded that due to the temporary and reversible nature of the impact of heat on benthic invertebrates during the operation and maintenance phase, the magnitude of the impact on the features of the Fylde MCZ was negligible. The subtidal mud features of the Fylde MCZ is considered to be of medium vulnerability, high recoverability and national importance and therefore was considered to have a negligible sensitivity. Therefore, the significance of effect was considered to be **negligible**, which is not significant in EIA terms.

#### Summary

1.8.10.17 Based on the information presented in **paragraphs 1.8.10.9** to **1.8.10.16**, it can be concluded that impacts to benthic invertebrates due to heat arising from the Transmission Assets during the operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The **presence and spatial distribution of component communities** and **key species** is unlikely to be affected based on the low sensitivity of the communities, the range of temperatures experienced by these communities on a seasonal basis and the small increases in heat anticipated as a result of the presence of cables.

### 1.8.11 Future monitoring

1.8.11.1 **Table 1.20** below outlines the proposed monitoring commitments within the Fylde MCZ.

**Table 1.20: Monitoring commitments within the Fylde MCZ**

| Commitment number | Measure adopted | How the measure will be secured |
|---|---|---|
| CoT115 | An OIPMP (document reference J20) has been prepared and submitted as part of the application for development consent. The OIPMP includes for monitoring of the recovery of sediments and benthic communities within representative areas of the Fylde MCZ potentially impacted by sandwave clearance, cable installation and cable protection, at appropriate temporal intervals as part of the operational asset integrity surveys. Detailed Offshore Monitoring Plans will be produced prior to operation and maintenance phases in accordance with the OIPMP, and will be approved in consultation with statutory advisors and regulators. | DCO Schedules 14 & 15, Part 2- Condition18(d) (Pre-construction plans and documentation). |

# 1.9 Cumulative Assessment

## 1.9.1 Introduction

1.9.1.1 The Marine and Coastal Access Act 2009 does not provide any legislative requirement for explicit consideration of cumulative effects on features of MCZs. However, the MMO guidelines (MMO, 2013) state that the MMO considers that in order for the MMO to fully discharge its duties under section 69 (1) of the Marine and Coastal Access Act 2009 (which dictates that the appropriate licensing authority must have regard to the need to protect the environment and human health as well as prevent interference with legitimate uses of the sea and other such matters as the authority thinks relevant), cumulative effects must be considered.

1.9.1.2 The CEA takes into account the impact associated with the Transmission Assets together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this report only include other projects which interact with the Fylde MCZ.

1.9.1.3 The cumulative assessment has been undertaken as follows.

- Scenario 1: Transmission Assets together with Morecambe Offshore Windfarm: Generation Assets.
- Scenario 2: Transmission Assets together with Morgan Offshore Wind Project: Generation Assets.
- Scenario 3: Transmission Assets together with Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets.
- Scenario 4: Scenario 3 together with Tier 1, Tier 2 and Tier 3 projects, plans and activities, defined as follows.
  - Scenario 4a: Scenario 3 and Tier 1 projects, plans and activities which are:

- under construction;
- permitted application;
- submitted application; or
- those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact.

– Scenario 4b: Scenario 4a and Tier 2 projects, plans and activities which a:
  - Scoping Report has been submitted in the public domain.

– Scenario 4c: Scenario 4b and Tier 3 projects, plans and activities which are:
  - where a Scoping Report has not been submitted and it is not in the public domain;
  - identified in the relevant Development Plan; or
  - identified in other plans and programmes.

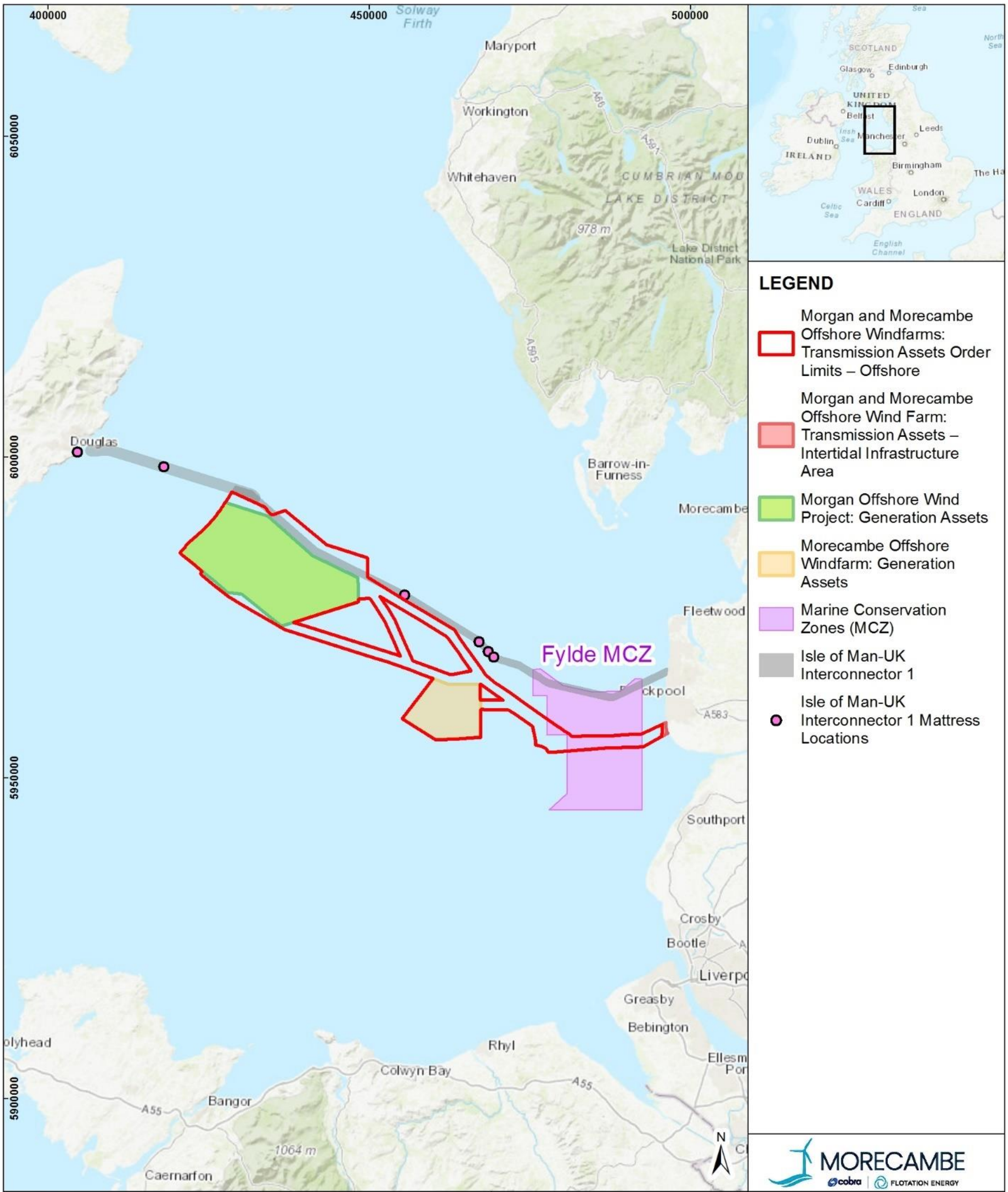
1.9.1.4 This tiered approach is adopted to provide a clear assessment of the Transmission Assets alongside other projects, plans and activities.

1.9.1.5 The specific projects, plans and activities scoped into the CEA for the MCZ Stage 1 assessment, are outlined in **Table 1.21** and shown in **Figure 1.9**.

## Table 1.21: List of other projects, plans and activities considered within the CEA for the MCZ Stage 1 assessment

| Project/Plan | Status | Distance from the Transmission Assets (nearest point, km) | Description of project/plan | Dates of construction (if applicable) | Dates of operation (if applicable) | Overlap with the Transmission Assets |
|---|---|---|---|---|---|---|
| Transmission Assets | - | - | - | 2027 – 2030 | 2030 – 2065 | - |
| Morecambe Offshore Windfarm: Generation Assets | Submitted | 0 | 480 MW Offshore Wind Farm (generating assets) | 2026 - 2029 | 2030 - 2065 | All phases of this project will overlap with all phases of the Transmission Assets. |
| Morgan Offshore Wind Project: Generation Assets | Submitted | 0 | 1.5 GW Offshore Wind Farm (generating assets) | 2026 - 2030 | 2030 - 2065 | All phases of this project will overlap with all phases of the Transmission Assets. |
| **Tier 1** | | | | | | |
| Isle of Man - UK Interconnector 1 - Maintenance and Repair (MLA/2016/00211) | Consented | 4.98 | Cable repair or maintenance to lay a new section of cable and or cable protection in the form of rock or concrete mattresses. | N/A | 2018 - 2033 | This maintenance and repair work for the Isle of Man Interconnector overlap with the construction and operation and maintenance phases of the Transmission Assets. |
| **Tier 2** | | | | | | |
| There are no relevant Tier 2 projects to consider in this MCZ Stage 1 assessment. | | | | | | |

| Project/Plan | Status | Distance from the Transmission Assets (nearest point, km) | Description of project/plan | Dates of construction (if applicable) | Dates of operation (if applicable) | Overlap with the Transmission Assets |
|---|---|---|---|---|---|---|
| **Tier 3** | | | | | | |
| Isle of Man – UK Interconnector 2 | Pre-application | Unknown | A new 70 MW to 100 MW HVAC interconnector to be operational by 2030 between the Isle of Man and north west England. | 2024 to 2030 | 2030 onwards | The location/route of the interconnector is currently unknown however there is potential for it to pass through the Fylde MCZ. This project is likely to overlap with the construction and operation and maintenance phases of the Transmission Assets. |
| Mooir Vannin - UK Transmission Assets | Pre-application | N/A | Comprising of offshore export cables and a booster station to connect the Mooir Vannin Offshore Wind Farm to the UK. | 2030 to 2033 | 2033 onwards | The construction and operation and maintenance phases of this project may temporally overlap with the operation and maintenance and decommissioning phases of the Transmission Assets. |




**Service Layer Credits:** Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

**Data Sources:** Client, The Crown Estate, Marine Management Organisation, Marine Scotland, Natural Resources Wales,

**Project Name:**
MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

0 2.5 5 10 nm
0 5 10 20 km

**Drawing Number:**
RPSE-ES-MCZ-003-04

**Drawing Title:**
OTHER PROJECTS/PLANS SCREENED INTO THE CUMULATIVE EFFECTS ASSESSMENT FOR THE MCZ ASSESSMENT

**Geodetic Information:**
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N
Scale@220mmx160mm: 1:1,000,000

| VER | DATE | DETAILS | BY | CHECK |
|---|---|---|---|---|
| 00 | 09/04/24 | First Issue | MJ | TH |
| 04 | 23/09/24 | Final | MJ | BM |

**Figure 1.9: Other projects and activities screened into the cumulative effects assessment for the Fylde MCZ**

1.9.1.6 Over the lifetime of the Transmission Assets, there is potential for up to three projects to overlap both spatially and temporally with the Fylde MCZ.

- Maintenance and repair to the Isle of Man - UK Interconnector 1 (Tier 1 project).
- The construction and operation and maintenance phases of the Isle of Man - UK Interconnector 2 (Tier 3 project).
- The construction and operation and maintenance phases of the Mooir Vannin – UK Transmission Assets (Tier 3 project).

1.9.1.7 These projects have been considered within the cumulative assessment for additive effects (i.e. temporary habitat disturbance, long term habitat loss, and colonisation of hard structures).

1.9.1.8 Regarding the Isle of Man-UK Interconnector 1 approximately 18.1 km of the cable overlaps the Fylde MCZ. Currently there is no cable protection associated with this project within the Fylde MCZ (Manx Cable Company, 2016).

1.9.1.9 As there is currently very little information available regarding the Tier 3 Isle of Man – UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets, therefore it is not yet possible to determine how much, if any, of these cables will overlap with the Fylde MCZ. A project description has however been published which described the Mooir Vannin Offshore Wind Farm as well as the Mooir Vannin – UK Transmission Assets (Mooir Vannin Offshore Wind Farm Ltd, 2024). This project description identified that Mooir Vannin – UK Transmission Assets will include export cables and offshore substations which will export power to the UK. The route of the Mooir Vannin – UK Transmission Assets is not yet available however it was identified that the export cables will connect to an onshore substation at Penwortham (Mooir Vannin Offshore Wind Farm Ltd, 2024).

1.9.1.10 A description of the significance of cumulative effects upon features of the MCZ arising from each identified impact within the Fylde MCZ is given below.

### 1.9.2 Temporary habitat disturbance

#### Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets

1.9.2.1 There is no spatial overlap between the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative temporary habitat disturbance with the Transmission Assets.

### Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets

1.9.2.2 There is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative temporary habitat disturbance with the Transmission Assets.

### Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets

1.9.2.3 As noted for scenarios 1 and 2 is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets, the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. These projects are, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative temporary habitat disturbance with the Transmission Assets.

### Scenario 4a: Scenario 3 + Tier 1

#### Construction phase

1.9.2.4 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Isle of Man-UK Interconnector 1. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative temporary habitat loss/disturbance with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man-UK Interconnector 1 only. The construction phase of the Transmission Assets temporally overlaps with potential maintenance and repair activities of the Isle of Man-UK Interconnector 1. There is no spatial overlap between the Transmission Assets and the Isle of Man-UK Interconnector 1 (there is 4.98 km between the two projects).

1.9.2.5 The temporary habitat disturbance associated with the maintenance of the Isle of Man-UK Interconnector 1 within the Fylde MCZ is 0.008 km$^2$ (Manx Utilities Ltd, 2017). The temporary habitat disturbance within the MCZ as a result of maintenance and repair of the Isle of Man Interconnector accounts for 0.0055 km$^2$ from cable trenching (a 1 km section within a width of 5.5 m), as well as 0.0027 km$^2$ for anchoring (50 anchor drops with a 10 m drag) (Manx Utilities Ltd, 2017). Any disturbance as a result of these maintenance activities was determined to be a one-off event and highly localised (Manx Utilities Ltd, 2017). Together with the Transmission Assets, the total habitat disturbance may be up to 2.51 km$^2$ within the Fylde MCZ, equating to 0.96% of the total area of the MCZ.

1.9.2.6 Activities resulting in temporary habitat disturbance may occur intermittently throughout construction phase of the Transmission

Assets, with only a small proportion of the total maximum area of temporary habitat disturbance occurring at any one time. As such, only a very small proportion of the temporary habitat disturbance that could occur over the lifetime of the Isle of Man-UK Interconnector 1 within the MCZ, if any is required at all, is likely to overlap with the construction of the Transmission Assets and contribute to a cumulative impact.

1.9.2.7 There is no spatial overlap between the Transmission Assets and the Isle of Man-UK Interconnector 1 within the Fylde MCZ (**Figure 1.9**), therefore there will be no repeat disturbance to the same areas of seabed within any part of the MCZ as a result of these projects. This will support the recovery processes for the ecological communities affected by temporary habitat disturbance as recovery will not be delayed by further physical disturbance and the recovery timescales described for the projects alone will apply.

### Physical attributes

1.9.2.8 The physical attributes of the subtidal sand protected features of the Fylde MCZ that are relevant to cumulative temporary habitat disturbance/loss are as described previously in **paragraphs 1.8.2.9**.

1.9.2.9 The subtidal sand feature extends across the majority of the Fylde MCZ (**Figure 1.5**). The MCZ Stage 1 assessment of the Isle of Man-UK Interconnector 1 attributes its whole impact to the subtidal sand feature therefore it has been assumed all of the cumulative temporary habitat disturbance could occur within the subtidal sand feature. The extent of cumulative habitat disturbance to the subtidal sand feature from the Isle of Man-UK Interconnector 1 together with the impact of the Transmission Assets to the subtidal sand feature is therefore predicted to be up to 1.56 $km^2$, which equates to 0.72% of the total extent of this feature within the MCZ. There will be no cumulative impact to the subtidal mud feature of the MCZ.

1.9.2.10 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- **Extent and distribution:** The maintenance and repair activities proposed for the Isle of Man - UK Interconnector 1 may involve the movement of material within the MCZ for trenching, however this is likely to be highly localised, and sediments are likely to be kept within the immediate area it was disturbed from. Overall 2.51 $km^2$ of temporary habitat disturbance/loss may result from the Transmission Assets together with the Isle of Man - UK Interconnector 1 (0.96% of the total area of Fylde MCZ). The area of subtidal sand feature potentially affected by the Transmission Assets and the Isle of Man - UK Interconnector 1 is very small in comparison to the full extent of the subtidal sand feature (0.72%) and would only result in temporary recoverable disturbance. This would result in no change in the extent and distribution of the subtidal sand feature within the MCZ.

- **Structure: sediment composition and distribution**: This attribute is unlikely to be affected by cumulative temporary habitat disturbance as the activities for the Transmission Assets and Isle of Man - UK Interconnector 1 are highly localised and are unlikely to involve the movement of sediment beyond the immediate site of works.

### Ecological attributes

1.9.2.11 The ecological attributes of the subtidal sand protected feature of the Fylde MCZ that are relevant to cumulative temporary habitat disturbance/loss are as described previously in **paragraph 1.8.2.24**.

#### Subtidal sand

1.9.2.12 The sensitivity of the subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.2.25** and **1.8.2.27**.

1.9.2.13 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The ecological attributes (**Distribution: presence and spatial distribution of biological communities, Structure and function: presence and abundance of key structural and influential species and Structure: species composition of component communities**) of this feature are unlikely to be impacted to a greater extent as a result of this cumulative impact. The very small area that may potentially be affected by maintenance of the Isle of Man - UK Interconnector 1 (0.0082 $km^2$) and its distance from the Transmission Assets (4.98 km) make it very unlikely that there will be a compounding impact upon the presence and spatial distribution of the biological communities and key/influential species of the subtidal sand feature. This would ensure that the recovery time of one to two years is maintained following the construction phase of the Transmission Assets. The minimal level of additional disturbance associated with this cumulative impact indicates that the time scale of recovery provided **in paragraphs 1.8.2.26** and **1.8.2.27** would still apply.

### Summary

1.9.2.14 Based on the information presented in **paragraphs 1.9.2.4** to **1.9.2.13**, it can be concluded that cumulative temporary habitat disturbance during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand feature of the Fylde MCZ in a favourable condition for the following reasons.

- While the cumulative temporary habitat disturbance is predicted to affect a small proportion of the subtidal sand feature (0.72%), and Fylde MCZ overall (0.96%), intermittently during the construction phase, these habitats will recover such that the **extent and distribution** of the subtidal sand protected feature will remain stable following the construction phase; and

- The **structures and functions** provided by the **component communities** will remain in (or recover to) a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the years following seabed preparation and cable installation, with complete recovery within the areas affected within a one to two years, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of construction.

**Operation and maintenance phase**

1.9.2.15 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Isle of Man Interconnector 1. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative temporary habitat loss/disturbance with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man Interconnector 1 only. The operation and maintenance phase of the Transmission Assets temporally overlaps with the potential maintenance and repair activities of the Isle of Man - UK Interconnector 1 for a period of three years (2030 to 2033). There is, however, no spatial overlap between the Transmission Assets and the Isle of Man – UK Interconnector 1.

1.9.2.16 The temporary habitat disturbance associated with the maintenance of the Isle of Man - UK Interconnector 1 within the Fylde MCZ is 0.008 $km^2$ (Manx Utilities Ltd, 2017) and is detailed in full in **paragraph 1.9.2.5**. These activities may only occur in the Transmission Assets operation and maintenance phase within the three years over which the marine licence for the Isle of Man - UK Interconnector 1 is valid. Together with the Transmission Assets, the total habitat disturbance may be up to 0.84 $km^2$ within the Fylde MCZ, equating to 0.32% of the total area of the MCZ.

1.9.2.17 The subtidal sand feature extends across the majority of the Fylde MCZ (**Figure 1.5**). The MCZ Stage 1 assessment of the Isle of Man - UK Interconnector 1 attributes its whole impact to the subtidal sand feature therefore it has been assumed all of the cumulative temporary habitat disturbance could occur within the subtidal sand feature. The extent of cumulative habitat disturbance to the subtidal sand feature is therefore predicted to be up to 0.53 $km^2$, which equates to 0.24% of the total extent of this feature within the MCZ.

1.9.2.18 Activities resulting in temporary habitat disturbance may occur intermittently throughout the operation and maintenance phase of the Transmission Assets, with only a proportion of the total maximum area of temporary habitat disturbance occurring at any one time. As such, only a very small proportion of the temporary habitat disturbance that could occur over the lifetime of the Isle of Man - UK Interconnector 1 within the MCZ, if any is required at all, is likely to temporally overlap with the operation and maintenance phase of the Transmission Assets and contribute to a cumulative impact. This is largely due to the short period of potential temporal overlap between these two projects (i.e. three years). As detailed in **Table 1.17**, the lengths of cable within the MCZ which may require repair or reburial at any one time are very small, further reducing the magnitude of this impact. Additionally, as in the construction phase there is no spatial overlap between the Transmission Assets and Isle of Man - UK Interconnector 1 within the Fylde MCZ (**Figure 1.9**) (there is 4.98 km between the two projects), therefore there will be no repeat disturbance to the same areas of seabed within any part of the MCZ as a result of these projects.

1.9.2.19 The impact of the cumulative temporary habitat disturbance impact is slightly increased in the operation and maintenance phase compared to the Transmission Assets alone assessment. The cumulative impact on the subtidal sand feature of the Fylde MCZ will, however, be intermittent over a short time frame (i.e. three years of potential temporal overlap between the two projects) with each individual disturbance event of a very small scale. The impact is, therefore as described in **paragraph 1.8.2.49**.

### Summary

1.9.2.20 Based on the information presented in **paragraphs 1.9.2.15** to **1.9.2.19**, it can be concluded that cumulative temporary habitat disturbance during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand protected features of the Fylde MCZ in a favourable condition for the following reasons.

- While the cumulative temporary habitat disturbance is predicted to affect a small proportion of the Fylde MCZ (0.32%) and specifically the subtidal sand feature (0.24%) intermittently during the operation and maintenance phase, these habitats will recover such that the **extent and distribution** of the subtidal sand protected feature will remain stable following the construction phase.
- The **structures and functions** provided by the **component communities** will remain in (or recover to) a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the months/years following cable maintenance, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of maintenance if not months due to the small extent of the areas disturbed.

### Scenario 4b: Scenario 4a + Tier 2

1.9.2.21 There are no Tier 2 projects which overlap with the Fylde MCZ, therefore no assessment for Scenario 4b is required.

### Scenario 4c: Scenario 4b + Tier 3

#### Construction phase

1.9.2.22 Scenario 4c in the construction phase includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Isle of Man-UK Interconnector 1 and the Isle of Man-UK Interconnector 2. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative temporary habitat loss/disturbance with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4c includes the Transmission Assets together with the Isle of Man-UK Interconnector 1 and Isle of Man-UK Interconnector UK 2 only. The construction phase of the Transmission Assets temporally overlaps with potential construction phase of the proposed Isle of Man - UK Interconnector 2. Scenario 4c also encompasses the Tier 1 and 2 projects which in this case only includes the Isle of Man - UK Interconnector 1 operation and maintenance licences.

1.9.2.23 There are no details in the public domain relating to the design of the proposed Isle of Man - UK Interconnector 2 project including the proposed route, therefore it is uncertain whether there would be any overlap with the Fylde MCZ. The extent and location of temporary habitat disturbance associated with the construction of the proposed Isle of Man - UK Interconnector 2 within the Fylde MCZ is therefore unknown. However, construction of the proposed Isle of Man - UK Interconnector 2 is likely to include activities such as site preparation (e.g. sandwave clearance and boulder clearance), UXO clearance and trenching for installation. Therefore, the impacts associated with the proposed Isle of Man - UK Interconnector 2 within the Fylde MCZ (if there is any overlap), are likely to be similar in magnitude to that associated with the construction of the Transmission Assets. This would lead to a small increase in the area affected by cumulative temporary habitat disturbance within the Fylde MCZ from the area detailed for Scenario 4a in **paragraph 1.9.2.10**.

1.9.2.24 Assuming there is a spatial overlap between the proposed Isle of Man - UK Interconnector 2 within the Fylde MCZ, activities resulting in temporary habitat disturbance may occur in the construction phase of the Transmission Assets with the cable currently scheduled to be installed in 2028 (Isle of Man Today, 2023). It is possible therefore that the construction phase of the Transmission Assets could overlap temporally with the construction phase Isle of Man-UK Interconnector 2 and therefore both projects could undertake construction in the Fylde MCZ at the same time.

1.9.2.25 As it is not currently known if there will be an overlap between the Transmission Assets and the Isle of Man - UK Interconnector 2 within the Fylde MCZ, there is a possibility for repeat disturbance to the same areas of seabed as a result of these projects.

### Physical attributes

1.9.2.26 The physical attributes of the subtidal sand and subtidal mud protected feature of the Fylde MCZ that are relevant to cumulative temporary habitat disturbance/loss are as described previously in **paragraph 1.8.2.9**.

