The Great Grid Upgrade

Sea Link

Sea Link

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March 2025	A	Final	For DCO Submission
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Executive Summary

Ex1.0.1 This report presents the Marine Conservation Zone (MCZ) Assessment for The Sea Link Project (hereafter referred to as the ‘Proposed Project’). The purpose of this report is to inform the MCZ assessment process in determining whether there is a likely significant risk to an MCZ during the Construction, Operation and Maintenance, and Decommissioning Phases of the Proposed Project.

Ex1.0.2 Specific consideration of the potential for impacts on MCZs is required for any marine licence application in English waters, and the consideration of MCZs is set out Section 126 of the Marine and Coastal Access Act (2009) (MCAA). Therefore, this report has been produced to provide the necessary information to allow the Marine Management Organisation (MMO) to meet their specific duty for MCZs as outlined in Section 126 of the MCAA (2009).

Ex1.0.3 The assessment process for MCZs is outlined by the MMO (2013). The report outlines the legislative requirement for an MCZ Assessment, the potential impacts associated with the Proposed Project, as well the Screening and Stage 1 of the MCZ Assessment.

Ex1.0.4 During the Screening Stage, several MCZs were screened in for further assessment: Goodwin Sands MCZ, Thanet Coast MCZ, Kentish Knock East MCZ, Orford Inshore MCZ, Dover to Deal MCZ, and Medway Estuary MCZ. However, the Stage 1 assessment found that these impact pathways are not considered to have significant effects on the designated features or conservation objectives of these MCZs.

Ex1.0.5 Overall, this report provides the relevant information to allow the MMO to undertake an MCZ Assessment, concluding that the conditions of Section 126 of the MCAA (2009) as determined under Stage 1 of the MCZ assessment process, will be met and that there is not a likely significant risk to any of the identified designated features or conservation objectives of the sites as a result of Proposed Project related activities.

1. Marine Conservation Zone Assessment

1.1 Introduction

1.1.1 The Sea Link Project (hereafter referred to as the 'Proposed Project') is a proposal by National Grid Electricity Transmission plc (hereafter referred to as National Grid) to reinforce the transmission network in the South East and East Anglia. The Proposed Project is required to accommodate additional power flows generated from renewable and low carbon generation, as well as accommodating additional new interconnection with mainland Europe.

1.1.2 National Grid owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, National Grid holds a transmission licence under which it is required to develop and maintain an efficient, coordinated, economic electricity transmission system.

1.1.3 This would be achieved by reinforcing the network with a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400kV overhead line close to Richborough in Kent.

1.1.4 National Grid is also required, under Section 38 of the Electricity Act 1989, to comply with the provisions of Schedule 9 of the Act. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to:

Schedule 9(1)(a) *"…have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest"*; and

Schedule 9(1)(b) *"…do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or object."*

1.1.5 The Proposed Project is proposed to reinforce the transmission system in the South East of England and East Anglia. This would be achieved by reinforcing the network with a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400kV overhead line close to Richborough in Kent.

Purpose of this Document

1.1.6 Specific consideration of the potential for impacts on Marine Conservation Zones (MCZ) is required for any marine licence application in English waters. The need for the consideration of MCZs is set out Section 126 of the Marine and Coastal Access Act (MCAA) (2009).

1.1.7 The purpose of this report is to provide the relevant information to allow the Regulator to undertake an MCZ Assessment. The report will inform this MCZ assessment process in determining whether the Offshore Scheme is capable of affecting (other than insignificantly):

- protected features of an MCZ; and/or
- any ecological or geomorphological process on which the conservation of any protected features of an MCZ is (wholly or in part) dependant.

1.1.8 The MCZ assessment provides a description of the Offshore Scheme, identifies the potential impacts that could arise from the planned activities (Section 1.4) and identifies the MCZ sites that could be affected (Section 1.6).

1.1.9 The assessment process for MCZs is outlined by the Marine Management Organisation (MMO) in the guidance document 'Marine conservation zones and marine licensing' (MMO, 2013).

1.1.10 The Order Limits, which illustrate the boundary of the Proposed Project, are illustrated on **Application Document 2.2.1 Overall Location Plan**.

1.1.11 This chapter should be read in conjunction with:

- **Application Document 5.1 Consultation Report;**
- **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project;**
- **Application Document 6.2.1.5 Part 1 Introduction Chapter 5 Approach and Methodology;**
- **Application Document 6.2.1.6 Part 1 Introduction Chapter 6 Scoping Opinion and Consultation;**
- **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes;**
- **Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology;**
- **Application Document 6.2.4.3 Part 4 Marine Chapter 3 Fish and Shellfish;**
- **Application Document 6.2.4.11 Part 4 Marine Chapter 11 Inter-Project Cumulative Effects;**
- **Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report);**
- **Application Document 6.3.4.2.B ES Appendix 4.2.B Geophysical Survey Interpretation (Additional Surveys);**
- **Application Document 6.3.4.2.D Appendix 4.2.D Additional Subtidal Survey Report (Additional Surveys);**
- **Application Document 6.3.4.7.B ES Appendix 4.7.B Electromagnetic Deviation Study;**
- **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice;**
- **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC);**
- **Application Document 7.7 Marine Biosecurity Plan;** and
- **Application Document 7.5.12 Outline Offshore Invasive Non-Native Species Management Plan.**

1.1.12 This chapter is supported by the following figure located in **Appendix A Figures**:

- **Figure 1 Marine Conservation Zones (MCZ) within 17 km of the Offshore Scheme Order Limits, including sites beyond 17 km with potential indirect effects**; and
- **Figure 2 Marine habitats and Relevant Protected Sites and Areas of Rock Backfill within the offshore Scheme Boundary**.

The Proposed Project

1.1.13 The Proposed Project would comprise the following elements:

The Suffolk Onshore Scheme

- A connection from the existing transmission network via Friston Substation, including the substation itself. Friston Substation already has development consent as part of other third-party projects. If Friston Substation has already been constructed under another consent, only a connection into the substation would be constructed as part of the Proposed Project.
- A high voltage alternating current (HVAC) underground cable of approximately 1.9 km in length between the proposed Friston Substation and a proposed converter station (below).
- A 2 GW high voltage direct current (HVDC) converter station (including permanent access from the B1121 and a new bridge over the River Fromus) up to 26 m high plus external equipment (such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, similar small scale operational plant, or other roof treatment) near Saxmundham.
- A HVDC underground cable connection of approximately 10 km in length between the proposed converter station near Saxmundham, and a transition joint bay (TJB) approximately 900 m inshore from a landfall point (below) where the cable transitions from onshore to offshore technology.
- A landfall on the Suffolk coast (between Aldeburgh and Thorpeness).

The Offshore Scheme:

- Approximately 122 km of subsea HVDC cable, running between the Suffolk landfall location (between Aldeburgh and Thorpeness), and the Kent landfall location at Pegwell Bay.

The Kent Onshore Scheme:

- A landfall point on the Kent coast at Pegwell Bay.
- A TJB approximately 800 m inshore to transition from offshore HVDC cable to onshore HVDC cable, before continuing underground for approximately 1.7 km to a new converter station (below).
- A 2 GW HVDC converter station (including a new permanent access off the A256), up to 28 m high plus external equipment such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, and similar small scale operational plant near Minster. A new substation would be located immediately adjacent.

- Removal of approximately 2.2 km of existing HVAC overhead line, and installation of two sections of new HVAC overhead line, together totalling approximately 3.5 km, each connecting from the substation near Minster and the existing Richborough to Canterbury overhead line.

1.1.14 The Proposed Project also includes modifications to sections of existing overhead lines in Suffolk (only if Friston Substation is not built pursuant to another consent) and Kent, diversions of third-party assets, and land drainage from the construction and operational footprint. It also includes opportunities for environmental mitigation and compensation. The construction phase will involve various temporary construction activities including overhead line diversions, use of temporary towers or masts, working areas for construction equipment and machinery, site offices, parking spaces, storage, accesses, bellmouths, and haul roads, as well as watercourse crossings and the diversion of public rights of way (PROWs) and other ancillary operations.

1.2 Scoping Opinion and Consultation

Scoping

1.2.1 A Scoping Report (National Grid, 2022) for the Proposed Project was issued to the Planning Inspectorate (PINS) on 24 October 2022 and a Scoping Opinion (PINS, 2022) was received from the Secretary of State on 1 December 2022 (**Application Document 6.2.1.6 Part 1 Introduction Chapter 6 Scoping Opinion and Consultation**). Table 1.1 sets out the comments raised in the Scoping Opinion and how these have been addressed in this assessment. The Scoping Opinion takes account of responses from prescribed consultees as appropriate. **Application Document 6.2.1.6 Part 1 Introduction Chapter 6 Scoping Opinion and EIA Consultation** provides responses to the comments made by the prescribed consultees at scoping stage and how each comment has been considered.

Table 1.1 Comments raised in the Scoping Opinion

ID	Inspectorate's comments	Response
5.2.1	[*Changes to marine water quality during cable installation and cable lay from the use of HDD drilling fluids (construction)*]. The Applicant proposes to scope this matter out on the basis that the control and management measure LVS05 of the outline CoCP would be implemented meaning only inert (non-toxic), biodegradable drilling fluid will be used and disposed of at a licenced disposal site. The Inspectorate agrees that this matter can be scoped out on the basis that the mitigation measures proposed within the outline CoCP should be sufficient to address the likely impacts and avoid a likely significant effect. The ES should include details of the mitigation and	Following statutory consultation, changes to marine water quality during cable installation and cable lay from the use of drilling fluids has been scoped back into the assessment in Section 1.5. Relevant mitigation measures identified at this stage are provided in Section 1.4.

ID	Inspectorate's comments	Response
	explain how its delivery is assured with reference to relevant documents.	
5.2.2	[*Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils (construction, maintenance and decommissioning*)]. The Applicant proposes to scope this matter out on the basis that the control and management measures referred to within the outline CoCP create limited potential for accidental spills to occur and should an accidental spill or leak occur, it would be small in extent and subject to immediate control measures, dilution and rapid dispersal within the marine environment. The Inspectorate agrees that this matter can be scoped out on the basis that the mitigation measures proposed within the outline CoCP should be sufficient to address the likely impacts and avoid a likely significant effect. The ES should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	Changes to marine water quality from accidental leaks and spills from vessels, including loss of fuel oils on benthic ecology has been scoped out and has not been assessed further. Relevant project design and embedded mitigation measures, which include industry best practice, identified at this stage are provided in Section 1.4.
5.2.3	[*Introduction and spread of invasive non-native species (INNS) via vessel hull or ballast water (construction, maintenance and decommissioning*)]. The Applicant proposes to scope this matter out on the basis that the control and management measures referred to within the outline CoCP make the introduction of INNS through ship hulls and ballast water unlikely. The Inspectorate agrees that this matter can be scoped out on the basis that the mitigation measures proposed within the outline CoCP such as the Biosecurity Plan should be sufficient to address the likely impacts and avoid a likely significant effect. The ES should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	Introduction and spread of invasive non-native species INNS via vessel hull or ballast water on benthic ecology has been scoped out and has not been assessed further. Relevant mitigation measures identified at this stage are provided in Section 1.4. This includes the production of **Application Document 7.5.12 Outline Offshore Invasive Non-Native Species Management Plan** and **Application Document 7.7 Marine Biosecurity Plan**.
5.2.4	[*Underwater sound impacts on marine invertebrates (intertidal and subtidal ecology) (construction, maintenance and decommissioning)].* The Applicant proposes to scope this matter out on the basis that the type and duration of underwater sound that will be generated by the Proposed Project will not have any significant effects on benthic invertebrates or benthic communities. In the absence of confirmed	Underwater sound impacts on benthic marine invertebrates has been scoped in for further assessment in Section 1.5.

ID	Inspectorate's comments	Response
	construction details, the Inspectorate considers that this matter should be scoped in for further assessment.	
5.2.5	[*EMF emissions (operation)].* The Applicant proposes to scope this matter out on the basis that significant effects from EMF are unlikely to occur due to the depth of cable burial and the limited sensitivity of benthic species. In the absence of an estimation of EMFs arising from cables the Inspectorate considers that this matter should be scoped in for further assessment.	The effects from EMF emissions on benthic ecology have been scoped in for further assessment in Section 1.5.
5.3.2	The Scoping Report seeks to scope this matter [*effect of HDD drilling fluids on marine water quality*] out because the proposed mitigation measures include a commitment to only use inert, biodegradable drilling fluids which would be disposed of at a licensed disposal site. The Inspectorate agrees that this matter can be scoped out of further assessment. However, as noted in point 2.1.6 above, the ES should provide information on the mitigation measures relied on to avoid likely significant effects, including the measures which would be employed in the event of an accidental leak of drilling fluids.	Following statutory consultation, impacts to designated features as a result of changes to marine water quality during cable installation and cable lay from the use of drilling fluids has been scoped back into the assessment in Section 1.5. Relevant mitigation measures identified at this stage are provided in Section 1.4.
5.3.3	The Scoping Report seeks to scope out this matter [*leaks and spills from vessels*] on the grounds that the measures contained in the CoCP would make the risk of accidental spills/leaks negligible. The Inspectorate agrees that, provided the measures to mitigate the risks of leaks and spills are clearly described in the ES and secured in the dDCO [draft DCO], this matter can be scoped out of further assessment.	The effects on marine water quality accidental leaks and spills from vessels, including loss of fuel oils on migratory fish receptors (e.g. smelt) has been scoped out and has not been assessed further. Relevant mitigation measures identified at this stage are provided in Section 1.4.
5.3.4	The Scoping Report states that cable thermal emissions have been scoped in because of the potential to alter community structure within the sediment. However, it also then states that cables have negligible capacity to heat the overlying water column. The Inspectorate has interpreted this as meaning that effects from thermal heating of the water column would not be assessed and agrees that this matter can be scoped out of further assessment.	Due to comments from the Environment Agency as part of Statutory Consultation, thermal effects have now been scoped back in (with specific consideration to smelt migration) in Section 1.5.