1.9.2.27 As the route for the proposed Isle of Man - UK Interconnector 2 is unknown the temporary habitat disturbance/loss associated with the project could be attributed to either the subtidal sand or subtidal mud feature therefore it has been assumed that all the cumulative temporary habitat disturbance could occur within either the subtidal sand or subtidal mud feature.

1.9.2.28 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected feature of the Fylde MCZ.

- **Extent and distribution:** The construction activities which are likely to be associated with the proposed Isle of Man - UK Interconnector 2 (if the route spatially overlaps with the Fylde MCZ) will involve the movement of material within the MCZ for cable installation/seabed preparation, however this is likely to be highly localised to within the cable corridor. Overall the area potentially affected by the construction of the proposed Isle of Man - UK Interconnector 2 is likely to be very small and will not contribute to a significant increase in the extent of temporary habitat disturbance in the MCZ in comparison to the full extent of either the subtidal sand or subtidal mud features. All impacts would only result in temporary and recoverable disturbance. This would result in no change in the extent and distribution of either feature within the MCZ.
- **Structure: sediment composition and distribution**: This attribute is unlikely to be affected by cumulative temporary habitat disturbance as the activities for the Transmission Assets and proposed Isle of Man - UK Interconnector 2 are highly localised and is unlikely to involve the movement of sediment beyond the immediate site of works.

### Ecological attributes

1.9.2.29 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative temporary habitat disturbance/loss are as described previously in **paragraph 1.8.2.24** for subtidal sand and **paragraph 1.8.2.33** for subtidal mud.

#### Subtidal sand and mud

1.9.2.30 The sensitivity of the subtidal sand and subtidal mud protected features and their associated communities to this impact are detailed in **paragraphs 1.8.2.25** and **1.8.2.28** for subtidal sand and **paragraph 1.8.2.30 to 1.8.2.33** for subtidal mud.

1.9.2.31 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- The ecological attributes (**Distribution: presence and spatial distribution of biological communities, Structure and function: presence and abundance of key structural and influential species and Structure: species composition of component communities**) of this feature are unlikely to be impacted to a significantly greater extent as a result of this cumulative impact compared to the Transmission Assets alone. The small area which is likely to be affected by all projects in this scenario (i.e. the construction of the proposed Isle of Man - UK Interconnector 2, the operation and maintenance of the Isle of Man - UK Interconnector 1 and the Transmission Assets) make it very unlikely that there will be an impact upon the presence and spatial distribution of the biological communities and key/influential species of the subtidal sand and subtidal mud features. This would ensure that the recovery time of one to two years is maintained following the construction phase of the Transmission Assets. The minimal level of additional disturbance associated with this cumulative impact indicates that the time scale of recovery provided in the Transmission Assets construction phase **(section 1.8.2)** would still apply.

### Summary

1.9.2.32 Based on the information presented in **paragraphs 1.9.2.22** to **1.9.2.31**, it can be concluded that cumulative temporary habitat disturbance during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- While the cumulative temporary habitat disturbance is predicted to affect a small proportion of the subtidal sand and mud features during the construction phase, these habitats will recover such that the **extent and distribution** of the subtidal sand and subtidal mud protected feature will remain stable following the construction phase.
- The **structures and functions** provided by the **component communities** will remain in (or recover to) a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the years following seabed preparation and cable installation, with complete recovery within the

areas affected within a one to two years, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of construction.

### Operation and maintenance phase

1.9.2.33 Scenario 4c in the operation and maintenance phase includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Isle of Man-UK Interconnector 1, the Isle of Man-UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative temporary habitat loss/disturbance with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4c includes the Transmission Assets together with the Isle of Man-UK Interconnector 1, the Isle of Man-UK Interconnector UK 2 and the Mooir Vannin – UK Transmission Assets only. The operation and maintenance phase of the Transmission Assets is likely to temporally overlap with the potential maintenance and repair activities of the proposed Isle of Man - UK Interconnector 2 project as well as the construction and operation and maintenance phases of the Mooir Vannin – UK Transmission Assets. Scenario 4c also encompasses the Tier 1 and 2 projects which in this case only includes the Isle of Man - UK Interconnector 1 operation and maintenance licences.

1.9.2.34 Any temporary habitat disturbance which is associated with the maintenance of the proposed Isle of Man - UK Interconnector 2 (if indeed the project spatially overlaps with the Fylde MCZ) is likely to result in a similar extent of temporary habitat disturbance as the Isle of Man - UK Interconnector 1 as detailed in **paragraph 1.9.2.16**.

1.9.2.35 The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a landfall at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). Any temporary habitat disturbance within the Fylde MCZ associated with the construction and operation and maintenance of Mooir Vannin – UK Transmission Assets (if indeed the project spatially overlaps with the Fylde MCZ) is likely to result in a similar extent of temporary habitat disturbance as described for the Transmission Assets as detailed in **section 1.8.2**.

1.9.2.36 These activities would increase the temporary habitat disturbance within the Fylde MCZ from the 0.84 $km^2$ detailed in the operation and maintenance phase (**paragraph 1.9.2.16**) for Scenario 4a (i.e. as a result of the cumulative impact from the Transmission Assets and the Isle of Man – UK Interconnector 1).

1.9.2.37 As the route for the proposed Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets is unknown the temporary habitat disturbance associated with the projects could be attributed to either the subtidal sand or subtidal mud feature therefore it has been assumed that all of the cumulative temporary habitat disturbance could occur within either the subtidal sand or mud feature.

1.9.2.38 Activities resulting in temporary habitat disturbance, such as sandwave clearance and cable installation (during the construction phase of the Mooir Vannin – UK Transmission Assets) and cable repair and reburial (during maintenance for all projects in this scenario), may occur intermittently throughout the operation and maintenance phase of the Transmission Assets, with only a small proportion of the total maximum area of temporary habitat disturbance occurring at any one time. As such, only a very small proportion of the temporary habitat disturbance that could occur over the lifetime of the proposed Isle of Man - UK Interconnector 2 and Mooir Vannin – UK Transmission Assets within the Fylde MCZ, if any occurs at all (i.e. the routes are currently unknown and so potential overlap with the Fylde MCZ is also unknown), is likely to temporally overlap with the operation and maintenance of the Transmission Assets and contribute to a cumulative impact. It is not currently known if there will be an overlap between the Transmission Assets and the proposed Isle of Man - UK Interconnector 2 or the Mooir Vannin – UK Transmission Assets within the Fylde MCZ, therefore there is a possibility for repeat disturbance to the same areas of seabed as a result of these projects.

1.9.2.39 The impact on the subtidal sand and subtidal mud features of the Fylde MCZ will, however, be intermittent over a longer time frame (i.e. 35 years operational lifetime) with each individual disturbance event of a very small scale and duration.

#### Summary

1.9.2.40 Based on the information presented in **paragraphs 1.9.2.33** to **1.9.2.39**, it can be concluded that cumulative temporary habitat disturbance during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- While the cumulative temporary habitat disturbance is likely to affect a small proportion of the subtidal sand or mud features intermittently during the operation and maintenance phase, these habitats will recover such that the **extent and distribution** of the subtidal sand and subtidal mud protected feature will remain stable following the construction phase.
- The **structures and functions** provided by the **component communities** will remain in (or recover to) a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the months/years following cable

maintenance, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of maintenance if not months due to the small extent of the areas disturbed.

### Decommissioning phase

1.9.2.41 Scenario 4c in the decommissioning phase includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, and the operation and maintenance phase of the Mooir Vannin – UK Transmission Assets. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative temporary habitat loss/disturbance with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4c includes the Transmission Assets together with the Mooir Vannin – UK Transmission Assets only. The decommissioning phase of the Transmission Assets is likely to temporally overlap with any potential maintenance and repair activities of the proposed Mooir Vannin – UK Transmission Assets.

1.9.2.42 The Mooir Vannin – UK Transmission Assets is likely to be in the operation and maintenance phase at the time of decommissioning of the Transmission Assets. The activities involved in this phase of the project are likely to involve the repair and reburial of cable as well as any structural maintenance to the booster station (if required) resulting in disturbance at a similar magnitude to the Transmission Assets as detailed in **section 1.8.2**.

1.9.2.43 These activities would increase the temporary habitat disturbance within the Fylde MCZ from what is detailed in the decommissioning phase for the Transmission Assets alone assessment (**paragraph 1.8.2.55**).

1.9.2.44 As the route for the proposed Mooir Vannin – UK Transmission Assets is unknown the temporary habitat disturbance associated with the project could be attributed to either the subtidal sand or subtidal mud feature therefore it has been assumed that all of the cumulative temporary habitat disturbance during the decommissioning phase of the Transmission Assets could occur within either the subtidal sand or mud feature.

1.9.2.45 Activities resulting in temporary habitat disturbance, such as cable repair and reburial for the Mooir Vannin – UK Transmission Assets, may occur intermittently throughout the decommissioning phase of the Transmission Assets, with only a small proportion of the total maximum area of temporary habitat disturbance occurring at any one time. As such, only a very small proportion of the temporary habitat disturbance that could occur over the lifetime of the proposed Mooir Vannin – UK Transmission Assets within the MCZ, if any is required at all, is likely to temporally overlap with the decommissioning phase of the Transmission Assets and contribute to a cumulative impact. It is not currently known if there will be an overlap between the Transmission Assets and the proposed Mooir Vannin – UK Transmission Assets within the Fylde MCZ, therefore there is a possibility for repeat disturbance to the same areas of seabed as a result of these projects.

1.9.2.46 The impact on the subtidal sand and subtidal mud features of the Fylde MCZ will, however, be intermittent over a longer time frame (i.e. 35 years operational lifetime) with each individual disturbance event of a very small scale and duration.

#### Summary

1.9.2.47 Based on the information presented in **paragraphs 1.9.2.33** to **1.9.2.39**, it can be concluded that cumulative temporary habitat disturbance during the Transmission Assets decommissioning phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- While the cumulative temporary habitat disturbance is likely to affect a small proportion of the subtidal sand or mud features intermittently during the decommissioning phase, these habitats will recover such that the **extent and distribution** of the subtidal sand and subtidal mud protected feature will remain stable following the construction phase.
- The **structures and functions** provided by the **component communities** will remain in (or recover to) a condition which is healthy and not deteriorating in the long term. Recovery of the seabed sediment will occur in the months/years following cable removal, allowing the long term maintenance of the **sediment composition and distribution**. The **key structural and influential species** are predicted to recolonise disturbed sediment, with full recovery of characteristic communities within one to two years of removal, if not months due to the small extent of the areas disturbed.

## 1.9.3 Increases in suspended sediment concentration and associated deposition

### Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets

#### Construction phase

1.9.3.1 The Morecambe Offshore Windfarm: Generation Assets will be in the construction phase at the same time as the Transmission Assets and may also result in increases in SSC and associated deposition as a result of the installation activities such as foundation drilling and cable trenching.

### Physical attributes

1.9.3.2 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.6**.

1.9.3.3 The MDS for Morecambe Offshore Windfarm: Generation Assets includes seabed preparation for 40 conical gravity bases, up to 12 km of sandwave clearance, foundation installation of 30 monopile wind turbine structures and 120 km of cable trenching. In terms of sedimentation, ‘light’ deposition is anticipated to deposit on a small proportion of the Fylde MCZ (Morecambe Offshore Windfarm Ltd., 2023). Additionally at a distance of approximately 8 km from the windfarm site it is unlikely that the temporary increase in SSC and deposition from the Morecambe Offshore Windfarm: Generation Assets would be distinguishable from background levels and would be in line with the range of natural variability (Morecambe Offshore Windfarm Ltd., 2023).

1.9.3.4 The construction of the Transmission Assets within the Fylde MCZ is predicted to result in sedimentation levels beyond the immediate vicinity of the trench of approximately 10 mm and reducing to <1 mm within 2 km. Noting that much of the displaced material would, in reality, be used to backfill the trench (see **paragraph 1.8.3.9**).

1.9.3.5 It is noted that given the relationship of these projects site preparation and installation of infrastructure would be phased and SSC increases would not occur concurrently. However, should multiple operations be undertaken plumes would be advected on the tide and not towards one another and these activities would be of limited spatial extent and frequency and plume interactions likely of a low magnitude and short duration. In both cases the majority of sedimentation would occur within close proximity to each installation however, given the active sediment transport regime deposited material would be redistributed across the vicinity.

1.9.3.6 This is supported by the conclusions of the Morecambe Offshore Windfarm: Generation Assets MCZ Stage 1 Assessment (Morecambe Offshore Windfarm Ltd, 2023) which indicated that due to the distance between the Morecambe Offshore Windfarm: Generation Assets and Fylde MCZ (over 8 km) there was no need to consider the sensitivity of the features to the heavier smothering and siltation rate changes which may occur within 1 km of the windfarm site. At this distance any increase in SSC and associated deposition would be indistinguishable from background levels and well in line with the range of natural variability.

1.9.3.7 Due to the mobile nature of the SSC plumes this cumulative impact may affect both the subtidal sand and subtidal mud feature of the Fylde MCZ.

1.9.3.8 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud features of the Fylde MCZ.

- The level of change associated with construction activities for the Morecambe Offshore Windfarm: Generation Assets has the potential to be small in magnitude and intermittent in nature throughout the period of temporal overlap with the Transmission Assets. Additionally, it is unlikely that the sediment plumes created by the Morecambe Offshore Windfarm: Generation Assets will interact with the sediment plumes created by the Transmission Assets enhancing sedimentation levels. As a result it is unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.13** details the effect of an increase in SSC and associated deposition on the relevant physical attributes (**structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)**).

### Ecological attributes

1.9.3.9 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.14**.

#### Subtidal sand

1.9.3.10 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.15** and **1.8.3.16**.

1.9.3.11 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The level of change associated with construction activities for the Morecambe Offshore Windfarm: Generation Assets has the potential to be small in magnitude and intermittent in nature throughout the period of temporal overlap with the Transmission Assets. Additionally, it is unlikely that the sediment plumes created by the Morecambe Offshore Windfarm: Generation Assets will interact with the sediment plumes created by the Transmission Assets enhancing sedimentation levels. As a result it is unlikely that the cumulative impact on the benthic communities within the Fylde MCZ will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.17** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Subtidal mud

1.9.3.12 The sensitivity of this subtidal mud protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.19** and **1.8.3.20**.

1.9.3.13 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The level of change associated with construction activities for the Morecambe Offshore Windfarm: Generation Assets has the potential to be small in magnitude and intermittent in nature throughout the period of temporal overlap with the Transmission Assets. Additionally, it is unlikely that the sediment plumes created by the Morecambe Offshore Windfarm: Generation Assets will interact with the sediment plumes created by the Transmission Assets enhancing sedimentation levels. As a result it is unlikely that the cumulative impact on the benthic communities within the Fylde MCZ will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Summary

1.9.3.14 Based on the information presented in **paragraphs 1.9.3.1** to **1.9.3.13**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of sandwave clearance and cable installation from the Transmission Assets and construction activities from the Morecambe Offshore Windfarm: Generation Assets. The effect will, however, remain localised, with no interaction, and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC

and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.

- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally, any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

**Operation and maintenance phase**

1.9.3.15 The Transmission Assets and the Morecambe Offshore Windfarm: Generation Assets are on the same projected timeline and will therefore both be in the operation and maintenance phase at the same time.

**Physical attributes**

1.9.3.16 Potential cumulative impacts associated with the Morecambe Offshore Windfarm: Generation may relate to repair and reburial of up to 300 m of inter-array cables per year as well as the associated jack-ups. However, maintenance activities are both intermittent and a smaller scale than that of the construction phase and therefore any potential cumulative impacts are less likely to occur and be on a smaller scale. Additionally at a distance of approximately 8 km from the windfarm site, and considering the small scale of the maintenance activities, it is unlikely that the temporary increase in SSC and deposition from the Morecambe Offshore Windfarm: Generation Assets would be distinguishable from background levels and would be in line with the range of natural variability (Morecambe Offshore Windfarm Ltd., 2023).

1.9.3.17 If maintenance works to the Transmission Assets and the Morecambe Offshore Windfarm: Generation Assets occur simultaneously, it is likely that suspended sediment plumes from export cable and inter array cable repair or reburial could interact. However, these activities would be of limited spatial extent and frequency and plume interactions likely of a low magnitude and short duration.

1.9.3.18 If cable repairs are undertaken within a distance of 5 km of the Fylde MCZ, then the magnitude of impact would be as described for the construction phase in the construction phase (**paragraphs 1.9.3.2 to 1.9.3.6**).

1.9.3.19 Due to the mobile nature of the SSC plumes this cumulative impact may affect both the subtidal sand and subtidal mud feature of the Fylde MCZ.

1.9.3.20 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the Morecambe Offshore Windfarm: Generation Assets has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone. **Paragraph 1.8.3.29** details the effect of an increase in SSC and associated deposition on the relevant physical attributes (**structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)**).

### Ecological attributes

1.9.3.21 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.30**.

#### Subtidal sand

1.9.3.22 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.15** and **1.8.3.16.**

1.9.3.23 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the Morecambe Offshore Windfarm: Generation Assets is likely to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone. **Paragraph 1.8.3.32** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Subtidal mud

1.9.3.24 The sensitivity of this subtidal mud protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.19** and **1.8.3.20**.

1.9.3.25 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the Morecambe Offshore Windfarm: Generation Assets is likely to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.35** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure**

**and function: presence and abundance of key structural and influential species**).

### Summary

1.9.3.26 Based on the information presented in **paragraphs 1.9.3.15** to **1.9.3.25**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of cable maintenance activities for the Morecambe Offshore Windfarm: Generation Assets however the effect will be highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally, any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets

1.9.3.27 The Morgan Offshore Wind Project: Generation Assets will be in the construction phase at the same time as the Transmission Assets and may also result in increases in SSC and associated deposition as a result of the installation activities such as foundation drilling and cable trenching. The MDS for the Morgan Offshore Wind Project: Generation Assets for SSC includes site preparation with sandwave clearance along 286 km inter-array and interconnector cables, installation of up to 45 three-legged jacket piles, 23 conical gravity base foundations, a six-legged OSP with three piles per leg and trenching for 450 km of inter-array and interconnector cables.

1.9.3.28 The construction of the Transmission Assets within the Fylde MCZ is predicted to result in sedimentation levels beyond the immediate vicinity of the trench of approximately 10 mm and reducing to < 1 mm within

2 km. Noting that much of the displaced material would, in reality, be used to backfill the trench.

1.9.3.29 Sedimentation for the Morgan Offshore Wind Project: Generation Assets is predicted to be typically <50 mm beyond the immediate vicinity of the installation and less than one tenth of this value in the wider domain and is generally limited to the Morgan Offshore Wind Project: Generation Assets (Morgan Offshore Wind Ltd., 2024b). The SSC plumes would not extend to the Fylde MCZ as the Morgan Offshore Wind Project: Generation Assets is 29.2 km from the MCZ.

1.9.3.30 It is noted that given the relationship of these projects site preparation and installation of infrastructure would be phased and SSC increases would not occur concurrently. However, should multiple operations be undertaken plumes would be advected on the tide and not towards one another and these activities would be of limited spatial extent and frequency and plume interactions likely of a low magnitude and short duration. In both cases the majority of sedimentation would occur within close proximity to each installation however, given the active sediment transport regime deposited material would be redistributed across the vicinity.

1.9.3.31 Based on these conclusions, no further assessment will be conducted due to the lack of cumulative impact on the Fylde MCZ.

### Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets

#### Construction phase

1.9.3.32 The magnitude of the cumulative effect of increased SSC and subsequent deposition from the Transmission Assets, Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets will be a combination of scenario 1 and 2 in a spatial sense. However, the cumulative magnitude of impact in the construction phase will be no greater than scenario 1 or 2 alone. This is due to the fact that the Generation Assets are separated by a distance of 16.76 km and owing to the principal orientation of the tidal currents, no increased cumulative effect between the two projects are predicted to occur.

1.9.3.33 The cumulative impact of increased SSC and subsequent deposition from the Transmission Assets, Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets for the construction phase are therefore as described in **paragraphs 1.9.3.2** to **1.9.3.13**.

#### Summary

1.9.3.34 Based on the information presented in **paragraphs 1.9.3.32** and **1.9.3.33**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets construction phase **will not lead to a significant risk of hindering the**

**achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of sandwave clearance and cable installation from the Transmission Assets and construction activities from the Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets. The effect will, however, remain localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally, any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Operation and maintenance phase

1.9.3.35 As in the construction phase, the magnitude of the cumulative effect of increased SSC and subsequent deposition from the Transmission Assets, Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets will be a combination of scenario 1 and 2 in a spatial sense. However, the cumulative magnitude of impact in the operation and maintenance phase will be no greater than scenario 1 or 2 alone. This is due to the fact that the Generation Assets are separated by a distance of 16.76 km and owing to the principal orientation of the tidal currents, no increased cumulative effect between the two projects are predicted to occur.

1.9.3.36 The cumulative impact of increased SSC and subsequent deposition from the Transmission Assets, Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets for the operation and maintenance phase are therefore as described in **paragraphs 1.9.3.16** to **1.9.3.25**.

### Summary

1.9.3.37 Based on the information presented in **paragraphs 1.9.3.35** and **1.9.3.36**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering** the achievement of the overall conservation objective of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of cable maintenance activities for the Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets however the effect will be highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally, any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Scenario 4a: Scenario 3 + Tier 1

#### Construction phase

1.9.3.38 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Tier 1 Isle of Man-UK Interconnector 1 project. The construction phase of the Transmission Assets coincides with the maintenance and repair activities for the Isle of Man - UK Interconnector 1. As a result of the activities associated with this project there is expected to be some intermittent cumulative increases in SSC and associated sediment deposition which may temporally overlap with activities resulting in from the Transmission Assets.

#### Physical attributes

1.9.3.39 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.6**.

1.9.3.40 The Isle of Man - UK Interconnector 1 lies within and in close proximity to the Fylde MCZ and so there is potential for cumulative impacts. Any maintenance activities within the Fylde MCZ would include trenching, deployment of anchors and jack-up barge use which may result in the suspension of sediments which may disperse before resettling (Manx

Utilities Ltd., 2017). The scale of this effect is likely to be very small with only 1.4 mm of deposition (Manx Utilities Ltd., 2017). The effect of deposition of suspended sediments are likely to be localised and short term with all sedimentation expected to be dispersed within one tidal cycle (Manx Utilities Ltd., 2017). During reburial of cables, sediments would be disturbed through the creation of the trench, the accumulation of spoil berms either side and the generation of some suspended sediments. Any sediment dispersed as a result of these activities will only travel over a short distance depending on grain size before re-settling, reaching a maximum of 250 m from the trench location resulting in a sedimentation layer of between 7 – 1.4 mm (Manx Utilities Ltd., 2017). It is unlikely that there would be any spatial overlap between the sedimentation arising from the Transmission Assets and that from the Isle of Man-UK Interconnector 1 as the projects are 4.98 km apart. However if they did interact the impact would be very minor as sedimentation for the Transmission Assets is <0.5 mm beyond 2 km. This is however considered highly unlikely to occur as temporally it would require maintenance activities to occur at a section of the Isle of Man – UK Interconnector 1 in close proximity to where the Transmission Assets offshore export cables are being installed at the same time.

1.9.3.41 The magnitude of the cumulative impact would vary depending on the location and scale of reburial operations and also the timing of the work relative to the Transmission Assets. In the unlikely event that activities temporally overlap, there is potential that suspended sediment plumes could interact. As with other maintenance activities these would be intermittent and limited in nature.

1.9.3.42 Due to the mobile nature of the SSC plumes this cumulative impact may effect both the subtidal sand and subtidal mud features of the Fylde MCZ.

1.9.3.43 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility.

1.9.3.44 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.17** details the effect of an increase in SSC and associated deposition on the relevant physical attributes (**structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)**).

### Ecological attributes

1.9.3.45 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.14**.

#### Subtidal sand

1.9.3.46 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.15** and **1.8.3.16**.

1.9.3.47 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.17** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Subtidal mud

1.9.3.48 The sensitivity of this subtidal mud protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.19** and **1.8.3.20**.

1.9.3.49 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

### Summary

1.9.3.50 Based on the information presented in **paragraphs 1.9.3.38** to **1.9.3.49**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of sandwave clearance and cable installation from the Transmission Assets and maintenance activities from the Isle of Man – UK Interconnector 1. The effect will, however, remain highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes such as an increase in SSC up to 1,000 mg/l however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally, any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Operation and maintenance phase

1.9.3.51 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Tier 1 Isle of Man-UK Interconnector 1 project. The operation and maintenance phase of the Transmission Assets coincides with the maintenance phase of the Isle of Man - UK Interconnector 1. The activities associated with this project are expected to result in some intermittent cumulative increases in SSC and associated sediment deposition. These activities may temporally overlap with activities resulting from the Transmission Assets however, the likelihood of occurrence if greatly reduced in the operation and maintenance phase compared to the construction phase.

### Physical attributes

1.9.3.52 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in

SSC and associated deposition are as described previously in **paragraph 1.8.3.27**.