Statutory Consultation

1.2.2 Statutory consultation for the Proposed Project took place between 24 October and 18 December 2023. A further targeted consultation exercise on the main changes to the Proposed Project introduced after the 2023 statutory consultation, was undertaken between 8 July and 11 August 2024. A summary of relevant feedback received during statutory consultation relating to MCZs is provided below. Further details on how consultation responses have informed the assessment can be found in **Application Document 5.1 Consultation Report**.

1.2.3 Statutory consultees with feedback relevant to MCZs included Natural England, and Kent and Essex Inshore Fisheries and Conservation Authority (IFCA).

1.2.4 Key comments rising from Natural England feedback were:

- Natural England requested a robust baseline characterisation to be provided to inform the MCZ Assessment, including lessons learned and post-construction evidence from other projects (e.g., Nemo Link) for impacts on Goodwin Sands MCZ. In response to this comment:
  - The Offshore Scheme has been re-routed to avoid the Goodwin Sands MCZ (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**) and will therefore, avoid direct impacts on the site, reducing the impacts to the known and potential receptors located within the area.
  - A comprehensive overview of the designated features and conservation objectives has been provided in Section 1.6 and Section 1.7.
- Natural England recommended that The Swale Estuary MCZ and Blackwater, Crouch, Roach and Colne Estuaries MCZ are scoped into the MCZ Assessment. In response to this comment:
  - There has been further consideration of these MCZs considered within the MCZ Assessment. Justification for the screening decision have been provided where appropriate.
- Natural England disagreed with the conclusion that the conservation objectives of Goodwin Sands MCZ will not be hindered. Natural England advise that further information regarding impacts and mitigation measures to reduce the level of risk to acceptable levels are required. Natural England also advised that the conservation objectives of the MCZ's designated features, specifically blue mussel (*Mytilus edulis)* beds should be considered further due to the recovery objective of the feature. In response to these concerns:
  - The Offshore Scheme has been re-routed to avoid the Goodwin Sands MCZ (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**) and will avoid direct impacts on the site, thereby reducing the impacts to the known and potential receptors located within the area.
  - The re-routing of the Offshore Scheme will reduce direct impacts to the known and potential benthic receptors located within Goodwin Sands MCZ, including *My. edulis* beds. This follows the mitigation hierarchy, avoiding impacts to the features and conservation objectives of Goodwin Sands MCZ.

- Additionally, based on updates to **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project** and additional survey data (**Appendix 4.2.A Benthic Characterisation Report (Original Report)** and **Appendix 4.2.B Geophysical Survey Interpretation (Additional Surveys)**), all data to support the baseline and fully assess impact pathways will be presented, including consideration of all features of conservation interest such as blue mussel (*M. edulis*) beds and ross worm (*Sabellaria spinulosa)* reef.

1.2.5 Key comments arising from the MMO feedback were:

- The MMO notes there will be a potential three degree increase in sediment temperature because of subsea cable installation (calculated based upon a maximum seabed ambient surface sediment temperature of 15°C). The MMO would consider the installation of the HVDC cable to negatively affect the recover conservation objective for blue mussel (*M. edulis)*, beds and ross worm, (*S. spinulosa)*, reefs and recommends that this is considered within the MCZ Assessment. In response to this comment:
  - The Offshore Scheme has been re-routed to avoid the Goodwin Sands MCZ (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**) and will therefore, avoid direct impacts on the site, reducing the impacts to the known and potential receptors located within the area, including blue mussel (*M. edulis)* beds. This follows the mitigation hierarchy, avoiding impacts to the features and conservation objectives of Goodwin Sands MCZ (Section 1.7).
  - An assessment of disturbance associated with thermal effects has been completed in **Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**.

1.2.6 Key comments arising from the Environment Agency feedback were:

- The Environment Agency requested the inclusion of disturbance effects from thermal emissions on this smelt. In response to this comment:
  - Consideration has also been given to potential disturbance from thermal emissions by migratory fish, such as smelt (Sections 1.5, 1.6, and 1.7).

1.2.7 No further responses have been received in response to targeted consultation.

Further Engagement

1.2.8 No further engagement specific to the MCZ Assessment was conducted.

1.3 Assessment Methodology

1.3.1 Guidance published by the MMO (2013) recommend a staged approach to MCZ Assessments, involving three sequential stages: Screening, Stage 1 Assessment, and Stage 2 Assessment. Full details of these stages have been provided below and presented in Plate 1.1.

- **Screening** – Determine whether the licensable activity is taking place within or near an area being put forward or already designated as an MCZ and whether the activity is capable of affecting the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature is dependant (as outlined in Section 1.1). If the answer is yes, then proceed to Stage 1.

- **Stage 1 Assessment** – Is the authority satisfied that there is no significant risk of the activity hindering the conservation objectives stated for the MCZ and can the authority exercise its functions to further the conservation objectives of the site. If the answer is no to either of these questions, then the authority must consider whether there are other means of proceeding with the activity which would create a substantially lower risk of hindering the conservation objectives. If the answer is still no, then proceed to Stage 2.
- **Stage 2 Assessment** – This stage looks at whether the benefit to the public of proceeding with the activity clearly outweighs the risk of damage to the environment and seeks to satisfy the authority that the applicant can make arrangements to undertake measures of equivalent environmental benefit to the damage which the activity will or is likely to have of the MCZ.

1.3.2 To determine whether Section 126 applies, it is necessary to consider the geographical proximity of the Offshore Scheme to the MCZ, and the potential for proposed activities to affect the protected features of an MCZ or the ecological/geomorphological processes upon which protected features are reliant.

1.3.3 A risk-based approach is recommended by the MMO when determining the proximity of an activity to an MCZ. The application of appropriate buffer zones to the protected features of an MCZ under consideration, as well as consideration of the potential risk of impacts from activities at greater distances from the MCZ is necessary.

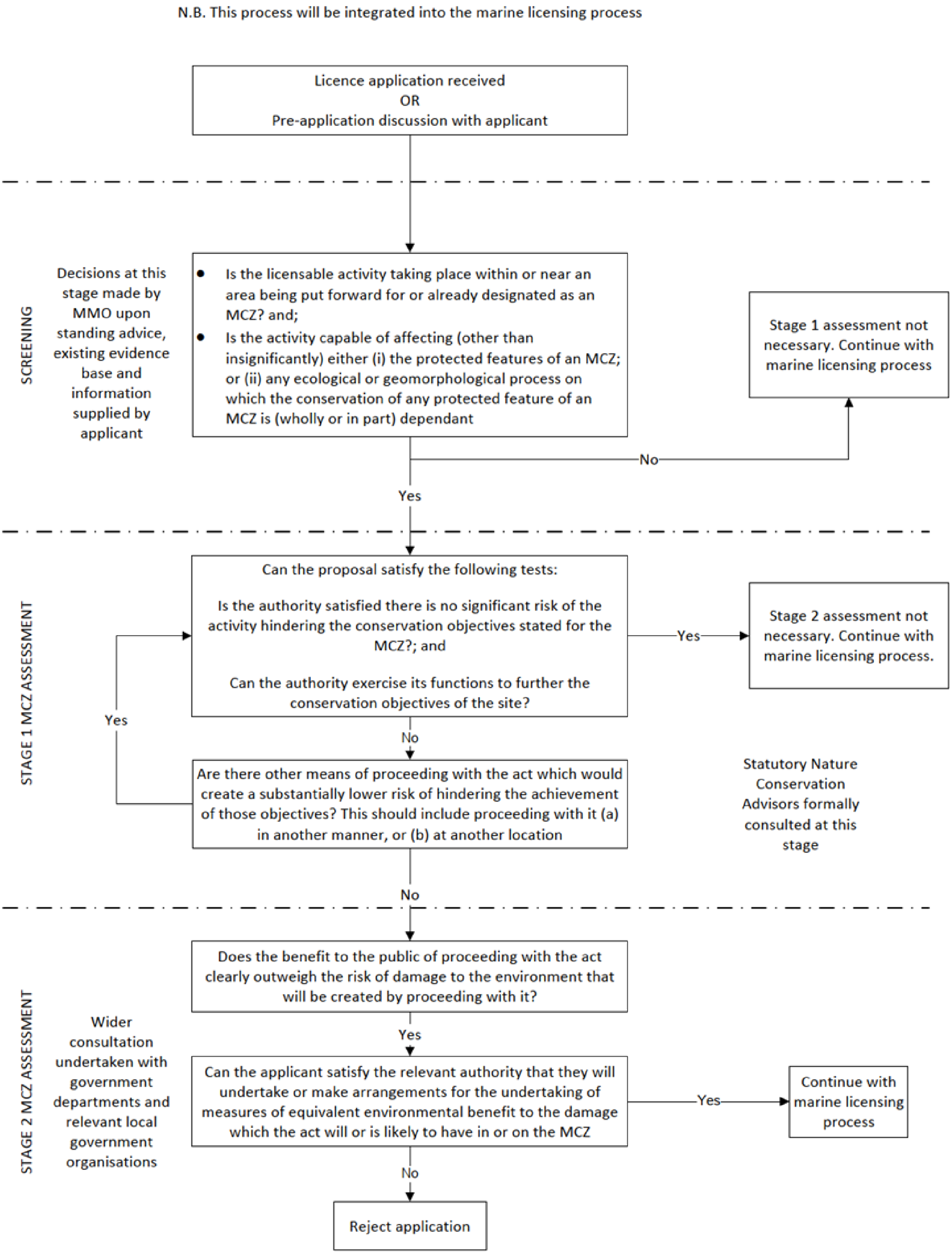

Plate 1.1 Summary of the MCZ assessment process used by the MMO in marine licence decision making (MMO, 2013)

Basis of Assessment

Flexibility assumptions

1.3.4 The environmental assessments have been undertaken based on the description of the Proposed Project provided in **Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**. To take account of the flexibility allowed in the Proposed Project, consideration has been given to the potential for effects to be of greater or different significance should any of the permanent or temporary infrastructure elements be moved within the Limits of Deviation (LoD) or Order Limits.

1.3.5 The assumptions made regarding the use of flexibility for the main assessment, and any alternatives assumptions are set out in Table 1.2 below.

Table 1.2 Flexibility assumptions

Element of flexibility	How it has been considered within the assessment?
Lateral LoD marine HVDC cable	The worst-case scenario assessed for the Offshore Scheme is one bundled HVDC (x2) and one fibre optic cable in one trench. This bundled scenario maybe placed anywhere within the Offshore Scheme Boundary.

Sensitivity test

1.3.6 It is likely that under the terms of the draft DCO, construction could commence in any year up to five years from the granting of the DCO which is assumed to be 2026. The Environmental Statement has given consideration to whether the assessment of impacts would be any different if the works were to commence in any year up to year five. This consideration has also been integrated into understanding the potential impacts assessed within the MCZ Assessment (Section 1.5).

1.4 Proposed Project Design and Embedded Mitigation

1.4.1 The Proposed Project has been designed, as far as possible, following the mitigation hierarchy in order to, in the first instance, avoid or minimise marine ecology impacts and effects through the process of design development, and by embedding measures into the design of the Proposed Project.

1.4.2 As set out in **Application Document 6.2.1.5 Part 1 Introduction Chapter 5 Approach and Methodology**, mitigation measures typically fall into one of the three categories: embedded measures; control and management measures; and mitigation measures.

Embedded Measures

1.4.3 Embedded measures have been integral in reducing the marine ecology effects of the Proposed Project. Measures that that have been incorporated are:

- Sensitive routeing and siting of infrastructure and temporary works.

- Commitments made within **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)**.

Control and Management Measures

1.4.4 The following measures have been included within **Application Document 7.5.2 Offshore Construction Environmental Management Plan** relevant to the control and management of impacts that could affect marine ecology receptors:

- BE01 - a biosecurity plan will be produced for the project, following the latest guidance on INNS from the Great Britain Non-Native Species Secretariat.
- BE02 - all project vessels will adhere to the International Maritime Organisation (IMO) Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines).
- BE03 - any material introduced into the marine environment, such as rock protection material, will be from a suitable source or cleaned to ensure no INNS can be introduced.
- BE04 – Where possible, cable protection materials will use locally sourced materials or environmentally benign sources.
- FSF01 - in accordance with the Department of Energy and Climate Change report (DECC, 2011c) and MMO recommendations, the target depth of lowering will be between 1 m to 2.5 m (subject to local geology and obstructions).
- LVS01 - all project vessels shall adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004.
- LVS02 - all project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972) (IMO, 1972) regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) (IMO, 1983) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (IMO, 1974).
- LVS04 - All oil, fuel and chemical spills will be reported to the MMO Marine Pollution response team.
- LVS05 - Drilling fluids required for trenchless operations will be carefully managed to minimise the risk of breakouts into the marine environment. Specific avoidance measures would include:
  - the use of biodegradable drilling fluids (PLONOR substances) where practicable,
  - drilling fluids will be tested for contamination to determine possible reuse or disposal; and
  - If disposal is required drilling fluids would be transported by a licensed courier to a licensed waste disposal site.
- GM01 - Designated (and as minimal as possible) anchoring areas and protocols shall be employed during marine operations to minimise physical disturbance of the seabed.
- GM03 - An offshore Construction Environmental Management Plan (CEMP) including an Emergency Spill Response Plan and Waste Management Plan, Marine

Pollution Contingency Plan (MPCP), Shipboard Oil Pollution Emergency Plan (SOPEP) and a dropped objects procedure will be produced prior to installation.

- MPE03 - Cable protection features (e.g. rock placement, mattresses and grout bags) will be installed only where considered necessary for the safe operation of the Proposed Project. This includes the repair of cables due to accidental damage.

1.5 Potential Impacts and Zones of Influence (ZOI)

1.5.1 The protected features of identified MCZs fall into one of two categories: subtidal benthic habitats and species' and 'migratory fish' in this assessment.

1.5.2 The OSPAR Intersessional Correspondence Group on Cumulative Effects pressure list (OSPAR Commission, 2011) and the Marine Life Information Network (MarLIN) marine evidence-based sensitivity assessments (MarESA) (Tyler-Walters, Tillin, d'Avack, Perry, & Stamp, 2018) have been used to understand the sensitivities of each of these receptors, alongside a range of academic papers and reports, such as the OSPAR Commissions background document on potential environmental impacts associated with subsea cables (2023).

1.5.3 Details of the Proposed Project have been used to identify the potential impact pathways. These potential impact pathways were subject to stakeholder review during the Scoping and PEIR (Section 1.2) and are outlined below. The impact pathways and associated ZOIs (the extent of the potential impact from the activity) considered within this assessment are those that specifically relate to each receptor group designated under the screened in MCZs (summarised in Table 1.3).

Construction phase

Temporary physical disturbance to benthic habitats and species

1.5.4 There are a number of landfall, route preparation and cable installation activities that will have the potential to result in temporary physical disturbance to MCZs. These activities include a pre-lay grapnel run, sandwave lowering (pre-sweeping), and cable trenching. As a worst case-scenario these activities will be occurring over the length of the Offshore Scheme (approximately 122 km) with a maximum swathe of 25 m (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**).

1.5.5 Sensitivity to the impact of habitat disturbance varies between habitats and species, depending on the stability of the habitat and its resilience to disturbance, and the vulnerability of individual species to mechanical disturbance. Mobile species and life stages are considered to have greater capacity to accommodate such changes through movement to undisturbed areas while sessile or less mobile species/life stages are considered less tolerant of such disturbance which may also result in physical damage in some instances. Therefore, impacts to benthic receptors from this impact pathway will be considered further in the assessment.

1.5.6 Certain life stages of some fish species are understood to be associated with the seabed. However, migratory fish, such as smelt, are not considered to have functional associations with seabed habitats due to their life history strategies and transient presence within the Offshore Scheme. Therefore, this migratory fish receptor group has not been considered further for this impact pathway.

Temporary increase in suspended sediment concentration (SSC) and deposition

1.5.7 Seabed disturbance from pre-installation and installation activities have the potential to increase SSC and turbidity, creating a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. There are several potential effects to marine ecology receptors, associated with increased SSC and sediment deposition including:

- reduced photosynthesis due to increased turbidity, resulting in reduced primary production in algae;
- smothering of invertebrate species, eggs, and larvae;
- clogging of respiratory and feeding apparatus;
- reduced feeding success of visual predators due to decreased visibility;
- impacts on the movements of migratory fish; and
- indirect effects of the release of contaminants, such as heavy metals and hydrocarbons, during sediment mobilisation, on benthic species.

1.5.8 SSC and depositional loads will vary along the Offshore Scheme depending on the local environmental conditions, particularly the sediment type and water movement (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). Modelling has been undertaken to estimate the extent of sediment dispersion before deposition as a result of cable installation activities. The method for these calculations, and the results, are reported in further detail in **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**. Based on this modelling, the highest dispersion is associated with jetting activities during cable installation. Therefore, effects from this activity have been assessed as the worst-case scenario for cable installation.

1.5.9 Based on calculations of the fall velocity of particles, the maximum distance travelled by larger fractions of sands and gravels is expected to be approximately 20 m. These particles will subsequently be re-deposited either directly back into the trench or within a few meters of the Offshore Scheme within timescales in the order of seconds to tens of seconds, having a very localised effect.

1.5.10 Fine sands, silts and clay may, however, be transported beyond the Offshore Scheme. The sediment dispersion modelling showed that SSC levels generally remained below 300 mg/l, with high concentration only occurring in the first 24 hours after disturbance. A SSC concentration of 100 mg/l was predicted as far as 11 km for fine sand, but these distances were associated with the resuspension of sediment at multiple locations, due to tidal currents, rather than a single large plume (**Plate 1.41** in **Application Document 6.4.4.1 Physical Processes**). It is considered that there will be no significant elevated SSC beyond this distance as these sediment fractions will be rapidly diluted, returning to background levels of 30 mg/l within 14 km from the point of mobilisation.

1.5.11 Gravel and sand represent the dominant sediment types which were recorded along the cable route (**Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**). Based on the known settling distance of these sediments, coarse sediments will be deposited within a maximum distance of 20 m from the jet trencher, within the Offshore Scheme Boundary, avoiding any interaction with MCZs. For finer sediment, temporary deposition of 0.5 - 10 mm was modelled as occurring within 2 km, at discrete locations in the south of the Offshore Scheme. However, any sediment will be rapidly resuspended or swept away by tidal currents over very short timescales and returned to negligible levels within a maximum of 14-days. Finer sediment fractions may be carried in suspension settling within a maximum distance of 17 km. However, due to the very low level of SSC this deposition will be limited to a thickness of less than 0.5 mm on the seabed which is considered very small and equivalent to natural variability, thus unlikely to be detectable in the field.

1.5.12 Therefore, impacts to marine ecology receptors from this impact pathway will be considered further in the assessment.

Changes to marine water quality from the use of drilling fluids

1.5.13 The Offshore Scheme will use a trenchless solution, such as horizontal directional drilling (HDD), at both landfall locations. At the northern landfall in Suffolk, the entry/exit points will be entirely in the subtidal environment. At the southern landfall, the entry/exit points will be located within an area of intertidal mudflat in the intertidal range.

1.5.14 The use of a trenchless installation method (such as HDD), and the associated discharge of drilling fluids, may result in a temporary, localised reduction in water quality at the HDD entry and exit points. However, any drilling fluids will be contained within the cofferdam, and captured where possible. Consequently, only receptors located in the immediate vicinity of the HDD breakout areas are likely to come into contact with drilling fluids in the event of a leak or spill.

1.5.15 All drilling fluids used, such as bentonite, will be selected from the OSPAR List of Substances/Preparations Used and Discharged Offshore (2021) which are considered to 'Pose Little or No Risk to the Environment' (PLONOR). Additionally, where entry/exit points are located in the intertidal area (i.e. at the Pegwell Bay landfall only) drilling fluid will be captured where possible (control measure LVS05 in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**), minimising release into the marine environment.

1.5.16 At the Suffolk Landfall, it has been estimated that up to 7,240 m^3 of drilling fluid will be discharged and at the Kent Landfall, it has been estimated that up to 40 m^3 of drilling fluid will be discharged. Although the potential dispersion of suspended particles is considered to be a maximum of 17 km (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**), the volumes of HDD drilling fluid will be very limited and the regular tidal movement in the intertidal zone acts to disperse and dilute any drilling fluid released. Therefore, any potential impacts are expected to be localised to the HDD entry/exit point locations. On this basis, and as all MCZs are greater than 4 km from a landfall location, it is considered unlikely that changes to marine water quality from the use of drilling fluids will result in any significant impacts to any features of MCZs. Therefore, this impact pathway is not considered further in the assessment.

Underwater noise

1.5.17 Vessel activity and cable installation activities could generate underwater sound which has the potential to directly affect marine species. Underwater sound has a range of potential effects depending on the type of sound and proximity to the sound source. The range of potential effects include lethal effects and physical injury, auditory injury, behavioural responses, and masking.

1.5.18 Several activities during the construction phase will generate underwater sound, including multi-beam echo sounder, side scan sonar, sub-bottom profiler (SBP), ultra-short baseline, cable installation activities, the use of cable lay vessels (operating with dynamic positioning), and the use of support vessels. The Proposed Project activity with the highest sound source is expected to be SBP. This activity operates at frequencies of

0.5-12 kHz. Therefore, impacts to marine ecology receptors from this impact pathway will be considered further in the assessment.

1.5.19 There is also potential for unexploded ordnance (UXO) detonation to be required prior to the cable installation programme. The Applicant is committing to a two-licence strategy for Unexploded Ordnance (UXO)-related works, as requested by the Marine Management Organisation (MMO) and supported by Natural England. This approach will involve a first marine licence for UXO identification surveys and a second for any UXO clearance activities, should they be required. Thus, UXO clearance has not been considered further in this assessment.

Operation and Maintenance Phase

Direct loss of benthic habitats and species

1.5.20 Cable installation, and repair, may require protection measures, in the form of rock berms, rock backfill or concrete mattresses, at some locations where the minimum target cable burial depth of 0.5 m below the seabed cannot be achieved. Introduction of hard substrate would replace other natural substrates, leading to permanent loss of these habitats and associated species.

1.5.21 Certain life stages of some fish species are understood to be associated with the seabed. However, migratory fish, such as smelt, are not considered to have functional associations with seabed habitats due to their life history strategies and transient presence within the Offshore Scheme. Therefore, the migratory fish receptor group has not been considered further for this impact pathway.

Interruption to sediment transport processes

Coastal geomorphological change and associated changes to sediment transport regimes

1.5.22 The Offshore Scheme is designed for a lifespan of approximately 40-60 years. The cable system installation is designed such that a regular maintenance regime is not required to maintain the integrity of the link.

1.5.23 Throughout its operational lifetime, it is intended that the majority of the cable will be trenched into the seabed. Therefore, the presence of the cable will have no impact on bedload sediment transport processes and therefore will not impact coastal geomorphology, nor the designated sites in the nearshore/coastal environment.

1.5.24 The use of cable protection measures including rock berms, mattresses and rock backfill will alter the seabed morphology by artificially raising parts of the sea floor (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**). In the offshore environment, the dimensions of the cable protection measures are considered too small, comprising a sloping berm up to a maximum height of 1 m above the seabed, or mattresses 0.5 m above the seabed at crossings sufficiently spread out along the Offshore Scheme Boundary route. These should be installed with a low enough profile to have no notable impact on the regional hydrodynamics and sediment transport patterns.

1.5.25 Cable protection may initially block or trap a limited volume of the sediment in transport, associated with the infilling of voids in the protection, and (under certain conditions) an accumulation of sediment against the upstream side. The potential volume of sediment blockage is limited by the volume of the voids and the height of the obstruction presented by the protection. Following an initial period of accumulation up to this limited volume, sediment transport will bypass over the protection and continue at the natural rate, with no measurable change expected to the onward supply of sediment to downstream areas, or the nature of nearby bedforms.

1.5.26 Therefore, the impact of offshore cable protection measures is small and will not impact coastal morphology nor the designated sites in the nearshore/coastal environment. Therefore, this impact pathway for offshore cable installation can be screened out in relation to the physical processes and benthic ecology receptors and have not been considered further for this impact pathway.

1.5.27 At the landfall sites, rock protection will be emplaced at the ducts after cable pull in and installation. The top of the duct will be approximately 1.1 m below the seafloor and the top of the rock bags/mattresses laid on top approximately 0.5 m below the seafloor. Therefore, they will be permanently buried and will not protrude from the seafloor. There is therefore no potential to affect coastal geomorphology at the Kent landfall, including the Thanet Coast MCZ. Therefore, these impact pathways in relation to the physical processes and cable protection at the landfall sites can be screened out and benthic ecology receptors and have not been considered further.

Cable protection measures and associated impact on the Goodwin Sands MCZ

1.5.28 As is also outlined in **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes,** the Goodwin Sands MCZ boundary is approximately 2.6 km from the cable crossing point at KP 113.1 (Nemo Link) and 260 m from the Thanet cable crossing point at KP 107.6. The Cross Ledge Sandbanks are approximately 3 km and 8 km from the crossing points at KP 113.1 and KP 107.6, respectively. At the crossing points cable protection will be required with the following proposed dimensions (dependent on specific Crossing Agreements):

- Mattressing: 0.3 m (H) x 3.0 m (W) x 6.0 m (L) or 0.45 m (H) x 3.0 m (W) x 6.0 m (L).
- No pre-lay berm: 1.0 m (H) x 1.0 m (top) x 7.0 m (base) with 1:3 slope.
- Includes pre-lay berm 1.0 m (H) x 1.0 m (top) 10.0 m (base) with 1:3 slope.

1.5.29 At these dimensions, the protrusion of the cable protection, a maximum of 1 m above the sea floor will not cause any significant interference with flow dynamics or sediment transport patterns on a scale that would lead to a change in morphology of the Goodwin Sands banks MCZ or the Cross Ledge Sandbanks.

1.5.30 While locally some scour is expected to occur around the protection, the hydrodynamic and sediment transport regimes that are associated with development and maintenance of the Goodwin Sands MCZ complex, occur on a regional scale that will not be altered by the presence of low-lying protection.