1.9.3.53 The magnitude of the increase in SSC arising from maintenance activities during operation and maintenance phase, has been assessed as low for the Transmission Assets alone. If cables repairs are undertaken within 5 km of the Fylde MCZ, then the magnitude of impact would be as described for the construction phase (**paragraph 1.9.3.44**).

1.9.3.54 During the period of temporal overlap between the Transmission Assets and Isle of Man -UK Interconnector 1 (three years) there may be continued maintenance of the Isle of Man - UK Interconnector 1 which was described in the previous section (**paragraph 1.9.2.16**). Whilst the potential magnitude of the cumulative impacts is the same, the likelihood of occurrence is greatly reduced.

1.9.3.55 Due to the mobile nature of the SSC plumes this cumulative impact may affect both the subtidal sand and subtidal mud feature of the Fylde MCZ.

1.9.3.56 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone. **Paragraph 1.8.3.29** details the effect of an increase in SSC and associated deposition on the relevant physical attributes (**structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)**).

### Ecological attributes

1.9.3.57 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.30**.

#### Subtidal sand

1.9.3.58 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.15** and **1.8.3.16.**

1.9.3.59 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the

Transmission Assets alone. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

**Subtidal mud**

1.9.3.60 The sensitivity of this subtidal mud protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.19** and **1.8.3.20**.

1.9.3.61 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

### Summary

1.9.3.62 Based on the information presented in **paragraphs 1.9.3.51** to **1.9.3.61**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of cable maintenance activities however the effect will be highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes such as an increase in SSC up to 500 mg/l however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC

and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.

- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Scenario 4b: Scenario 4a + Tier 2

1.9.3.63 There are no Tier 2 projects which overlap with the Fylde MCZ, therefore no assessment for Scenario 4b is required.

### Scenario 4c: Scenario 4b + Tier 3

#### Construction phase

1.9.3.64 Scenario 4c includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Tier 1 Isle of Man-UK Interconnector 1 project and the Tier 3 Isle of Man-UK Interconnector 2 project. As discussed in Scenario 4b, there are no Tier 2 projects which are relevant to the CEA for the Fylde MCZ. The construction phase of the Transmission Assets may coincide with the construction for the proposed Isle of Man - UK Interconnector 2. As a Tier 3 project there is little known about the Isle of Man - UK Interconnector 2 as a scoping report is yet to be released therefore detail regarding location and timing can only be estimated. There is potential that activities which could be associated with this project (e.g. sandwave clearance, boulder clearance and trenching for cable installation) could result in some intermittent cumulative increases in SSC and associated sediment deposition which may temporally overlap with activities resulting in from the Transmission Assets.

#### Physical attributes

1.9.3.65 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.6**.

1.9.3.66 The proposed Isle of Man - UK Interconnector 2 has the potential to cross the Fylde MCZ or be within close proximity to the Fylde MCZ and so there is potential for cumulative impacts. Interconnector cable installation activities would likely be of similar magnitude and extent as those associated with the Transmission Assets cable installation operations. Dependent on the detailed design and cable routing associated with the interconnector cable a cumulative impact may arise with the Transmission Assets with respect to the Fylde MCZ. As a Tier 3 project there is limited information available in this respect, however it is anticipated that this impact would be temporary in nature and of limited scale.

1.9.3.67 Due to the mobile nature of the SSC plumes this cumulative impact may effect both the subtidal sand and subtidal mud feature of the Fylde MCZ.

1.9.3.68 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility.

1.9.3.69 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud features of the Fylde MCZ.

- Due to the minor level of change associated with maintenance activities for the proposed Isle of Man - UK Interconnector 2 it is unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.17** details the effect of an increase in SSC and associated deposition on the relevant physical attributes (**structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)**).

### Ecological attributes

1.9.3.70 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increases in SSC and associated deposition are as described previously in **paragraph 1.8.3.14**.

#### Subtidal sand

1.9.3.71 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.15** and **1.8.3.16**.

1.9.3.72 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The level of change associated with construction activities for the proposed Isle of Man - UK Interconnector 2 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.17** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Subtidal mud

1.9.3.73 The sensitivity of this subtidal mud protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.19** and **1.8.3.20**.

1.9.3.74 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The level of change associated with construction activities for the proposed Isle of Man - UK Interconnector 2 has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

### Summary

1.9.3.75 Based on the information presented in **paragraphs 1.9.3.64** to **1.9.3.75**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets construction phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of sandwave clearance and cable installation from the Transmission Assets and construction activities from the Isle of Man - UK Interconnector 2 however the effect will remain highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes such as an increase in SSC up to 1,000 mg/l however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally, any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### Operation and maintenance phase

1.9.3.76 Scenario 4c includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Tier 1 Isle of Man-UK Interconnector 1 project, the two Tier 3 projects; the Isle of Man-UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. As discussed in Scenario 4b, there are no Tier 2 projects which are relevant to the CEA for the Fylde MCZ. The operation and maintenance phase of the Transmission Assets coincides with the maintenance phase of the proposed Isle of Man - UK Interconnector 2 and construction an operation and maintenance phases of the Mooir Vannin – UK Transmission Assets. The magnitude of impact associated with operation and maintenance activities associated with the Isle of Man to UK Interconnector Cable 2 and the construction and operation and maintenance of the Mooir Vannin – UK Transmission Assets, are expected to be similar to those associated with installation and reburial/repair activities for the Transmission Assets. The activities potentially associated with the two Tier 3 projects are expected to result in some intermittent cumulative increases in SSC and associated sediment deposition. These activities may temporally overlap with activities resulting from the Transmission Assets however, the likelihood of concurrent occurrence if greatly reduced in the operation and maintenance phase compared to the construction phase.

#### Physical attributes

1.9.3.77 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.27**.

1.9.3.78 The magnitude of the increase in SSC arising from installation and maintenance activities during operation and maintenance phase, has been assessed as low for the Transmission Assets alone. If cables repairs are undertaken within 5 km of the Fylde MCZ, then the magnitude of impact would be as described for the construction phase (**paragraph 1.9.3.44**).

1.9.3.79 During this the operation and maintenance phase of the Transmission Assets, there is the potential for maintenance activities associated with the proposed Isle of Man - UK Interconnector 2 and installation and maintenance activities associated with the Mooir Vannin – UK Transmission Assets to also occur. The potential for these two Tier 3 projects to spatially overlap with the Fylde MCZ is, however, currently unknown. The potential magnitude of the impacts arising from each maintenance event for these projects is the same as for the Transmission Assets alone, however, the likelihood of activities occurring concurrently with the Transmission Assets is low.

1.9.3.80 Due to the mobile nature of the SSC plumes this cumulative impact may effect both the subtidal sand and subtidal mud feature of the Fylde MCZ.

1.9.3.81 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the proposed Isle of Man - UK Interconnector 2 and construction and maintenance activities associated with the Mooir Vannin – UK Transmission Assets has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone. **Paragraph 1.8.3.29** details the effect of an increase in SSC and associated deposition on the relevant physical attributes (**structure: sediment composition and distribution, supporting processes: sediment movement and hydrodynamic regime (habitat) and supporting processes: water quality - turbidity (habitat)**).

### Ecological attributes

1.9.3.82 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative increase in SSC and associated deposition are as described previously in **paragraph 1.8.3.30**.

#### Subtidal sand

1.9.3.83 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.15** and **1.8.3.16.**

1.9.3.84 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the proposed Isle of Man - UK Interconnector 2 and construction and maintenance activities associated with the Mooir Vannin – UK Transmission Assets has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Subtidal mud

1.9.3.85 The sensitivity of this subtidal mud protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.3.19** and **1.8.3.20**.

1.9.3.86 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal mud feature of the Fylde MCZ.

- The level of change associated with maintenance activities for the proposed Isle of Man - UK Interconnector 2 and installation and maintenance activities associated with the Mooir Vannin – UK Transmission Assets has the potential to be small in magnitude as well as intermittent in nature making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.3.21** details the effect of an increase in SSC and associated deposition on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

### Summary

1.9.3.87 Based on the information presented in **paragraphs 1.9.3.76** to **1.9.3.86**, it can be concluded that cumulative increase in SSC and associated deposition during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **Sediment composition and distribution** as well as **sediment movement and hydrodynamic regime** may be disturbed as a result of cable maintenance activities however the effect will be highly localised and temporary. This will keep the sediment within the relevant sediment transport cell resulting in minimal and temporary change to sediment movement within the Fylde MCZ.
- **Water quality** factors such as turbidity may experience changes such as an increase in SSC up to 500 mg/l however the majority of the MCZ will experience minimal changes and overall changes in turbidity will be temporary.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by an increase in SSC and associated deposition as they are composed of sedimentary based infaunal species adapted for these kinds of conditions.
- The **presence and abundance of key species** will not be impacted as these species are able to resituate themselves in the sediment following deposition. Additionally any potential impediment to their function will be temporary as the sediment will quickly disperse throughout the habitat.

### 1.9.4 Long term habitat loss

#### Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets

1.9.4.1 There is no spatial overlap between the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative habitat loss with the Transmission Assets.

#### Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets

1.9.4.2 There is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative habitat loss with the Transmission Assets.

#### Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets

1.9.4.3 As noted for scenarios 1 and 2 is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets, the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. These projects are, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative long term habitat loss with the Transmission Assets.

#### Scenario 4a: Scenario 3 + Tier 1

**Construction and operation and maintenance phases**

1.9.4.4 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Isle of Man-UK Interconnector 1. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative long term habitat loss with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man-UK Interconnector 1 only. The long term habitat loss that may arise during the construction, and operation and maintenance phases of the Transmission Assets, in the event that cable protection is required for ground conditions and for the cable crossing within the Fylde MCZ, may temporally overlap with repair and maintenance activities for the Isle of Man - UK Interconnector 1. Although nothing there is no spatial overlap between the projects.

1.9.4.5 Cable protection, the deposition of rock or concrete mattresses, may potentially need to be installed within the Fylde MCZ for the Isle of Man - UK Interconnector 1 as part of maintenance activities for this project.

Currently there is no cable protection associated with the Isle of Man - UK Interconnector 1 within the Fylde MCZ (**Figure 1.9**). In the marine licence for the Isle of Man - UK Interconnector 1 maintenance activities, the MDS assumes that the placement of cable protection materials within the Fylde MCZ (if required) may be required along a 1.2 km section of the cable which could result in up to 0.00624 km$^2$ of long term habitat loss within the Fylde MCZ (0.0024% of the area of the Fylde MCZ) (Manx Utilities Ltd, 2017).

1.9.4.6 On the basis of these assumptions, there may potentially be up to 0.037 km$^2$ of cumulative long term habitat loss, resulting in a localised physical change from a predominantly soft sediment environment to one which includes areas of hard substrate, within the Fylde MCZ, equating to 0.01% of the total area of the MCZ.

### Physical attributes

1.9.4.7 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative long term habitat loss are as described previously in **paragraph 1.8.5.7**.

1.9.4.8 The subtidal sand feature extends across the majority of the Fylde MCZ (**Figure 1.5**). The MCZ Stage 1 assessment of the Isle of Man - UK Interconnector 1 attributes its whole impact to the subtidal sand feature therefore it has been assumed all of the cumulative long term habitat loss could occur within the subtidal sand feature. Therefore there is no cumulative long term habitat loss to the subtidal mud feature as a result of the Isle of Man - UK Interconnector 1. The extent of cumulative habitat loss of the subtidal sand feature as a result of the Transmission Assets together with the Isle of Man - UK Interconnector 1 is therefore predicted to be up to 0.006 km$^2$, which equates to 0.003% of the subtidal sand feature in the MCZ. Regarding the MCZ as a whole, the Isle of Man - UK Interconnector 1 together with the Transmission Assets is predicted to result in up to 0.037 km$^2$ of cumulative long term habitat loss, which equates to 0.01% of the area of the MCZ.

1.9.4.9 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- Regarding the physical attributes of the subtidal sand feature (**extent and distribution** and **sediment composition and distribution**) there may potentially be a small increase in long term habitat loss compared to the Transmission Assets alone assessment (**paragraphs 1.8.5.5**). The potential installation of cable protection for the Isle of Man - UK Interconnector 1 within the Fylde MCZ (if this is required) would represent a change in substrate type (from sedimentary to rocky substrate). The very small cumulative area potentially affected as a result of the Transmission Assets together with the Isle of Man - UK Interconnector 1 (0.01%) therefore makes it highly unlikely that this change will result in a greater adverse impact on the overall sediment composition and distribution which contributes to the designation of this feature within the Fylde MCZ.

### Ecological attributes

1.9.4.10 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative long term habitat loss are as described previously in **paragraph 1.8.5.13**.

#### Subtidal sand

1.9.4.11 The sensitivity of this subtidal sand protected feature and its associated communities to this impact is detailed in **paragraphs 1.8.5.14** to **1.8.5.17**.