1.5.31 The Goodwin Sands MCZ is a naturally morphologically dynamic area. In the past the Goodwin Sands MCZ has proven resilient to and recovered from dredging activities (carried out in 1998) (Goodwin Sands Conservation Trust, 2024). The Goodwin Sands sandbanks are a morphologically resilient feature which play a role as a natural sea defence of the Kent coast. The sandbanks from a large, dynamic and constantly changing feature consisting of sand and coarse sediments recognised as a "closed sediment system". This means the sandbanks are a largely self-contained and dynamic entity where little sand enters or leaves. Despite historical dredging, the total volume of sediment in the system has historically remained relatively stable. While considered "closed" regarding the input and output of sediments, the system is not static; it is characterised by active, shifting sandbanks and ongoing sediment migration. Due to the effect of cable protection measures being highly localised and the absence of an impact pathway to the Goodwin Sands MCZ, further consideration of physical processes can be screened out in relation to the benthic ecology receptors within the Goodwin Sands MCZ and have not been considered further**.**

1.5.32 ABPmer has undertaken an independent review of monitoring data from similar marine developments, primarily related to offshore windfarms, and has found no evidence of cable protection elsewhere within UK waters affecting regional sediment transport rates or pathways. For example, a report for the High Court of Justice (2019[1]) presented extensive technical evidence, modelling outputs, and expert advice demonstrating that the Goodwin Sands sandbank system is self-maintaining, highly resilient, and capable of natural recovery, in response to assessing the potential effects of dredging 2 million m^3 of sand from Goodwin Sands involving lowering of up to 2-4 m in places. The modelling indicates that, although localised disturbance may occur, the overall form and behaviour of the sandbank remain stable due to ongoing natural sediment transport processes. The report concludes that the Goodwin Sands possess a high degree of morphological resilience, enabling them to absorb small-scale impacts without affecting their wider structure or long-term evolution (Thomson v Marine Management Organisation & Others, 2019 EWHC 2368 (Admin)).

1.5.33 Thus, the lack of an impact on physical processes at the Goodwin Sands MCZ is due to the vastly different scales at which natural processes operate relative to the scale of cable protection in both horizontal and vertical dimensions. Whilst there may be a short-term period of re-adjustment before patterns of sediment movement are re-established, no long-term changes in regional sediment transport patterns are therefore expected to occur following installation of cable protection.

1.5.34 In conclusion, low-lying cable protection measures are highly unlikely to alter coastal processes. Therefore, impacts pathways for physical processes can be screened out in relation to the benthic ecology receptors at the Goodwin Sands MCZ and have not been considered further.

Introduction and spread of invasive non-native species (INNS)

1.5.35 Rock berms, rock backfill, and concrete mattresses are proposed for a number of locations along the Offshore Scheme to protect the cable at intersections with other cables or pipeline infrastructure and in areas where burial cannot be achieved. This could provide additional habitat for any existing epifaunal INNS populations allowing for localised spreading.

1.5.36 Some studies have demonstrated the ability for artificial hard structures to function as artificial rocky reef, which are known to be preferred habitat for many INNS acting as ‘ecological stepping stones’ (Adams, Miller, Aleynik, & Burrows, 2014). This could facilitate the colonisation and spread of INNS in areas of the benthos which may have previously been unsuitable. However, there remain uncertainties surrounding this theory (Coolen, et al., 2020) and the function of artificial structures as ‘stepping stones’ remains unclear.

1.5.37 Infrastructure associated with cable routes, including cable protection, are usually restricted to a narrow strip along parts of the cable route. Although, there are concerns

[1] See Thomson vs Marine Management Organisation and others, 2019, EWHC 2368 judgement available at: https://www.casemine.com/judgement/uk/5d72490c2c94e02c0a4b2708

around introduced substrata providing habitat for INNS, particularly given the substantial growth of marine infrastructure in the North Sea, the available field studies of cables indicate a colonisation of the provided new habitat by endemic, rather than invasive fauna (OSPAR Commission, 2023). Several studies indicate that the risk of the establishment of non-native species on hard substrates in subtidal areas exists, but is lower compared to structures in the intertidal zone (Kuhnz, Buck, Lovera, Whaling, & Barry, 2015; Sherwood, et al., 2016). Therefore, as subsea cables, and associated protection structures, are almost exclusively laid in the subtidal which makes them less prone to colonisation by non-native species (OSPAR Commission, 2023), and to date, no spread of INNS caused by submarine cabling has been documented (Taormina, et al., 2018).

1.5.38 To ensure that the potential impact of INNS introduction is reduced, management measures have been introduced (control measures BE01, BE02, BE03, and BE04 in **Application Document 7.5.2 Offshore Construction Environmental Management Plan**), including ensuring that all selected rock protection and concrete mattresses used for cable protection will be clean, so do not provide a vector for INNS directly. Additionally, an INNS Management Plan (**Application Document 7.5.12 Outline Offshore Invasive Non-Native Species Management Plan**) and Marine Biosecurity Plan (**Application Document 7.7 Marine Biosecurity Plan**) will also be implemented.

1.5.39 On this basis, it is considered unlikely that INNS will be introduced to the subtidal environment during the placement of cable protection associated with the Offshore Scheme or result in any significant impacts on MCZs. Therefore, this impact pathway is not considered further in the assessment.

Effects of thermal emissions

1.5.40 Submarine power cables are known to produce heat during operation which when buried in the seabed, can increase the temperature of surrounding sediment (Emeana, et al., 2016). Such heat has the potential to cause sediment dwelling and demersal mobile organisms to move away from the affected area. Increased heat may also alter physio-chemical conditions for epifaunal species and bacterial activity (with shifts in bacterial community composition and changes in nitrogen cycling) in surrounding sediments, contributing to altered faunal composition and localised ecological shifts (Meissner, Schabelon, Bellebaum, & Sordyl, 2006; Hicks, et al., 2018).

1.5.41 Migratory fish, such as smelt, have the potential to be sensitive to temperature changes, which can influence migration timing and routes. Therefore, migratory fish have been considered as having the potential to be affected by the effect of thermal emissions during migration (Section 1.2).

1.5.42 The Offshore Scheme is expected to use one bundled cable which will be buried to a target burial depth between 1 m – 2.5 m below the seabed (as per control measure FSF01 in **Application Document 7.5.3.1 Appendix A Outline Code of Construction Practice**, Section1.4). Heat dissipation modelling undertaken for a similar cable installation project, the Eastern Green Link 2 submarine HVDC transmission link between Peterhead in Aberdeenshire and Drax in North Yorkshire (AECOM, 2022) for bundled cables buried at a depth of 1.5 m, indicated that within 500 mm of the seabed surface the increase in sediment temperature was limited to approximately 3°C. However, seawater at the seabed surface will have a cooling effect and will dissipate any temperature increases further.

1.5.43 Although thermal effects would be long-term and occurring continuously for the operational lifetime of the Offshore Scheme, the temperature increase is predicted to be only a few degrees higher than ambient at the shallow sediment depths (<20 cm) at which infaunal species are typically found. The latest OSPAR report states a threshold of 2^{o}C temperature increase from a power cable at a sediment depth of 0.2 m will only be exceeded in rare cases and for short periods of time (OSPAR Commission, 2023). Thus, if the burial depth is increased to a target burial depth of target 1 m to 2.5 m, then any further changes to temperature are also considered to be negligible.

1.5.44 Therefore, impacts to marine ecology receptors from this impact pathway will be considered further in the assessment.

Effects of electromagnetic field (EMF) emissions

1.5.45 Subsea power cables are known to produce EMF emissions (Hutchison, Gill, Sigray, He, & King, 2020) which may have potential to disrupt sensory mechanisms in magnetosensitive and electrosensitive marine species.

1.5.46 There is very little information about the sensitivity of benthic species to EMF but there have been a small number of investigations in laboratory experiments. There is evidence from studies that some benthic invertebrates are able to detect EMF (Bochert & Zettler, 2006). However, in a laboratory study there was found to be no evidence of avoidance or attraction behaviours at an EMF of 1000 μT (Jakubowska, Urban-Malinga, Otremba, & Andrulewicz, 2019) a much higher intensity than will the emitted by the Offshore Scheme. Moreover, in an experiment with American lobsters, only subtle behavioural responses to HVDC EMF were observed (Hutchison Z. L., et al., 2018). There were notable changes in movement and distribution within an enclosed space, but the EMF did not represent a barrier to lobster movements, and no significant impact was observed overall.

1.5.47 Elasmobranch fish are particularly sensitive to EMF due to their reliance on an electrosensory system for detecting prey, avoiding predators, and locating mates (Hutchison Z. , et al., 2018). However, there is also some evidence of migratory fish exhibiting directional and behavioural reactions to magnetic fields (Westerberg & Lagenfelt, 2008; Westerberg & Begout-Anras, 2000). However, disturbance to migratory fish is not well understood, a review of literature suggests that significant responses are expected to be limited, with some studies demonstrating no significant differences in behavioural reactions and migration success (Wyman, et al., 2018). On this basis, migratory fish are anticipated to have a low sensitivity to EMF emissions.

1.5.48 Modelling of the predicted EMF emissions for the Offshore Scheme (**Application Document 6.3.4.7.B ES Appendix 4.7.B Electromagnetic Deviation Study**) shows that the EMF for a bundled cable design buried at 1 m, indicates field intensity of 51.5 μT at the seabed surface, representative of background levels, thus having only a very localised effect. The effects of EMF reduce with vertical distance from the cable, and the modelling shows the magnetic field resulted in a negligible magnetic field at 5 m above the seabed.

1.5.49 Therefore, impacts to marine ecology receptors from this impact pathway will be considered further in the assessment.

Decommissioning Phase

1.5.50 Following the completion of the Operational phase, the Decommissioning phase will take place. As this work is planned decades into the future, it is unknown what the exact methodology will be for decommissioning, as it will be based on the best available technology available at the time of decommissioning.

1.5.51 In the years leading up to the end of the Project’s operational life, options for decommissioning will be evaluated through integrated environmental, technical, and economic assessments. The objective in undertaking these assessments will be to minimise the short- and long-term effects on the environment, whilst ensuring that the sea is safe for other users to navigate. The level of decommissioning will be based on the regulations, best practice methods, and technology available at the time of decommissioning. The principal options for decommissioning include:

- Full removal of the cable; and
- Leaving the cable buried *in-situ*.

1.5.52 In the event of the full removal of the cable, this would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Should the cable be left *in-situ*, there would likely be no impact pathways to marine receptors. Thus, as a worst-case scenario, impacts during decommissioning may be of a similar magnitude to Construction Phase activities, depending upon the decommissioning option selected.

Table 1.3 Summary of potential impact pathways and associated ZOI

Proposed Project phase	Potential impact pathway	Receptor	Rationale	Maximum ZOI
Construction, Operation and Maintenance, and Decommissioning	Temporary physical disturbance to benthic habitats and species	Benthic habitats and species	Temporary disturbance from construction-based activities is expected at both landfall locations and along the Offshore Scheme (approximately 122 km in length), with swathes of up to 25 m (12.5 m from the central line).	12.5 m from the cable
		Migratory fish	Migratory fish are not considered to have functional associations with seabed habitats due to their life history strategies and transient presence within the Offshore Scheme. Therefore, this receptor group has not been considered further for this impact pathway.	NA
Construction, Operation and Maintenance, and Decommissioning	Temporary increase in SSC and deposition	Benthic habitats and species Migratory fish	Based on calculations undertaken in **Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**, fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km, in discrete locations near the Kent coast. It is considered that there will be no significant elevated SSC beyond this distance as these sediment fractions will be rapidly diluted, returning to background levels within 14 km from the point of mobilisation. These finer fractions may be carried in suspension, with calculations concluding that fine sands would settle within a maximum distance of 17 km. Sediment deposition will be limited to a thickness of less than 0.5 mm on the seabed which is considered very small and equivalent to natural variability, thus unlikely to be detectable in the field. There is therefore, no ZOI for this element of the impact pathway.	17 km

Proposed Project phase	Potential impact pathway	Receptor	Rationale	Maximum ZOI
Construction, Operation and Maintenance and Decommissioning	Underwater noise	Benthic habitats and species	Few formal studies have been conducted on the impacts of underwater sound on marine invertebrates, although invertebrates are believed to be sensitive to particle motion rather than to sound pressure (Popper & Hawkins, The importance of particle motion to fishes and invertebrates, 2018). At present there are no published sensitivity thresholds for invertebrates. The crustacean (*Nephrops norvegicus)* and the bivalve, (*Ruditapes philip pinarum)* demonstrated behavioural responses to impact pile driving sound source levels in a controlled laboratory environment, including physiological stress responses (Solan, et al., 2016). However, field-based studies revealed no evidence of increased mortality in scallops, clams, or lobsters following airgun exposure, or of reduced catch-rates for plankton, reef associated invertebrates, snow crab, shrimp, or lobster (Sole, et al., 2023). Studies have found a range of responses in invertebrates, depending on species, with little evidence of increased mortality or ecosystem impacts. Although there was evidence of anatomical damage and behavioural responses in lab studies with specific species (e.g., rock lobster (Carrol, Przeslawski, Duncan, Grunning, & Bruce, 2017) and green shore crab (Wale, Simpson, & Radford, 2013), respectively) there was also evidence that habituation is possible The Proposed Project activity with the highest sound source is expected to be SBP. This activity operates at frequencies of 0.5-12 kHz. This sound is of an intensity beyond those at which some effects on invertebrates have been observed. Therefore, underwater sound is considered to have a highly localised ZOI.	Highly localised (< 10 m)

Proposed Project phase	Potential impact pathway	Receptor	Rationale	Maximum ZOI
		Migratory fish	The Proposed Project activity with the highest sound source is expected to be SBP. This activity operates at frequencies of 0.5-12 kHz, within the hearing range of some fish species. Based on a standard geometric spreading calculation in **Application Document 6.2.4.3 Part 4 Marine Chapter 3 Fish and Shellfish**, the distance at which the injury and behavioural disturbance threshold is met is 46 m and 54 m respectively. Therefore, responses will be limited to some minor avoidance behaviour, with the ZOI of underwater noise is expected to be localised to these distances.	< 54 m
Operation and Maintenance	Permanent loss of subtidal benthic habitats and species	Benthic habitats and species	Cable installation, and repair, may require protection measures, in the form of rock berms, rock backfill or concrete mattresses. The area of permanent loss of habitat will be localised to footprint of any rock protection.	Highly localised to rock placement
		Migratory fish	Migratory fish, such as smelt, are not considered to have functional associations with seabed habitats due to their life history strategies and transient presence within the Offshore Scheme. Therefore, this receptor group has not been considered further for this impact pathway.	NA
Operation and Maintenance	Effects of thermal emissions	Benthic habitats and species Migratory fish	Submarine power cables are known to produce heat during operation which when buried in the seabed, can increase the temperature of surrounding sediment (Emeana, et al., 2016). Sensitivity to the thermal emissions depends on the sensitivity of the species associated with benthic habitats, as well as the sediment particle size composition (Emeana, et al., 2016), with coarser sediments with higher permeability transferring heat further but with a lower increase in temperature.	Highly localised to the a few metres around the cable

Proposed Project phase	Potential impact pathway	Receptor	Rationale	Maximum ZOI
			Additionally, migratory fish, such as smelt, have the potential to be sensitive to temperature changes, which can influence migration timing and routes. The Offshore Scheme is expected to use one bundled cable which will be buried to a target burial depth between 1 m – 2.5 m below the seabed (as per control measure FSF01 in **Application Document 7.5.3.1 CEMP Appendix A Outline Code of Construction Practice**). Heat dissipation modelling undertaken in previous projects (AECOM, 2022) indicates that, for bundled cables buried at a depth of 1.5 m, within 50 cm of the seabed surface the increase in sediment temperature was limited to 3°C. Although thermal effects would be long-term and occurring continuously for the operational lifetime of the Offshore Scheme, the temperature increase is low level and likely to be only a few degrees higher than ambient at the shallow sediment depths (<20 cm) at which infauna species are typically found. The latest OSPAR report states a threshold of 2°C temperature increase of power cables at a sediment depth of 0.2 m will only be exceeded in rare cases and for short periods of time (OSPAR Commission, 2023). Thus, if the burial depth is increased a to a target burial depth of target 1 m to 2.5 m, then any further changes to temperature are also considered to be negligible. Additionally, due to natural seasonal changes in water temperature, a temperature change of a few degrees higher than ambient is regarded as an insignificant temperature increase.	
Operation and Maintenance	Effects of EMF emissions	Benthic habitats and species	Subsea cables options associated with the Proposed Project, are known to produce EMF emissions (Hutchison, Gill, Sigray, He, & King, 2020).	Highly localised to the

Proposed Project phase	Potential impact pathway	Receptor	Rationale	Maximum ZOI
		Migratory fish	Modelling of the predicted EMF emissions for the Offshore Scheme (**Application Document 6.3.4.7.B ES Appendix 4.7.B Electromagnetic Deviation Study**) shows that the EMF for a bundled cable design buried at 1 m, indicates field intensity of 51.5 μT at the seabed surface, representative of background levels, thus having only a very localised effect. The effects of EMF reduce with vertical distance from the cable, and the modelling shows the magnetic field resulted in a negligible magnetic field at 5 m above the seabed.	cable (8 – 10 m)
Decommissioning	Decommissioning effects	Same as Construction Phase	As this work is planned decades into the future, it is unknown what the exact methodology will be for decommissioning, as this will be based on the best available technology available at the time of decommissioning. In the years leading up to the end of the Project's operational life, options for decommissioning will be evaluated through integrated environmental, technical, and economic assessments. The objective in undertaking these assessments will be to minimise the short- and long-term effects on the environment. In the event of the full removal of the cable, this would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Should the cable be left in-situ, there would likely be no impact pathways to marine receptors. Thus, as a worst-case scenario, impacts during decommissioning may be of a similar magnitude to Construction Phase activities.	Same as Construction Phase

1.6 Screening

1.6.1 The assessment approach applied during the MCZ screening is based on MMO guidance document (MMO, 2013) and presented in Plate 1.2.

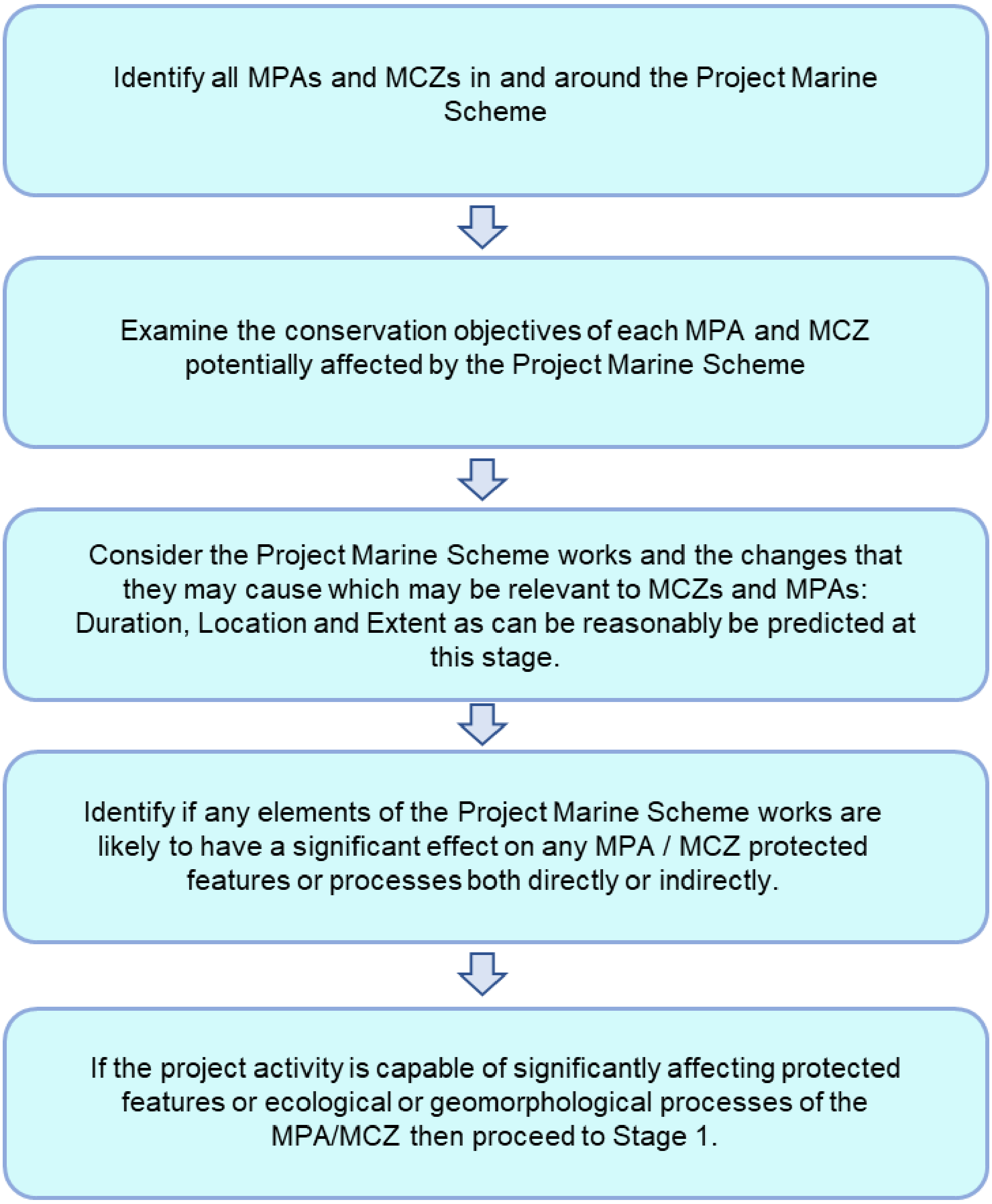

Plate 1.2 MCZ screening process

Study Area

1.6.2 In line with the precautionary approach encouraged by the MMO, the screening process has considered a Study Area of 17 km around the Offshore Scheme, as the area in which all ZOIs are represented (**Figure 1 Marine Conservation Zones (MCZ) within 17 km of the Offshore Scheme Order Limits, including sites beyond 17 km with potential indirect effects**). This is considered a sufficiently precautionary buffer around the Proposed Project that exceeds the maximum ZOI of Proposed Project related activities that are likely to impact MCZ protected features.

1.6.3 However, given that smelt are known to migrate over large distances, consideration has also been given to indirect effects on the Medway Estuary MCZ, which has smelt as a protected feature, which is beyond the 17 km screening distance (**Figure 1 Marine Conservation Zones (MCZ) within 17 km of the Offshore Scheme Order Limits, including sites beyond 170 km with potential indirect effects**).

1.6.4 Since the submission of the PEIR, refinement of the screening distance has been completed based on professional opinion and project-specific modelling (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). As a result, although the following sites were originally included in the PEIR, they are excluded from this assessment because they lie beyond the refined 17 km screening distance and are also only designated for benthic features:

- Foreland MCZ (21.0 km);
- The Swale Estuary MCZ (22.4 km); and
- Blackwater, Crouch, Roach and Colne Estuary MCZ (34.7 km).

Goodwin Sands MCZ

1.6.5 Goodwin Sands is an MCZ that covers 277 km^2 and consists of a dynamic area of sand and coarse sediments off the coastline of Kent, including the English Channel outburst flood feature. The site is designated for areas of subtidal sand and coarse sediment (Table 1.4) that are managed to maintain their favourable condition. The site is also designated for, and is managed to recover to favourable condition, several specific habitat types: Ross worm (*S. spinulosa*) reefs, blue mussel beds, and moderate energy circalittoral rock, which is animal-dominated rock found on deeper or shaded vertical rock faces. This rocky habitat supports a range of species including bryozoans, anemones, pink sea fans, cup corals, soft corals, sponges, sea squirts and red algae, as well as commercially important shellfish and fish (Defra, 2019c).

1.6.6 The Offshore Scheme boundary runs adjacent to the boundary of the Goodwin Sands MCZ for approximately 3.2 km, between KP107.3 to KP110.5, and is within the ZOI of the following impact pathways (Table 1.3):

- temporary physical disturbance to benthic habitats and species;
- permanent loss of subtidal benthic habitats and species;
- temporary increase in SSC;
- underwater noise;
- effects of EMF emissions;
- effects from thermal emissions;

- decommissioning effects.

1.6.7 Due to the potential for a number of impact pathways to have an effect on the Goodwin Sands MCZ, this site has been **screened in for Stage 1 assessment** (Table 1.4).

Kentish Knock East MCZ

1.6.8 Kentish Knock East MCZ covers 96 km^2 and is designated for a range of subtidal sediment types (Table 1.4). Fine sand is managed to maintain in favourable condition, and coarse and mixed sediments are managed with the aim to recover to favourable condition. The varied nature of the seabed means it supports a wide range of species, both on and in the sediment. Within the sandy areas, burrowing molluscs such as razor clams, live within the sediment while amphipods scavenge within the sand grains. This habitat is also important for a range of fish species, including commercially important flatfish such as sole and plaice. The coarser sediments within the site also support a wide range of species. Again, some live within the sediment, such as anemones and clams, and others live on the surface, such as starfish and sea urchins (Defra, 2019d).

1.6.9 This MCZ is 1.0 km from the Offshore Scheme, falling within the ZOI of the following impact pathway (Table 1.3):

- temporary increase in SSC; and
- decommissioning effects.

1.6.10 Due to the potential for a temporary increase in SSC to have an effect on the Kentish Knock East MCZ, this site has been **screened in for Stage 1 assessment** (Table 1.4).

Thanet Coast MCZ

1.6.11 Thanet Coast MCZ includes an area of subtidal chalk that extends seawards from the chalk reefs and cliffs and covers an area of 64 km^2. The chalk seabed within the area is the longest continuous stretch of coastal chalk in the UK. The site is designated for a range of protected features (Table 1.4) that currently have a conservation objective to be maintained in favourable condition. These features include subtidal benthic habitats such as *S. spinulosa* reefs and blue mussel beds. The conservation objective for the *S. spinulosa* reefs is to recover to favourable condition. Living reefs such as this play an important role within the ecosystem as they stabilise mobile sediment, provide habitat niches, and can protect coastlines by reducing the energy of incoming waves, and improving water quality through water filtration processes. The MCZ also protects two species of stalked jellyfish that are typically attached to red seaweeds (Defra, 2019g) (Defra, 2019g).

1.6.12 This MCZ is 1.2 km from the Offshore Scheme, falling within the ZOI of the following impact pathway (Table 1.3):

- temporary increase in SSC; and
- decommissioning effects.

1.6.13 Due to the potential for a temporary increase in SSC to have an effect on the Thanet Coast MCZ, this site has been **screened in for Stage 1 assessment** (Table 1.4).