1.9.4.12 The following can be concluded with respect to the ecological attributes of the subtidal sand feature of the Fylde MCZ.

- The biological attributes relevant to this impact (**Distribution: presence and spatial distribution of biological communities, Structure and function: presence and abundance of key structural and influential species and Structure: species composition of component communities**) are unlikely to be impacted to a greater extent as a result of this cumulative impact compared to the Transmission Assets alone assessment. The small area that may potentially be affected by the Isle of Man - UK Interconnector 1 (0.006 $km^2$), and its distance from the Transmission Assets (4.98 km), make it very unlikely that there will be a compounding impact upon the presence and spatial distribution of the biological communities and key/influential species of the subtidal sand feature. Any larger mobile species will be able to move out of the way during the installation of the cable protection. Furthermore as any potential cable protection is a surface level disturbance infauna associated with these communities will be minimally disturbed.

#### Subtidal mud

1.9.4.13 No further cumulative assessment is required to be undertaken for the subtidal mud protected feature in relation to the long term habitat loss impact as all of the long term habitat loss that may potentially be associated with the Isle of Man - UK Interconnector 1 has been determined to fall within the subtidal sand feature (**paragraph 1.9.4.8**).

### Summary

1.9.4.14 Based on the information presented in **paragraphs 1.9.4.4** to **1.9.4.12**, it can be concluded that cumulative long term habitat loss during the Transmission Assets construction and operation and maintenance phases **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **The extent and distribution** of the subtidal sand feature will be largely maintained within the MCZ with <0.05% of the subtidal sand protected feature potentially affected by cumulative long term habitat loss. This ensures that the **sediment composition and distribution** will be maintained throughout the Fylde MCZ.
- The **presence and spatial distribution of biological communities** will also be preserved by the very small percentage of the subtidal sand feature affected by long term habitat loss (<0.05%). The **species composition of component communities** would change with the cable protection being colonised by hard substrate adapted species however this will only impact the immediate area of the cable protection. The **presence and abundance of key structural and influential species** would be altered slightly by the small reduction in extent however the overall presence and abundance through the Fylde MCZ would be unaffected.

### Scenario 4b: Scenario 4a + Tier 2

1.9.4.15 There are no Tier 2 projects which overlap with the Fylde MCZ, therefore no assessment for Scenario 4b is required.

### Scenario 4c: Scenario 4b + Tier 3

#### Construction and operation and maintenance phases

1.9.4.16 Scenario 4c in the construction and operation and maintenance phases includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Tier 1 Isle of Man-UK Interconnector 1 project and two Tier 3 projects, the Isle of Man-UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative long term habitat loss with the Transmission Assets within the Fylde MCZ. As discussed in Scenario 4b, there are no Tier 2 projects which are relevant to the CEA for the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man-UK Interconnector 1, the Isle of Man-UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets only. The long term habitat loss that may arise during the construction, and operation and maintenance phases of the Transmission Assets, may temporally overlap with construction and maintenance activities for the proposed Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets, as well as the Isle of Man - UK Interconnector 1 operation and maintenance licence.

1.9.4.17 Cable protection and cable crossings may potentially need to be installed within the Fylde MCZ for the proposed Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. The Mooir Vannin – UK Transmission Assets may also include a booster station. As these are Tier 3 projects there is, however, currently no information on the amount of hard substrate that may be installed for these projects (and if any would be required in the Fylde), the design of this cable protection or the location(s) where it may be installed. The magnitude of long term habitat loss associated with the proposed Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets within the Fylde MCZ will depend upon the project design parameters and the final cable route and specifically if there is indeed any overlap with the MCZ. The total cumulative temporary habitat loss associated with the Scenario 4b projects is 0.04 km$^2$, this may increase with the addition of the Tier 3 projects. The magnitude of long term habitat loss associated with the Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets is currently unknown however based on the long term habitat loss associated with the Transmission Assets and the Isle of Man – UK Interconnector 1 any increase in long term habitat loss would be small.

### Physical attributes

1.9.4.18 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative long term habitat loss are as described previously in **paragraph 1.8.5.7**.

1.9.4.19 As the routes for the proposed Isle of Man – UK Interconnector 2 and Mooir Vannin – UK Transmission Assets are unknown, any long term habitat loss within the Fylde MCZ associated with these projects could be attributed to either the subtidal sand or subtidal mud feature therefore it has been assumed that all of the cumulative long term habitat loss could occur within either the subtidal sand or mud feature.

1.9.4.20 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ.

- Regarding the physical attributes of the subtidal sand feature (**extent and distribution** and **sediment composition and distribution**) there could be a small increase in the cumulative long term habitat loss impact beyond what has been assessed for the Transmission Assets alone (**paragraphs 1.8.5.12**). The potential installation of cable protection and cable crossings for the proposed Isle of Man - UK Interconnector 2 and Mooir Vannin – UK Transmission Assets, as well a potential booster station associated with the Mooir Vannin – UK Transmission Assets, would represent a change in substrate type (from sedimentary to rocky substrate). It is however likely that the area affected by long term habitat loss associated with these projects would be very small. The small scale of the impact makes it highly unlikely that this change would result in a greater adverse impact compared to the Transmission Assets alone assessment or the Scenario 4a cumulative assessment on the overall sediment composition and distribution which contributes to the designation of the subtidal sand and mud features within the Fylde MCZ. It is also possible that the Isle of Man - UK Interconnector 1, the Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets could not install any cable protection/infrastructure within the Fylde MCZ, however to ensure a precautionary approach, this assessment has assumed that cable protection/infrastructure could be installed.

### Ecological attributes

1.9.4.21 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative long term habitat loss are as described previously in **paragraph 1.8.5.13**.

#### Subtidal sand and subtidal mud

1.9.4.22 The sensitivity of the subtidal sand and subtidal mud protected features and their associated communities to this impact are detailed in **paragraphs 1.8.5.14** to **1.8.5.17** for subtidal sand and **paragraphs 1.8.5.19 to 1.8.5.21** for subtidal mud.

1.9.4.23 The following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- The biological attributes relevant to this impact (**Distribution: presence and spatial distribution of biological communities, Structure and function: presence and abundance of key structural and influential species and Structure: species composition of component communities**) are unlikely to be impacted to a greater extent as a result of this cumulative impact compared to the Transmission Assets alone assessment. The very small area that is likely to be potentially affected by the proposed Isle of Man - UK Interconnector 2 and Mooir Vannin – UK Transmission Assets makes it very unlikely that there will be a compounding impact upon the presence and spatial distribution of the biological communities and key/influential species of the subtidal sand and mud features. Any larger mobile species will be able to move out of the way during the installation of the cable protection. Furthermore as cable protection is a surface level disturbance infauna associated with these communities will be minimally disturbed.

### Summary

1.9.4.24 Based on the information presented in **paragraphs 1.9.4.16** to **1.9.4.23**, it can be concluded that cumulative long term habitat loss during the Transmission Assets construction and operation and maintenance phases **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- **The extent and distribution** of the subtidal sand and mud features will be largely maintained within the MCZ with a very minor portion of the subtidal sand and subtidal mud protected features affected by long term habitat loss. This ensures that the **sediment composition and distribution** will be maintained throughout the Fylde MCZ.

- The **presence and spatial distribution of biological communities** will also be preserved by the very small percentage of the subtidal sand and mud features affected by long term habitat loss. The **species composition of component communities** would change with the cable protection being colonised by hard substrate adapted species however this will only impact the immediate area of the cable protection. The **presence and abundance of key structural and influential species** would be altered slightly by the small reduction in extent however the overall presence and abundance through the Fylde MCZ would be unaffected.

### 1.9.5 Introduction of artificial structures

#### Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets

1.9.5.1 There is no spatial overlap between the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative introduction of artificial structures with the Transmission Assets.

#### Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets

1.9.5.2 There is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative introduction of artificial structures with the Transmission Assets.

#### Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets

1.9.5.3 As noted for scenarios 1 and 2 is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets, the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. These projects are, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative introduction of artificial structures with the Transmission Assets.

#### Scenario 4a: Scenario 3 + Tier 1

**Operation and maintenance phase**

1.9.5.4 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Tier 1 Isle of Man-UK Interconnector 1 project. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative introduction of artificial structures with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man-UK Interconnector 1 only. The operation and maintenance phase of the Transmission Assets is predicted to temporally overlap with the operation and maintenance phase of the Isle of Man - UK Interconnector 1. Colonisation of any cable protection required to be installed during maintenance of the Isle of Man - UK Interconnector 1 may occur and, whilst not quantified in the relevant documentation for the project, is likely to be similar to the estimate of long term habitat loss (0.00624 $km^2$) (Manx Utilities Ltd, 2017). In combination with the area of hard substrate associated with the Transmission Assets, should cable protection be required in the Fylde MCZ, this would equate to 0.037 $km^2$ of artificial hard substrate potentially being introduced into the Fylde MCZ.

1.9.5.5 **Paragraphs 1.8.6.10** to **1.8.6.12** describe the potential effects of the introduction of hard structures into sedimentary environments. These studies suggest that the communities which will colonise these structures will be ecologically distinct from those typically found across the sedimentary environment of the Fylde MCZ, comprising mostly of epifauna. Studies also found the introduction of these new communities only impacted on the immediate sedimentary community where they did have an impact. These conclusions are supported by the studies such as those conducted by Hutchinson *et al*. (2020a), Li *et al.* (2023) and monitoring of the Beatrice Offshore Wind Farm (APEM, 2021).

### Ecological attributes

1.9.5.6 The ecological attributes of the subtidal sand protected features of the Fylde MCZ that are relevant to the introduction of artificial structures are as described previously in **paragraph 1.8.6.5**.

1.9.5.7 As noted in **paragraph 1.9.4.8**, Manx Utilities Ltd (2017) have determined that should they need to install cable protection within the Fylde MCZ, it will likely occur exclusively within the subtidal sand protected feature and therefore only the subtidal sand protected feature has been assessed in regard to the cumulative introduction of artificial structures impact.

#### Subtidal sand

1.9.5.8 The effects of cumulative introduction of artificial structures is predicted to be very similar to the Transmission Assets alone assessment as the same type of artificial structures could be introduced for both projects. The assessment and the sensitivity of the subtidal sand feature to this impact is therefore as presented in **paragraphs 1.8.6.1** to**1.8.6.16**.

### Summary

1.9.5.9 Based on the information presented in **paragraphs 1.9.5.4** to **1.9.5.8**, it can be concluded that the cumulative introduction of artificial structures during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the**

**overall conservation objective** of maintaining the subtidal sand protected feature of the Fylde MCZ in a favourable condition for the following reasons.

- The **presence and spatial distribution of biological communities** will be preserved by the very small percentage of the subtidal sand features affected by the installation of artificial structures (<0.05%). The **species composition of component communities** is unlikely to be affected by the installation of artificial structures, other than in the immediate vicinity of the cable protection, as the communities which colonise the structures as the communities colonise very different niches and are unlikely to overlap. The **presence and abundance of key structural and influential species** would be altered slightly by the small reduction in extent however the overall presence and abundance through the Fylde MCZ would be unaffected.

### Scenario 4b: Scenario 4a + Tier 2

1.9.5.10 There are no Tier 2 projects which overlap with the Fylde MCZ, therefore no assessment for Scenario 4b is required.

### Scenario 4c: Scenario 4b + Tier 3

#### Operation and maintenance phase

1.9.5.11 Scenario 4c includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Tier 1 Isle of Man-UK Interconnector 1 project and the two Tier 3 projects, the Isle of Man-UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative introduction of artificial structures with the Transmission Assets within the Fylde MCZ. As discussed in Scenario 4b, there are no Tier 2 projects which are relevant to the CEA for this impact pathway for the Fylde MCZ. Therefore, Scenario 4c includes the Transmission Assets together with the Isle of Man-UK Interconnector 1, the Isle of Man-UK Interconnector UK 2 and the Mooir Vannin – UK Transmission Assets only.

1.9.5.12 The operation and maintenance phase of the Transmission Assets is predicted to temporally overlap with the operation and maintenance phase of the proposed Isle of Man - UK Interconnector 2 and the construction and operation and maintenance phases of the Mooir Vannin – UK Transmission Assets. The proposed Isle of Man - UK Interconnector 2 may potentially introduce artificial structures in to the Fylde MCZ in the form of cable protection and cable crossings (if these are required). The Mooir Vannin – UK Transmission Asset may potentially introduce artificial structures in to the Fylde MCZ in the form of cable protection, cable crossings and a booster station (if these are required).