Orford Inshore MCZ

1.6.14 Orford Inshore MCZ covers an area of 72 km^2 and is designated for subtidal mixed sediments (Table 1.4) and site management aims to recover these habitats to favourable condition. The site is dominated by sediments ranging from pebbles to finer silts and muds that are important as nursery and spawning grounds for sand eels (Defra, 2019f).

1.6.15 This MCZ is 8.6 km from the Offshore Scheme, falling within the ZOI of the following impact pathway (Table 1.3):

- temporary increase in SSC; and
- decommissioning effects.

1.6.16 Due to the potential for a temporary increase in SSC to have an effect on the Orford Inshore MCZ, this site has been **screened in for Stage 1 assessment** (Table 1.4).

Dover to Deal MCZ

1.6.17 Dover to Deal MCZ covers an area of 10 km^2, and protects several habitats and species, including intertidal and subtidal habitat and native oyster (Table 1.4). The sites conservation objectives aim to maintain these features in a favourable condition. The site helps to protect intertidal underboulder communities, where large boulders provide conditions for algae to thrive, and mobile animals such as sea slugs and brittlestars. Crabs, fish, and young lobsters also scavenge for food and seek shelter amongst the boulders. These unique littoral chalk communities of seaweeds, and the animals that associate with them, are limited within Britain. The site also includes the best example in the region of wave-cut platforms, as well as Ross worm reefs on the lower shore (Defra, 2019a).

1.6.18 This MCZ is 11.4 km from the Offshore Scheme, falling within the ZOI of the following impact pathway (Table 1.3):

- temporary increase in SSC; and
- decommissioning effects.

1.6.19 Due to the potential for a temporary increase in SSC to have an effect on the Thanet Coast MCZ, this site has been **screened in for Stage 1 assessment** (Table 1.4).

Medway Estuary MCZ

1.6.20 The MCZ encompasses the Medway Estuary and extends seaward between the Medway and the Thames estuary. The MCZ area is also protected by the Medway Estuary and Marshes Ramsar, SPA, and SSSI. This MCZ covers an area of 59.96 km^2.

1.6.21 Within the site there is a complex and dynamic estuarine ecosystem. The mix of fresh and marine waters combined with tidal movement create changing levels of salinity and nutrients that provide a fertile environment for large populations of animals, particularly invertebrates, fish, and birds. Numerous species of commercially important fish including bass, herring, cod, plaice, and sole use the area as a nursery ground.

1.6.22 Two species and eight different habitats and their associated wildlife are protected by the Medway Estuary MCZ (Table 1.4).

1.6.23 The nationally scarce tentacled lagoon-worm (*Alkmaria romijni*) is found within the Medway estuary. This species creates and lives in tubes within mud habitats in sheltered areas of the estuary. These worms have several tentacles around their mouths which they use for gathering food from the surrounding muddy sediments. The tentacled lagoon-worm is particularly vulnerable to threats that cause changes in its habitat.

1.6.24 In 2019 an additional feature, smelt (*Osmerus eperlanus*) was added to the designation of the MCZ with the conservation objective to recover to favourable condition. Smelt were once widespread in estuaries in the UK but have declined considerably over the past 200 years (Defra, 2019e). A migratory fish, they are known to congregate in large shoals in lower estuaries and to migrate into freshwater where they spawn in spring. Estuaries, such as the Medway, therefore, provide critical habitats for smelt lifecycles. Smelt are viewed as an indicator of ecosystem health, being very sensitive to a broad range of environmental degradations, including overfishing, loss of spawning habitat, blockage to migration and water quality impacts.

1.6.25 At 42.4 km from the Offshore Scheme, The Medway Estuary MCZ falls outside of the ZOIs associated with the impact pathways. However, smelt have the potential to migrate through the Study Area and be impacted by the Proposed Project activities, including from the following impact pathways:

- temporary increase in SSC;
- underwater noise;
- effects from thermal emissions;
- effects of EMF emissions; and
- decommissioning effects.

1.6.26 The Medway Estuary MCZ has been **screened in for Stage 1 assessment** using the precautionary principle, to ensure that the impact pathways that may affect the ‘smelt *O. eperlanus’* protected feature is considered further and assessed.

Table 1.4 Summary of MCZs screened into the Stage 1 of the MCZ Assessment for the Proposed Project

Site name	Protected features	Distance from Offshore Scheme (km)	Potential impact pathway	Screening decision
Goodwin Sands MCZ	• Subtidal coarse sediment; • Subtidal sand; • Blue mussel *Mytilus edulis* beds; • Moderate energy circalittoral rock; and • Ross worm *Sabellaria spinulosa* reefs.	0.0	• Temporary physical disturbance to benthic habitats and species; • Temporary increase in SSC; • Underwater noise; • Permanent loss of subtidal benthic habitats and species; • Effects of EMF emissions; • Effects from thermal emissions; and • Decommissioning effects.	Due to the potential for temporary physical disturbance and permanent loss of benthic habitats and species, temporary increase in SSC, underwater noise, and effects of EMF, thermal emissions, and decommissioning effects to have an impact on the conservation objectives of the habitat features of Goodwin Sands MCZ, this site has been **screened in for Stage 1 assessment.**

Site name	Protected features	Distance from Offshore Scheme (km)	Potential impact pathway	Screening decision
Kentish Knock East MCZ	• Subtidal sand; • Subtidal coarse sediment; and • Subtidal mixed sediment.	1.0	• Temporary increase in SSC; and • Decommissioning effects.	Due to the potential for temporary increase in SSC and decommissioning effects to have an impact on the conservation objectives of the habitat features of Kentish Knock East MCZ, this site has been **screened in for Stage 1 assessment.**
Thanet Coast MCZ	• Blue mussel *Mytilus edulis* beds; • Moderate energy circalittoral rock; • Moderate energy infralittoral rock; • Peat and clay exposures; • Ross worm *Sabellaria spinulosa* reefs; • Stalked jellyfish *Calvadosia cruxmelitensis;* • *Haliclystus* spp.; • Subtidal chalk;	1.2	• Temporary increase in SSC; and • Decommissioning effects.	Due to the potential for temporary increase in SSC to have an impact on the conservation objectives of the habitat and sessile species features of Thanet Coast MCZ, this site has been **screened in for Stage 1 assessment.**

Site name	Protected features	Distance from Offshore Scheme (km)	Potential impact pathway	Screening decision
	• Subtidal coarse sediment; • Subtidal mixed sediments; and • Subtidal sand.			
Orford Inshore MCZ	• Subtidal mixed sediment.	8.6	• Temporary increase in SSC; and • Decommissioning effects.	Due to the potential for temporary increase in SSC and decommissioning effects to have an impact on the conservation objectives of the habitat and sessile species features of Thanet Coast MCZ, this site has been **screened in for Stage 1 assessment.**
Dover to Deal MCZ	• High energy intertidal rock; • Intertidal coarse sediment; • Intertidal sand and muddy sand; • Intertidal underboulder communities; • Littoral chalk communities;	11.4	• Temporary increase in SSC; and • Decommissioning effects.	Due to the potential for temporary increase in SSC and decommissioning effects to have an impact on the conservation objectives of the habitat and sessile species features of Thanet Coast MCZ, this site has been **screened in for Stage 1 assessment.**

Site name	Protected features	Distance from Offshore Scheme (km)	Potential impact pathway	Screening decision
	• Low energy intertidal rock; • Moderate energy infralittoral rock; • Moderate energy intertidal rock; • Native Oyster *Ostrea edulis*; • Subtidal chalk; • Subtidal mixed sediments; • Subtidal sand; • Blue mussel beds; • High energy circalittoral rock; • Moderate energy circalittoral rock; and • Ross worm reefs.			
Medway Estuary MCZ	• Estuarine rock habitats; • Intertidal mixed sediments;	42.4	• Temporary increase in SSC; • Underwater noise;	This MCZ falls outside of the ZOIs associated with the impact pathways. However, smelt have the potential to migrate through the Study Area and

Site name	Protected features	Distance from Offshore Scheme (km)	Potential impact pathway	Screening decision
	• Intertidal sand and muddy sand; • Low energy intertidal rock; • Peat and clay exposures; • Subtidal coarse sediment; • Subtidal mud; • Subtidal sand; • Tentacled lagoon-worm *Alkmaria romijini*; and • Smelt *Osmerus eperlanus*.		• Effects from thermal emissions; • Effects of EMF emissions; and • Decommissioning effects.	be impacted by the Proposed Project activities. Due to the potential for temporary increase in SSC, Underwater noise, effects from thermal emissions, effects of EMF emissions, and decommissioning effects to have an impact on the conservation objectives of the 'Smelt *O. eperlanus'* of Medway Estuary MCZ, this site has been **screened in for Stage 1 assessment.**

1.7 Stage 1 Assessment

Goodwin Sands MCZ

1.7.1 The Offshore Scheme Boundary runs parallel to the Goodwin Sands MCZ for approximately 3.2 km between KP107.3 to KP110.5, Goodwin Sands MCZ is designated for the protection of the following features:

- Subtidal coarse sediment.
- Subtidal sand.
- Blue mussel (*M. edulis)* beds.
- Moderate energy circalittoral rock.
- Ross worm (*S. spinulosa)* reefs.

1.7.2 In 2021, a subtidal characterisation survey was commissioned to characterise benthic ecological conditions and benthic habitats within the Offshore Scheme (**Application Document 6.3.4.2.A ES Appendix 4.2.A Benthic Characterisation Report (Original Report)**). This survey included sampling within the boundary of Goodwin Sands MCZ. During the benthic characterisation survey in 2021, six grab samples were taken from within the MCZ (S026 to S031), as well as two transects (T003 and T004). Grab samples from within the MCZ indicated particularly sparse fauna. At three of these sample stations, the protected feature ‘subtidal sand’ was identified, however none of the other protected features were observed. Although juvenile blue mussels were identified within three of the grab samples (S026, S027 and S029), these were not seen in aggregations of continuous reef, and therefore no mussel beds were observed (OSPAR, 2010). For further information regarding the baseline for benthic ecology, see **Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**.

1.7.3 However, following consultation (Section 1.4), the Offshore Scheme has been rerouted to completely avoid Goodwin Sands MCZ (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**). Where the revised Offshore Scheme Boundary deviates from the Subtidal Characterisation Report 2021 survey area a Geophysical Survey (**Application Document 6.3.4.2.B ES Appendix 4.2.B Geophysical Survey Interpretation (Additional Surveys)**), and an Additional Subtidal Survey were commissioned in 2024 (**Application Document 6.3.4.2.D Appendix 4.2.D Interim Subtidal Survey Report (Additional Surveys)**) for gap filling, to ensure a complete understanding of the ecological conditions across the entire Offshore Scheme. These additional surveys included the areas within the Offshore Scheme Boundary shifted to outside the Goodwin Sands MCZ boundary.

1.7.4 In the areas of the Offshore Scheme closest to Goodwin Sands MCZ, not surveyed in 2021, the 2024 surveys indicated the presence of sand and gravel sediments to the north of the MCZ, interspersed with small, localised patches / aggregations of *S. spinulosa* and stony presence (KP99.0 - KP103.2) (**Application Document 6.3.4.2.D Appendix 4.2.D Interim Subtidal Survey Report (Additional Surveys)**). Furthermore, these surveys also indicated the presence of sand and coarse sediments with isolated patches of circalittoral rock area to the west of Goodwin Sands MCZ (KP104.7 - KP114.5) (**Application Document 6.3.4.2.B ES Appendix 4.2.B Geophysical Survey Interpretation (Additional Surveys)**). Additionally, based on the OSPAR (2010) definition, *M. edulis* beds were observed at KP109, with density indicative of Annex I ‘biogenic reefs’ habitat (H1170) (**Application Document 6.3.4.2.D Appendix 4.2.D**

Interim Subtidal Survey Report (Additional Surveys)), though these were not located within a European designated site and were located beyond the boundary of Goodwin Sands MCZ.

Construction phase

Temporary physical disturbance to benthic habitats and species

1.7.5 Proposed Project activities will result in short term physical disturbance to, and temporary loss of, seabed habitats. However, the Offshore Scheme Boundary runs directly adjacent to Goodwin Sands MCZ, ensuring avoidance of the designated features of the site. Therefore, as there will be no activities occurring within Goodwin Sands MCZ, it is not anticipated that temporary physical disturbance associated with the Proposed Project will hinder the conservation objectives of the protected features of Goodwin Sands MCZ. Pre-installation and installation activities that will occur within the Offshore Scheme Boundary and have the potential to disturb the benthos are shown in **Figure 2 Marine habitats and Relevant Protected Sites and Areas of Rock backfill within the Offshore Scheme Boundary**.

Temporary increase in SSC and deposition

1.7.6 Seabed disturbance from pre-installation and installation activities, including pre-sweeping and trenching and/or ploughing installation activities, have the potential to increase SSC and turbidity, creating a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. There are several potential effects to benthic receptors, associated with increased SSC and sediment deposition including the smothering of invertebrate species and clogging of respiratory and feeding apparatus.

1.7.7 As summarised in Section 1.5 and Table 1.3, modelling to estimate the extent of sediment dispersion before deposition as a result of cable installation activities was undertaken, concluding fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km. However, this peak increase will be very short term, occurring in the immediate period after the installation activity, rapidly returning to concentrations within background variability. These finer fractions may be carried in suspension, with calculations concluding that fine sands would deposit on the seabed at a thickness of less than 0.5 mm which is unlikely to be detectable in the field (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**).