1.9.5.13 As the proposed Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets are Tier 3 projects, details are limited and the routes for these Tier 3 projects are unknown. Therefore, if these projects spatially overlap with the Fylde MCZ the artificial structures associated with them could be attributed to either the subtidal sand or subtidal mud feature therefore it has been assumed that all of the cumulative introduction of artificial structures could occur within either the subtidal sand or mud feature.

1.9.5.14 **Paragraphs 1.8.6.10** to **1.8.6.12** describe the potential effects of the introduction of artificial structures into sedimentary environments. These studies suggest that the communities which will colonise these structures will be ecologically distinct from those typically found across the sedimentary environment of the Fylde MCZ, comprising mostly of epifauna. Studies also found the introduction of these new communities only impacted on the immediate sedimentary community where they did have an impact. These conclusions are supported by the studies such as those conducted by Hutchinson *et al*. (2020a), Li *et al.* (2023) and monitoring of the Beatrice Offshore Wind Farm (APEM, 2021).

### Ecological attributes

1.9.5.15 The ecological attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to the introduction of artificial structures are as described previously in **paragraph 1.8.6.5**.

#### Subtidal sand and subtidal mud

1.9.5.16 The effects of cumulative introduction of artificial structures is predicted to be very similar to the Transmission Assets alone assessment as the same type of artificial structures (i.e. cable protection and/or cable crossing) could be introduced for both projects. The assessment and the sensitivity of the subtidal sand and subtidal mud features to this impact is therefore as presented in **paragraphs 1.8.6.9** to **1.8.6.14**.

### Summary

1.9.5.17 Based on the information presented in **paragraphs 1.9.5.11** to **1.9.5.8**, it can be concluded that the cumulative introduction of artificial structures during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The **presence and spatial distribution of biological communities** will be preserved by the very small percentage of the subtidal sand and subtidal mud features affected by the installation of artificial structures. The **species composition of component communities** is unlikely to be affected by the installation of artificial structures, other than in the immediate vicinity of the cable protection, as the communities which colonise the structures as the communities colonise very different niches and are unlikely to overlap. The **presence and abundance of key structural and influential species** would be altered slightly by the small reduction in extent however the overall presence and abundance through the Fylde MCZ would be unaffected.

### 1.9.6 Increased risk of introduction and spread of INNS

#### Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets

1.9.6.1 There is no spatial overlap between the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative increased risk of introduction or spread of INNS with the Transmission Assets.

#### Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets

1.9.6.2 There is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets and the Fylde MCZ. This project is, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative increased risk of introduction or spread of INNS with the Transmission Assets.

#### Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets

1.9.6.3 As noted for scenarios 1 and 2 is no spatial overlap between the Morgan Offshore Wind Project: Generation Assets, the Morecambe Offshore Windfarm: Generation Assets and the Fylde MCZ. These projects are, therefore, not considered further for this impact pathway as there is no potential for it to contribute to any cumulative increased risk of introduction or spread of INNS with the Transmission Assets.

#### Scenario 4a: Scenario 3 + Tier 1

**Construction and operation and maintenance phases**

1.9.6.4 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Tier 1 Isle of Man-UK Interconnector 1 project. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative increased risk of introduction and spread of INNS with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man-UK Interconnector 1 only. The construction and operation and maintenance phases of the Transmission Assets are predicted to temporally overlap with the maintenance phase of the Isle of Man - UK Interconnector 1.

1.9.6.5 The risk of introduction of INNS was not specifically addressed in the MCZ Stage 1 assessment for the Isle of Man - UK Interconnector 1 maintenance and repair marine licence. The project will however develop an Environmental Management Plan (Manx Utilities Ltd, 2017) which may address the risk of INNS. They must also follow best practice guidance and the IMO Ballast Water Convention (IMO, 2004). The potential risk posed by the Isle of Man - UK Interconnector 1 will likely be smaller than that associated with operation and maintenance activities for the Transmission Assets as it only accounts for vessel trips and artificial structures associated with one cable (see **paragraphs 1.9.4.5** and **1.9.4.6**). Cumulatively with the area of hard substrate from the Transmission Assets this would equate to up to 0.037 km$^2$ of hard substrate potentially occurring in the Fylde MCZ.

1.9.6.6 Due to the measures which will be implemented for the cumulative projects and the Transmission Assets (see **paragraph 1.8.7.6 and Table 1.14**), the effects resulting from an increased risk of introduction and spread of INNS will be the same as those described in the Transmission Assets alone assessment.

#### Summary

1.9.6.7 Based on the information presented in **paragraphs 1.9.6.4** to **1.9.6.6**, it can be concluded that the cumulative increased risk of introduction and spread of INNS during the Transmission Assets construction and operation and maintenance phases **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The introduction of **non-native species** is unlikely to present a risk to the subtidal sand and subtidal mud features due to the measures that will be adopted as part of the Transmission Assets to minimise the introduction and spread of INNS.
- The **presence, distribution and composition of component communities** is unlikely to be affected as the majority of relevant INNS in this region are hard substrate based with a limited ability to adapt to the conditions provided by these sedimentary features. The impact on **key structural and influential species will** vary depending on the species however their presence and abundance is unlikely to be affected as they occupy a separate ecological niches to most INNS species.

### Scenario 4b: Scenario 4a + Tier 2

1.9.6.8 There are no Tier 2 projects which overlap with the Fylde MCZ, therefore no assessment for Scenario 4b is required.

### Scenario 4c: Scenario 4b + Tier 3

**Construction and operation and maintenance phase**

1.9.6.9 Scenario 4c includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Tier 1 Isle of Man-UK Interconnector 1 project and the two Tier 3 projects, the Isle of Man-UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative increased risk of introduction and spread of INNS with the Transmission Assets within the Fylde MCZ. As discussed in Scenario 4b, there are no Tier 2 projects which are relevant to the CEA for the Fylde MCZ. Therefore, Scenario 4c includes the Transmission Assets together with the Isle of Man-UK Interconnector 1, the Isle of Man-UK Interconnector UK 2 and the Mooir Vannin – UK Transmission Assets only. The construction and operation and maintenance phases of the Transmission Assets are predicted to temporally overlap with the construction and operation and maintenance phases of the proposed Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets.

1.9.6.10 As Tier 3 projects, there is very limited information available regarding the proposed Isle of Man - UK Interconnector 2 and Mooir Vannin – UK Transmission Assets, therefore the magnitude of the risk of introduction and spread of INNS within the Fylde MCZ is unknown. However, the potential introduction of artificial structures, such as cable protection, cable crossings and booster stations (for the Mooir Vannin – UK Transmission Assets), has the potential to contribute to the introduction and spread of INNS along with any vessel movements associated with the installation and maintenance of the cables/other structures within the Fylde MCZ. It is reasonable to assume however that measures to minimise the risk associated with the introduction of INNS, such as an Environmental Management Plan, will be implemented for the Tier 3 projects in the same way as has been done for the Isle of Man - UK Interconnector 1 (**paragraph 1.9.6.5**) and as is proposed for the Transmission Assets (CoT65, **Table 1.14**).

1.9.6.11 Due to the likely small scale of the projects and potential mitigation measures which may be implemented for the cumulative projects and the Transmission Assets (see **paragraph 1.8.7.6**), the effects resulting from an increased risk of introduction and spread of INNS will be the same as those described in the Transmission Assets alone assessment.

**Summary**

1.9.6.12 Based on the information presented in **paragraphs 1.9.6.9** to **1.9.6.11**, it can be concluded that the cumulative increased risk of introduction and spread of INNS during the Transmission Assets construction and operation and maintenance phases **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The introduction of **non-native species** is unlikely to present a risk to the subtidal sand and subtidal mud features due to the measures that will be adopted as part of the Transmission Assets and the other cumulative projects to minimise the introduction and spread of INNS.
- The **presence, distribution and composition of component communities** is unlikely to be affected as the majority of relevant INNS in this region are hard substrate based with a limited ability to adapt to the conditions provided by these sedimentary features. The impact on **key structural and influential species will** vary depending on the species however their presence and abundance is unlikely to be affected as they occupy a separate ecological niches to most INNS species.

## 1.9.7 Changes in physical processes

### Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets

1.9.7.1 The Morecambe Offshore Windfarm: Generation Assets MDS comprises of 40 turbines 65 m in diameter with conical gravity base suction foundations, each with scour protection extending 15 m from foundations (Morecambe Offshore Windfarm Ltd., 2014). Changes in wave climate are expected in close proximity to these structures with said changes decreasing rapidly with distance from the infrastructure. There is partial overlap with the Fylde MCZ but the impact to the wave regime will be indistinguishable from natural variability given the Fylde MCZ is located approximately 8 km to the east/north east. Changes in tidal regime will be limited and are anticipated to be spatially confined to a narrow wake downstream of each individual wind turbine structure. It is expected that the changes in tidal flow and wave heights during the operation and maintenance phase would be limited to the immediate vicinity of infrastructure, then the changes in sediment transport would be similar.

1.9.7.2 Given the distance to the Fylde MCZ (8.17 km between the Fylde MCZ and Morecambe Offshore Windfarm: Generation Assets) the impact is considered to be negligible in the far-field. There will be no cumulative impacts on designated features.

1.9.7.3 This is supported by the Morecambe Offshore Windfarm: Generation Assets assessment which concluded that changes to hydrodynamic conditions in the near-field would be of low magnitude, and changes in the far-field would be of negligible magnitude, though detectable to the extent of the excursion of one tidal ellipse. Given that the area of subtidal mud and sand habitat that would be affected would represent a small proportion of the habitat availability in the study area, and elsewhere in the east Irish Sea.

1.9.7.4 Based on these conclusions no further assessment will be conducted due to the lack of cumulative impact on the Fylde MCZ.

### Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets

1.9.7.5 The Morgan Offshore Wind Project: Generation Assets will be in their operation and maintenance phase at the same time as the Transmission Assets and may also result in changes in physical processes as a result of the installation of new infrastructure which protrudes above the seabed and in to the water column.

1.9.7.6 The Morgan Offshore Wind Project: Generation Assets MDS comprises of 68 turbines that will be in operation during the operation and maintenance phase of the Transmission Assets. Changes in wave climate, tidal currents and sediment transport regime are expected in close proximity to these structures with said changes decreasing rapidly with distance from the infrastructure. The Morgan Offshore Wind Project: Generation Assets MDS also includes an OSP with rectangular gravity base foundation which may affect waves and tides up to 200 m by approximately 2 – 4%, at which point changes would rapidly decline.

1.9.7.7 Given the distance to the Fylde MCZ (29.2 km between the Fylde MCZ and Morgan Offshore Wind Project: Generation Assets) the impact is considered to be negligible in the far-field. There will be no cumulative impacts on designated features.

1.9.7.8 Based on these conclusions no further assessment will be conducted due to the lack of impact on the Fylde MCZ.

### Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets

1.9.7.9 The magnitude of the cumulative effect to physical processes and seabed morphology from the Transmission Assets and the Generation Assets will be a combination of scenario 1 and 2 in a spatial sense. However, in terms of impacts due to overlapping changes in physical processes and morphology the magnitude of impact will be no greater than presented for scenario 1 or 2 alone. This is due to the fact that the Generation Assets are separated by a distance of 16.76 km and owing to the principal orientation of the tidal currents and wave climate, no increased cumulative effect between the two projects are predicted to occur.

1.9.7.10 Based on these conclusions no further assessment will be conducted due to the lack of impact on the Fylde MCZ.

### Scenario 4a: Scenario 3 + Tier 1

#### Operation and maintenance phase

1.9.7.11 Scenario 4a includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets and the Tier 1

Isle of Man-UK Interconnector 1 project. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative changes in physical processes with the Transmission Assets within the Fylde MCZ. Therefore, Scenario 4a includes the Transmission Assets together with the Isle of Man-UK Interconnector 1 only. During the operation and maintenance phase of the Transmission Assets the Isle of Man - UK Interconnector 1 has a marine licence to conduct maintenance and repair activities.

### Physical attributes

1.9.7.12 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative changes in physical processes are as described previously in **paragraph 1.8.8.6**.

1.9.7.13 The Isle of Man - UK Interconnector 1 maintenance activities also includes the potential replacement of concrete mattresses with rock filled filter units and given the proximality of the cable route to the Transmission Assets there is a potential for cumulative impacts within the Offshore Order Limits. The magnitude of these would be highly dependent on both the water depth and proximity to the Transmission Assets. As with the Transmission Assets alone assessment, if cable protection is placed within a distance of less than 1 km of a designated area in shallow water it may influence wave climate, however this effect on wave climate will be indistinguishable from background levels within 1 km of the structures. The Transmission Assets and Isle of Man – UK Interconnector 1 within the Fylde MCZ are located at a distance greater than 1 km apart and therefore no cumulative impacts are anticipated on any of the designated features of the Fylde MCZ. Additionally any impact associated with the Transmission Assets would be mitigated as CoT45 (**Table 1.14**) commits to no more than 5% reduction in water depth (referenced to Chart Datum) occurring at any point on the offshore export cable corridor route without prior written approval from the MCA.

1.9.7.14 It is expected that the changes in tidal flow and wave heights during the operation and maintenance phase would be limited to the immediate vicinity of infrastructure, then the changes in sediment transport would be similar.

### Physical attributes

1.9.7.15 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative changes in physical processes are as described previously in **paragraph 1.8.8.13**.

1.9.7.16 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.8.12** details the effect of a change in physical processes on the relevant physical attributes (**Supporting processes: energy/exposure, structure: sediment composition and distribution, and supporting processes: sediment movement and hydrodynamic regime (habitat)**).

### Ecological attributes

#### Subtidal sand and subtidal mud

1.9.7.17 The sensitivity of the subtidal sand and subtidal mud protected features and their associated communities to this impact is detailed in **paragraphs 1.8.8.14** and **1.8.8.15**.

1.9.7.18 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 1 has the potential to be small in magnitude making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone. **Paragraph 1.8.8.16** details the effect of a change in physical processes on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

### Summary

1.9.7.19 Based on the information presented in **paragraphs 1.9.7.11** to **1.9.7.18**, it can be concluded that cumulative changed on physical processes during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The **energy and exposure** at the Fylde MCZ, based on modelling undertaken for the Morgan Offshore Wind Project: Generation Assets (Morgan Offshore Wind Ltd. 2024a) and Mona Offshore Wind Project (Mona Offshore Wind Ltd, 2024), will be minimally impacted by operational infrastructure. The effect of the infrastructure will be highly localised and will keep sediment within the relevant sediment transport cells ensuring maintenance of the **sediment composition and distribution** for the designated features.
- The baseline **sediment movement and hydrodynamic regime** runs in an east direction offshore and the cable protection from both projects could be installed perpendicular to these pathways, if and where cable protection is required in the MCZ potentially resulting in

some disruption to the sediment transport pathway. The scale of these projects however means it is likely there will be minimal interruption to sediment transport.

- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by a change in physical processes due to the small scale and extent of the changes modelled.
- The **presence and abundance of key species** is unlikely to be affected by changes in physical processes due to the small scale of the impact which will not lead to a change in the condition of the habitat which the component species would not be able to adapt to.

### Scenario 4b: Scenario 4a + Tier 2

1.9.7.20 There are no Tier 2 projects which overlap with the Fylde MCZ, therefore no assessment for Scenario 4b is required.

### Scenario 4c: Scenario 4b + Tier 3

#### Operation and maintenance phase

1.9.7.21 Scenario 4c includes the Transmission Assets together with the Morgan Generation Assets, the Morecambe Generation Assets, the Tier 1 Isle of Man - UK Interconnector 1 project and the two Tier 3 projects, the Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets. As discussed above in Scenarios 1 to 3, there is no potential for the Morgan Generation Assets or the Morecambe Generation Assets to contribute to any cumulative changes in physical processes with the Transmission Assets within the Fylde MCZ. As discussed in Scenario 4b, there are no Tier 2 projects which are relevant to the CEA for the Fylde MCZ. Therefore, Scenario 4c includes the Transmission Assets together with the Isle of Man-UK Interconnector 1, the Isle of Man - UK Interconnector 2 and the Mooir Vannin – UK Transmission Assets only. During the operation and maintenance phase of the Transmission Assets the Isle of Man - UK Interconnector 2 may also be within its operation and maintenance phase and the Mooir Vannin – UK Transmission Assets may be in its construction and operation and maintenance phase.

1.9.7.22 The Isle of Man - UK Interconnector 2 is likely to buried as far as possible therefore it is unlikely that there will be changes in seabed morphology as a result of the project leading it to be screened out for further assessment in Volume 2, Chapter 1: Physical Processes of the ES (document reference F2.1). There is however the possibility that cable protection could be installed within the MCZ however this has been avoided by previous similar projects (e.g. Isle of Man - UK Interconnector 1) therefore the impact of the Isle of Man - UK Interconnector 2 has the potential to have the same negligible level of magnitude in relation to changes in physical processes however not enough information is known about this project currently to assess in greater detail the impact of this project.

1.9.7.23 There is limited potential for a cumulative effect to arise between the Transmission Assets, Generation Assets and the Mooir Vannin - UK Transmission Assets, however the significance of the impact would be highly dependent on the usage and placement of cable protection and the placement of the offshore booster station. As a Tier 3 project there is very limited information available in this respect, however it is anticipated that if such an impact did arise that it would be of a highly localised and limited scale. There is however the possibility that cable protection or the booster station could be installed within the Fylde MCZ however this has been avoided by previous similar projects (e.g. Isle of Man - UK Interconnector 1) therefore the impact of the Mooir Vannin - UK Transmission Assets has the potential to have the same negligible level of magnitude in relation to changes in physical processes however not enough information is known about this project currently to assess in greater detail the impact of this project.

### Physical attributes

1.9.7.24 The physical attributes of the subtidal sand and subtidal mud protected features of the Fylde MCZ that are relevant to cumulative changes in physical processes are as described previously in **paragraph 1.8.8.13**.

1.9.7.25 Based on the information presented above, the following can be concluded with respect to the physical attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- The level of change associated with maintenance activities for the Isle of Man - UK Interconnector 2 and construction and operation and maintenance activities associated with the Mooir Vannin UK Transmission Assets has the potential to be negligible in magnitude making it unlikely that the cumulative impact will be greater than as described for the Transmission Assets alone assessment. **Paragraph 1.8.8.12** details the effect of a change in physical processes on the relevant physical attributes (**Supporting processes: energy/exposure, structure: sediment composition and distribution, and supporting processes: sediment movement and hydrodynamic regime (habitat)**).

### Ecological attributes

#### Subtidal sand and subtidal mud

1.9.7.26 The sensitivity of the subtidal sand and subtidal mud protected features and their associated communities to this impact is detailed in **paragraphs 1.8.8.14** and **1.8.8.15**.

1.9.7.27 Based on the information presented above, the following can be concluded with respect to the ecological attributes of the subtidal sand and subtidal mud features of the Fylde MCZ.

- The level of change associated with the Isle of Man - UK Interconnector 2 and the Mooir Vannin UK Transmission Assets has the potential to be negligible in magnitude making it unlikely that the cumulative impact will be greater than as described for the

Transmission Assets alone. **Paragraph 1.8.8.16** details the effect of a change in physical processes on the relevant ecological attributes (**Distribution: presence and spatial distribution of biological communities**, **Structure: species composition of component communities**, **Structure and function: presence and abundance of key structural and influential species**).

#### Summary

1.9.7.28 Based on the information presented in **paragraphs 1.9.7.11** to **1.9.7.18**, it can be concluded that cumulative changed on physical processes during the Transmission Assets operation and maintenance phase **will not lead to a significant risk of hindering the achievement of the overall conservation objective** of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition for the following reasons.

- The **energy and exposure** at the Fylde MCZ, based on modelling undertaken for the Morgan Offshore Wind Project: Generation Assets (Morgan Offshore Wind Ltd. 2024a) and Mona Offshore Wind Project (Mona Offshore Wind Ltd, 2024) and applied to the Transmission Assets alongside the Scenario 4c projects, will be minimally impacted by operational infrastructure. The effect of the infrastructure, if any, will be highly localised and will keep sediment within the relevant sediment transport cells ensuring maintenance of the **sediment composition and distribution** for the designated features.
- The baseline **sediment movement and hydrodynamic regime** runs in an east direction offshore, the cable protection from all projects could be installed perpendicular to these pathways, if and where cable protection is required in the MCZ potentially resulting in some disruption to the sediment transport pathway. The scale of these projects however means it is likely there will be minimal interruption to sediment transport.
- The **distribution and composition of biological communities** are highly unlikely to be adversely impacted by a change in physical processes due to the small scale and extent of the changes modelled.
- The **presence and abundance of key species** is unlikely to be affected by changes in physical processes due to the small scale of the impact which will not lead to a change in the condition of the habitat which the component species would not be able to adapt to.

## 1.10 Conclusions

### 1.10.1 MCZ Screening

1.10.1.1 The screening stage of this MCZ screening and Stage 1 assessment report identified a single MCZ, the Fylde MCZ, with the potential to be affected (other than insignificantly) by the construction, operation and maintenance, and decommissioning phases of the Transmission Assets. The Fylde MCZ was therefore carried through to a MCZ Stage 1 assessment for a full assessment against the relevant conservation objectives in relation to the potential direct and indirect impacts arising from the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.

### 1.10.2 MCZ Stage 1 Assessment

1.10.2.1 This MCZ Stage 1 assessment considered the effects of the Transmission Assets the construction, operation and maintenance, and decommissioning phases on the subtidal sand and subtidal mud protected features of the Fylde MCZ (subtidal sand and subtidal mud). This included consideration of effects on attributes and targets of the relevant protected features, and subsequently on the conservation objectives, using the best available scientific evidence to support the assessment process and with due regard to the relevant AoO (Natural England, 2023c).

1.10.2.2 Direct effects during the construction, operation and maintenance, and decommissioning phases associated with temporary habitat disturbance and loss, disturbance/remobilisation of sediment-bound contaminants, long term habitat loss, introduction of artificial structures, increased risk of introduction and spread of INNS, the impact of EMF to benthic invertebrates and heat from subsea electrical cables were assessed. Indirect effects during the construction, operation and maintenance and decommissioning phases associated with increases in SSC and associated deposition, and changes in physical processes were assessed.

1.10.2.3 Cumulative effects on features of the Fylde MCZ, resulting from the Isle of Man - UK Interconnector 1 and the proposed Isle of Man - UK Interconnector 2, were also considered in the MCZ Stage 1 assessment.

1.10.2.4 Based on the information presented in **sections 1.8**, which includes assessments on the relevant broadscale habitats of the Fylde MCZ (i.e. subtidal sand and subtidal mud), it is concluded that the conservation objective of maintaining the subtidal sand and subtidal mud protected features of the Fylde MCZ in a favourable condition will not be hindered by the construction, operation and maintenance, and decommissioning phases of the Transmission Assets in isolation, or cumulatively with any other plan, project or activity.

1.10.2.5 As no significant risks to the achievement of the Fylde MCZ conservation objectives have been identified in the MCZ Stage 1 assessment, a Stage 2 assessment is not required.

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# Appendix A: Biotope Sensitivity Ranges

## A.1 Sensitivity ranges for the protected features of the Fylde MCZ

Sensitivity ranges for the protected features of the Fylde MCZ, in relation to the pressures screened into the MCZ Stage 1 assessment. NI = no interaction between receptor and the pressure therefore sensitivity range is not provided; NA = Not Assessed by Natural England (Natural England, 2023c).

| Impact pathway (as assessed in ES) | Relevant pressure from the Advice on Operations | Subtidal mud | Subtidal sand |
|---|---|---|---|
| Temporary habitat disturbance/loss | Habitat structure changes – removal of substratum (extraction) | Medium | Medium |
| | Abrasion/disturbance of the substrate on the surface of the seabed | Not sensitive-Medium | Not sensitive-Medium |
| | Penetration and/or disturbance of the substratum subsurface below the surface of the seabed, including abrasion | Low-Medium | Low-Medium |
| | Smothering and siltation rate changes (heavy) | Low-Medium | Low-Medium |
| Increase in SSC and associated deposition | Changes in suspended solids (water clarity) | Not sensitive-Low | Not sensitive-Low |
| | Smothering and siltation rate changes (light) | Not sensitive-Low | Not sensitive-Low |
| Disturbance/remobilisation of sediment-bound contaminants | Transitional elements and organometal contamination | NA | NA |
| | Hydrocarbon and PAH contamination | NA | NA |
| | Introduction of other substances (solid, liquid or gas) | NA | NA |
| Long term habitat loss | Physical change (to another seabed type) | NA | High |
| | Physical change (to another sediment type) | High | High |

| Impact pathway (as assessed in ES) | Relevant pressure from the Advice on Operations | Subtidal mud | Subtidal sand |
|---|---|---|---|
| Increase risk of introduction and spread of INNS | Introduction or spread of invasive non-indigenous species (INIS) | Insufficient evidence-High | Not sensitive-High |
| Changes in physical processes | Water flow (tidal current) changes, including sediment transport considerations | Not sensitive-Medium | Not sensitive-Low |
| | Wave exposure changes | Not sensitive | Not sensitive |
| Impacts to benthic invertebrates due to EMF | Electromagnetic changes | Insufficient Evidence | Insufficient Evidence |
| Heat from subsea electrical cables | Temperature increase | Not sensitive-Low | Not sensitive-Low |