1.7.8 The Offshore Scheme Boundary runs parallel to the Goodwin Sands MCZ for 3.2 km, from approximately KP107.3 to KP110.5, ensuring avoidance of direct impacts on the designated features of the site. However, as the MCZ is within the dispersion range of any increase in SSC and associated deposition, there is potential for the protected features to be impacted.

1.7.9 Sediment habitats such as ‘subtidal coarse sediment’ and ‘subtidal sand’ are dynamic, as evidenced by the lack of finer silt sediments, and as such they are frequently subjected to varying levels of turbidity and energy. Thus, the sensitivity to increased SSC is low (Tillin & Watson, 2024). These habitats are also often low in biodiversity because of the naturally high disturbance regime, and the stations sampled within the MCZ fauna was found to be sparse (**Appendix 4.2.A Benthic Characterisation Report (Original Report)**). These habitats are therefore considered to have high capacity to tolerate increased SSC (Tillin & Watson, 2024), and it is expected that any impacts will be temporary and will not hinder the conservation objectives for these features.

1.7.10 'Moderate energy circalittoral rock' habitat supports higher biodiversity, supporting stable communities, including species such as bryozoans, pink sea fans, sponges and cup corals. Sessile benthic organisms are particularly at risk as many are filter feeders, and increased sediment loads can clog their systems (Pineda, Duckworth, & Webster, 2016). However, there is evidence that species such as pink sea fans and cup corals are able to tolerate small elevation ins SSC and associated deposition (Hiscock, Southward, Tittley, & Hawkins, 2004; Bell & Turner, 2000). However, the benthic characterisation survey did not record any evidence of these habitats within the area of the MCZ sampled (**Appendix 4.2.A Benthic Characterisation Report (Original Report)**), and based on the feature maps published by Defra (2019c), this feature is understood to be located on the eastern extent of the MCZ, approximately 7.5 km from the Offshore Scheme. At this distance, SSC will be limited to very short-term concentration increases of 100 mg/l and deposition thickness of less than 0.5 mm (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). Studies have demonstrated that increased concentrations above 250 mg/l can impair the growth of filter-feeding organisms (Essink, 1999; Widdows, Bayne, Livingstone, Newell, & Donkin, 1979) Therefore, the increased SSC associated with the Proposed Project is not considered to lead to adverse effects in benthic habitats and species.

1.7.11 Additionally, the deposition thickness associated with the Proposed Project is of such a negligible magnitude that it is unlikely to be detectable in the field, with studies demonstrating that filter feeders are able to withstand temporary periods of sediment deposition at thicknesses of up to 2 cm (Last, Hendrick, Beveridge, & Davies, 2011). Therefore, Proposed Project activities are not anticipated to hinder the conservation objective for this feature.

1.7.12 During the Subtidal Characterisation Survey 2021, the presence of 'ross worm *S. spinulosa* reefs' within Goodwin Sands MCZ was not evidenced (**Appendix 4.2.A Benthic Characterisation Report (Original Report)**), and based on the feature maps published by Defra (2019c), *S. spinulosa* reefs are understood to be located in the southern extent of the MCZ, approximately 6.6 km from the Offshore Scheme. Moreover, *S. spinulosa* tube growth is dependent on a supply of suspended sediment to facilitate the construction of tubes (Jackson & Hiscock, 2008) and therefore this habitat type has a low sensitivity to increased SSC.

1.7.13 The Subtidal Characterisation Survey 2021 did not evidence the presence of 'blue mussel *M. edulis* beds' within the area of the MCZ sampled (**Appendix 4.2.A Benthic Characterisation Report (Original Report)**), and based on the feature maps published by Defra (2019c), blue mussel bed are understood to be located in the southern extent of the MCZ, approximately 15.0 km from the Offshore Scheme. However, juvenile *M. edulis* were noted within Goodwin Sands MCZ during the Subtidal Characterisation Survey 2021 (S026, S027 and S029) (**Appendix 4.2.A Benthic Characterisation Report (Original Report)**). At this distance, it is considered that there will be no significant elevated SSC (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). However, as the management approach for the 'blue mussel *M. edulis* beds', is to recover to favourable condition, the presence of juveniles indicates recruitment to the 'blue mussel *M. edulis* beds' feature of the Goodwin Sands MCZ. Evidence indicates that *M. edulis* and their beds can tolerate a broad range of SSC (Moore, 1977; Essink, 1999), and that it is unlikely that associated deposition of < 5 cm will significantly affect the mussel bed (Mainwqaring, Tillin, Williams, Tyler-Walters, &

Watson, 2024; Last, Hendrick, Beveridge, & Davies, 2011). As SSC associated with the Proposed Project will be limited to very short-term concentration increases of 100 mg/l and deposition thickness of less than 0.5 mm, it is not considered to lead to adverse impacts on *M. edulis* beds (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). Additionally, modelling demonstrated that increased SSC will be highly temporary, reducing significantly from the time of mobilisation. Therefore, any measurable change in SSC will be temporary and localised to the point of mobilisation and the conservation objectives of these features are anticipated to be hindered.

1.7.14 In the areas of the Offshore Scheme closest to Goodwin Sands MCZ, the geophysical interpretation did indicate small, localised aggregations of *S. spinulosa* presence (KP99.0 - KP103.2) as well as isolated patches of circalittoral rock area to the west of the MCZ (KP104.7 - KP114.5) (**Appendix 4.2.B Geophysical Survey Interpretation (Additional Surveys)**). However, these observations were made beyond the boundary of the MCZ.

1.7.15 The sediment type within the area of the Offshore Scheme adjacent to Goodwin Sands MCZ is dominated by sand, with a very low fines component (3%), and thus any sediment disturbance in this area will settle to the seabed in very close proximity to the area of disturbance. Therefore, any sediment deposition within the MCZ is expected to be negligible. In addition, any sediment disturbed during pre-sweeping activity will remain within the Offshore Scheme.

1.7.16 With an increase in SSC, sediment contaminants could also be mobilised at these locations if above threshold levels. Contaminant concentrations were found to vary throughout the Offshore Scheme, but at levels consistent with general background levels for this region of the North Sea (**Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**). Therefore, it is not anticipated that the mobilisation of contaminants will hinder the conservation objectives of the site.

1.7.17 Overall, the predicted temporary increase to SSC levels and associated depositional loads in comparison to background levels is expected to be negligible and temporary. Therefore, the impact to the protected features of the Goodwin Sands MCZ is unlikely to hinder the conservation objectives of the site.

Underwater noise

1.7.18 Vessel activity and cable installation activities could generate underwater sound which has the potential to directly affect marine species. The Proposed Project activity with the highest sound source is expected to be associated with SBP (operating at frequencies of 0.5-12 kHz).

1.7.19 The sensitivity of benthic ecological features to the impact of underwater sound, depends on the sensitivity of the species associated with the habitats. As described in Table 1.3, few formal studies have been conducted on the impacts of underwater sound, and, at present there are no published sensitivity thresholds for invertebrates.

1.7.20 Some investigations have found a range of responses in invertebrates (Table 1.3), with little evidence of increased mortality or ecosystem impacts. Although there was evidence of anatomical damage and behavioural responses in lab studies with specific species (e.g., rock lobster (Carrol, Przeslawski, Duncan, Grunning, & Bruce, 2017) and green shore crab (Wale, Simpson, & Radford, 2013), respectively) there was also evidence that habituation is possible. Thus, the overall sensitivity of benthic ecological receptors to underwater noise is considered to be negligible.

1.7.21 Although the Offshore Scheme Boundary runs adjacent to the boundary of the Goodwin Sands MCZ, due to the negligible sensitivity of benthic species, it is not anticipated that underwater noise associated with the Proposed Project will hinder the conservation objectives of the protected features of Goodwin Sands MCZ.

Operation and maintenance phase

Direct loss of benthic habitats and species

1.7.22 Cable installation, and repair, may require protection measures, in the form of rock berms, rock backfill or concrete mattresses, at some locations where the minimum target cable burial depth of 0.5 m below the seabed cannot be achieved. However, the Offshore Scheme Boundary runs adjacent to the boundary of the Goodwin Sands MCZ, ensuring avoidance of the designated features of the site. Moreover, the Proposed Project will micro-route the submarine cable systems to avoid or minimise interactions with sensitive habitats. Therefore, as there will be no cable protection occurring within Goodwin Sands MCZ, it is not anticipated that permanent loss associated with the Proposed Project will hinder the conservation objectives of the protected features of Goodwin Sands MCZ.

Effects from thermal emissions

1.7.23 Submarine power cables are known to produce heat during operation which, when buried in the seabed, can increase the temperature of surrounding sediment (Emeana, et al., 2016). Such heat has the potential to cause sediment dwelling and demersal mobile organisms to move away from the affected area. Sensitivity to the thermal emissions depends on the sensitivity of the species associated with benthic habitats.

1.7.24 Sediment particle size composition has been identified as an influence on heat transfer in sediments (Emeana, et al., 2016), with Table 1.3 indicating that the influence of thermal emissions is expected to be negligible, with any increase highly localised to the cable. Therefore, as the Offshore Scheme avoids direct overlap with Goodwin Sands MCZ, it is not anticipated that thermal emissions associated with the Proposed Project will hinder the conservation objectives of the protected features of Goodwin Sands MCZ.

Effects of EMF emissions

1.7.25 Subsea cables options associated with the Proposed Project are known to produce EMF emissions (Hutchison, Gill, Sigray, He, & King, 2020). Sensitivity to the EMF emissions depends on the sensitivity of the species associated with benthic habitats. There is very little information about the sensitivity of benthic species to EMF but there have been a small number of investigations in laboratory experiments. There is evidence from studies that some benthic invertebrates are able to detect EMF (Bochert & Zettler, 2006). However, in another laboratory study with common rag worm (*Hediste diversicolor*) there was no evidence of avoidance or attraction behaviour at an EMF of 1000 µT (Jakubowska, Urban-Malinga, Otremba, & Andrulewicz, 2019) a much higher intensity than will the emitted by the Proposed Project.

1.7.26 EMF will be emitted from the subsea cables for the duration of operational life of the Proposed Project. A project-specific EMF assessment (**Application Document 6.3.4.7.B ES Appendix 4.7.B Electromagnetic Deviation Study**) indicated that the influence of EMF emissions is expected to be limited and highly localised to the cable (Table 1.3). On this basis, the Offshore Scheme avoids direct overlap with Goodwin Sands MCZ, coupled with the low sensitivity of benthic species, it is not anticipated that EMF emissions associated with the Proposed Project will hinder the conservation objectives of the protected features of Goodwin Sands MCZ.

Decommissioning phase

1.7.27 As discussed in Section 1.5, following the completion of the Operational phase, the Decommissioning phase will take place. Although the exact methodology for decommissioning will be evaluated nearing the time of decommission, the worst-case scenario to be considered is the full removal of the cable.

1.7.28 The full removal of the cable would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Therefore, as it has been concluded that impacts associated with the construction phase will not hinder the conservation objectives of the protected features of Goodwin Sands MCZ, it is not anticipated that decommissioning effects will hinder the conservation objectives of the protected features of Goodwin Sands MCZ.

Assessment conclusion

1.7.29 The potential impact pathways associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Project activities are not anticipated to hinder the conservation objectives of this MCZ. Therefore, it is concluded that **Goodwin Sands MCZ does not require a Stage 2 assessment** and will not be assessed further.

Thanet Coast MCZ

1.7.30 Thanet Coast MCZ is designated for the protection of the following features:

- Blue mussel *Mytilus edulis* beds;
- Moderate energy circalittoral rock;
- Peat and clay exposures;
- Ross worm *Sabellaria spinulosa* reefs;
- Stalked jellyfish *Calvadosia cruxmelitensis* and *Haliclystus* spp.;
- Subtidal chalk;
- Subtidal coarse sediment;
- Subtidal mixed sediments; and
- Subtidal sand.

Construction phase

Temporary increase in SSC and deposition

1.7.31 Seabed disturbance from pre-installation and installation activities have the potential to increase SSC and turbidity, creating a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. There are several potential effects to benthic receptors, associated with increased SSC and sediment deposition including the smothering of invertebrate species and clogging of respiratory and feeding apparatus.

1.7.32 As summarised in Section 1.5 and Table 1.3, modelling to estimate the extent of sediment dispersion before deposition as a result of cable installation activities was undertaken, concluding fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km. These finer fractions may be carried in suspension, with calculations concluding that fine sands would deposit on the seabed at a thickness of less than 0.5 mm which is unlikely to be detectable in the field (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**).

1.7.33 Sediment habitats such as ‘subtidal coarse sediment’, ‘subtidal mixed sediment’ and ‘subtidal sand’ are dynamic as they are frequently subjected to varying levels of turbidity and energy (Tillin & Watson, 2024). Thus, their sensitivity to increased SSC is considered to be low. These habitats are also often low in biodiversity because of the natural disturbance regime. These habitats are therefore considered to have high capacity to tolerate increased SSC (Tillin & Watson, 2024), and it is expected that any impacts will be temporary and will not hinder the conservation objectives for these features.

1.7.34 ‘Moderate energy circalittoral rock’, ‘subtidal chalk’, and ‘peat clay exposures’ are habitats that support higher biodiversity, supporting stable communities, with some species vulnerable to increased SSC. Sessile benthic organisms are particularly at risk as many are filter feeders, and increased sediment loads can clog their feeding and respiratory systems (Pineda, Duckworth, & Webster, 2016). However, there is evidence that many of the species these habitats support are able to tolerate small elevation in SSC and associated deposition (Hiscock, Southward, Tittley, & Hawkins, 2004; Bell & Turner, 2000; Essink, 1999; Last, Hendrick, Beveridge, & Davies, 2011). However, any measurable change in SSC and deposition as a result of Proposed Project activities will be localised and short-term as installation vessels will only be moving in the vicinity of the MCZ for a short period of time. Thus, Proposed Project activities are not anticipated to hinder the conservation objective for this feature.

1.7.35 The MCZ also protects biogenic reef features such as ‘blue mussel *M. edulis* beds’ and ‘ross worm *S. spinulosa* reefs’. *S. spinulosa* is relatively insensitive to changes in SSC as tube growth is dependent on a supply of SSC to facilitate the construction of tubes (Jackson & Hiscock, 2008). Similarly, evidence indicates that *M. edulis* and their beds can tolerate a broad range of SSC (Moore, 1977), and that it is unlikely that associated deposition of < 5 cm will significantly affect the mussel bed (Mainwqaring, Tillin, Williams, Tyler-Walters, & Watson, 2024). As previously discussed, any measurable change in SSC and deposition as a result of Proposed Project activities will be localised to the point of mobilisation and short-term as installation vessels will only be moving in the vicinity of the MCZ for a short period of time. Therefore, the conservation objectives of these features are not anticipated to be hindered.

1.7.36 Moreover, the MCZ also protects species features of stalked jellyfish (*Calvadosia cruxmelitensis* and *Haliclystus* spp.) that associate with algae. The species themselves are not noted as being particularly sensitive to increased SSC and deposition though they may adversely affect the algae that support them. However, as these species are found on intertidal shores that are regularly exposed to wave action, sediment is unlikely to persist for more than a few tidal cycles (Tyler-Walters & Richards, 2017; Tyler-Walters & Neal, 2017). As previously discussed, any measurable change in SSC and deposition as a result of Proposed Project activities will be localised to the point of mobilisation and short-term as installation vessels will only be moving in the vicinity of the MCZ for a short period of time. Therefore, the conservation objectives of these features are not anticipated to be hindered.

1.7.37 With an increase in SSC, sediment contaminants could also be mobilised. The concentration of heavy metal, organic content, and PAHs were found to vary throughout the Offshore Scheme but at levels consistent with general background levels for this region of the North Sea (**Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**). Therefore, it is not anticipated that the mobilisation of contaminants will hinder the conservation objectives of the site.

1.7.38 Overall, the predicted temporary increase to SSC levels in comparison to background levels is expected to be relatively minor and associated depositional loads undetectable. Therefore, the impact to the protected features of the Thanet Coast MCZ is unlikely to affect the conservation objectives of the site.

Decommissioning phase

1.7.39 As discussed in Section 1.5, following the completion of the Operational phase, the Decommissioning phase will take place. Although the exact methodology for decommissioning will be evaluated nearing the time of decommission, the worst-case scenario to be considered is the full removal of the cable.

1.7.40 The full removal of the cable would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Therefore, as it has been concluded that impacts associated with the construction phase will not hinder the conservation objectives of the protected features of Thanet Coast MCZ, it is not anticipated that decommissioning effects will hinder the conservation objectives of the protected features of Thanet Coast MCZ.

Assessment conclusion

1.7.41 The potential impact pathways associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Project activities are not anticipated to hinder the conservation objectives of this MCZ. Therefore, it is concluded that **Thanet Coast MCZ does not require a Stage 2 assessment** and will not be assessed further.

Kentish Knock East MCZ

1.7.42 Kentish Knock East MCZ is designated for the protection of the following features:

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

Construction phase

Temporary increase in SSC and deposition

1.7.43 Seabed disturbance from pre-installation and installation activities has the potential to increase SSC and turbidity, creating a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. There are several potential effects to benthic receptors, associated with increased SSC and sediment deposition including the smothering of invertebrate species and clogging of respiratory and feeding apparatus.

1.7.44 As summarised in Section 1.5 and Table 1.3, modelling to estimate the extent of sediment dispersion before deposition as a result of cable installation activities was undertaken, concluding fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km. These finer fractions may be carried in suspension, with calculations concluding that fine sands would deposit on the seabed at a thickness of less than 0.5 mm which is unlikely to be detectable in the field (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**).

1.7.45 Sediment habitats such as 'subtidal coarse sediment', 'subtidal mixed sediment' and 'subtidal sand' are dynamic as they are frequently subjected to varying levels of turbidity and energy. Thus, their sensitivity to increased SSC is considered to be low (Tillin & Watson, 2024). These habitats are also often low in biodiversity because of the natural disturbance regime. These habitats are therefore, considered to have high capacity to tolerate increased SSC (Tillin & Watson, 2024), and it is expected that any impacts will be temporary and will not hinder the conservation objectives for these features.

1.7.46 With an increase in SSC, sediment contaminants could also be mobilised at these locations if above threshold levels. The concentration of heavy metal, organic content, and PAHs were found to vary throughout the but at levels consistent with general background levels for this region of the North Sea (**Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**). Therefore, it is not anticipated that the mobilisation of contaminants will hinder the conservation objectives of the site.

1.7.47 Overall, the predicted temporary increase to SSC levels in comparison to background levels is expected to be relatively minor and associated depositional loads indetectable. Therefore, the impact to the protected features of the Kentish Knock East MCZ is unlikely to affect the conservation objectives of the site.

Decommissioning phase

1.7.48 As discussed in Section 1.5, following the completion of the Operational phase, the Decommissioning phase will take place. Although the exact methodology for decommissioning will be evaluated nearing the time of decommission, the worst-case scenario to be considered is the full removal of the cable.

1.7.49 The full removal of the cable would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Therefore, as it has been concluded that impacts associated with the construction phase will not hinder the conservation objectives of the protected features of Kentish Knock East MCZ, it is not anticipated that decommissioning effects will hinder the conservation objectives of the protected features of Kentish Knock East MCZ.

Assessment conclusion

1.7.50 The potential impact pathways associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Project activities are not anticipated to hinder the conservation objectives of this MCZ. Therefore, it is concluded that **Kentish Knock East MCZ does not require a Stage 2 assessment** and will not be assessed further.

Orford Inshore MCZ

1.7.51 Orford Inshore MCZ is designated for the protection of subtidal mixed sediment features.

Construction phase

Temporary increase in SSC and deposition

1.7.52 Seabed disturbance from pre-installation and installation activities have the potential to increase SSC and turbidity, creating a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. There are several potential effects to benthic receptors, associated with increased SSC and sediment deposition including the smothering of invertebrate species and clogging of respiratory and feeding apparatus.

1.7.53 As summarised in Section 1.5 and Table 1.3, modelling to estimate the extent of sediment dispersion before deposition as a result of cable installation activities was undertaken, concluding fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km. These fine fractions may be carried in suspension, with calculations concluding that fine sands would deposit on the seabed at a thickness of less than 0.5 mm which is unlikely to be detectable in the field (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**).

1.7.54 Sediment habitats, such as 'subtidal mixed sediment', are dynamic as they are frequently subjected to varying levels of turbidity and energy. Thus, their sensitivity to increased SSC is considered to be low (Tillin & Watson, 2024). These habitats are also often low in biodiversity because of the natural disturbance regime. These habitats are therefore, considered to have high capacity to tolerate increased SSC (Tillin & Watson, 2024), and it is expected that any impact will be temporary and will not hinder the conservation objectives for these features.

1.7.55 With an increase in SSC, sediment contaminants could also be mobilised at these locations if above threshold levels. The concentration of heavy metal, organic content, and PAHs were found to vary throughout the but at levels consistent with general background levels for this region of the North Sea (**Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**). Therefore, it is not anticipated that the mobilisation of contaminants will hinder the conservation objectives of the site.

1.7.56 Overall, the predicted temporary increase to SSC levels in comparison to background levels is expected to be relatively minor and associated depositional loads not detectable. Therefore, the impact to the protected features of the Orford Inshore MCZ is unlikely to affect the conservation objectives of the site.

Decommissioning phase

1.7.57 As discussed in Section 1.5, following the completion of the Operational phase, the Decommissioning phase will take place. Although the exact methodology for decommissioning will be evaluated nearing the time of decommission, the worst-case scenario to be considered is the full removal of the cable.

1.7.58 The full removal of the cable would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Therefore, as it has been concluded that impacts associated with the construction phase will not hinder the conservation objectives of the protected features of Orford Inshore MCZ, it is not anticipated that decommissioning effects will hinder the conservation objectives of the protected features of Orford Inshore MCZ.

Assessment conclusion

1.7.59 The potential impact pathways associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Project activities are not anticipated to hinder the conservation objectives of this MCZ. Therefore, it is concluded that **Orford Inshore MCZ does not require a Stage 2 assessment** and will not be assessed further.

Dover to Deal MCZ

1.7.60 Dover to Deal MCZ is designated for the protection of the following features:

- High energy intertidal rock;
- Intertidal coarse sediment;
- Intertidal sand and muddy sand;
- Intertidal underboulder communities;
- Littoral chalk communities;
- Low energy intertidal rock;
- Moderate energy infralittoral rock;
- Moderate energy intertidal rock;
- Native Oyster *Ostrea edulis*;
- Subtidal chalk;
- Subtidal mixed sediments;
- Subtidal sand;
- Blue mussel beds;
- High energy circalittoral rock;
- Moderate energy circalittoral rock; and
- Ross worm reefs.

Construction phase

Temporary increase in SSC and deposition

1.7.61 Seabed disturbance from pre-installation and installation activities has the potential to increase SSC and turbidity, creating a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. There are several potential effects to benthic receptors, associated with increased SSC and sediment deposition including the smothering of invertebrate species and clogging of respiratory and feeding apparatus.

1.7.62 As summarised in Section 1.5 and Table 1.3, modelling to estimate the extent of sediment dispersion before deposition as a result of cable installation activities was undertaken, concluding fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km. Dover to Deal is located beyond this distance at 11.4 km from the Offshore Scheme. At this distance, it is considered that there will be no significant elevated SSC (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). Therefore, the temporary increase in SSC associated with the Proposed Project activities are not anticipated to hinder the conservation objectives for features of Dover to Deal MCZ.

1.7.63 However, calculations concluded that finer sediment fractions may be carried in suspension to a maximum distance of 17 km from the point of mobilisation, depositing on the seabed at a thickness of less than 0.5 mm (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). This deposition thickness is unlikely to be detectable in the field and therefore Proposed Project activities are not anticipated to hinder the conservation objectives for features of Dover to Deal MCZ.

Decommissioning phase

1.7.64 As discussed in Section 1.5, following the completion of the Operational phase, the Decommissioning phase will take place. Although the exact methodology for decommissioning will be evaluated nearing the time of decommission, the worst-case scenario to be considered is the full removal of the cable.

1.7.65 The full removal of the cable would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Therefore, as it has been concluded that impacts associated with the construction phase will not hinder the conservation objectives of the protected features of Dover to Deal MCZ, it is not anticipated that decommissioning effects will hinder the conservation objectives of the protected features of Dover to Deal MCZ.

Assessment conclusion

1.7.66 The potential impact pathways associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Project activities are not anticipated to hinder the conservation objectives of this MCZ. Therefore, it is concluded that **Dover to Deal MCZ does not require a Stage 2 assessment** and will not be assessed further.

Medway Estuary MCZ

1.7.67 Medway Estuary MCZ is designated for the protection of the following features:

- Estuarine rock habitats;

- Intertidal mixed sediments;
- Intertidal sand and muddy sand;
- Low energy intertidal rock;
- Peat and clay exposures;
- Subtidal coarse sediment;
- Subtidal mud;
- Subtidal sand;
- Tentacled lagoon-worm *Alkmaria romijini*; and
- Smelt *Osmerus eperlanus*.

1.7.68 The Medway Estuary MCZ was screened into the Stage 1 assessment based on the application of the precautionary principle. This MCZ is beyond the ZOI of potential impact pathways (Table 1.3), however smelt have the potential to migrate through the Study Area, as identified during the Screening Stage (Section 1.6). Therefore, the protected feature 'Smelt *O. eperlanus'* has been screened into the stage 1 assessment to be considered further.

1.7.69 The European smelt is an anadromous species that is occasionally recorded in inshore waters but is most commonly found in lower river reaches and upper estuarine habitats (Heessen, Daan, & Ellis, 2015). Smelt migrate to the lower reaches of estuaries, where they congregate in large shoals in feed, before moving to freshwater to spawn in spring; post-larval juveniles then utilise estuarine nursery habitats.

1.7.70 Once widespread in UK estuaries smelt have experienced significant population declines. The Medway Estuary MCZ was designated in 2019 for smelt as it is considered to provide critical habitat for this species. It is believed that adult smelt aggregate in the lower Thames estuary, in February and March, before commencing their upstream migration to spawn in March and April (ZSL, 2020). Based on the feature map published by Defra (2019e), smelt tend to aggregate around the entrance to the Medway River. Therefore, as smelt migrate between the marine environment and the estuaries individuals may transit through the Offshore Scheme. This indicates that any smelt presence within the vicinity of the Offshore Scheme will be small and short-term.

1.7.71 For further information regarding the ecological baseline for smelt, see **Application Document 6.2.4.3 Part 4 Marine Chapter 3 Fish and Shellfish.**

Construction phase

Temporary increase in SSC and deposition

1.7.72 Seabed disturbance from Proposed Project activities have the potential to increase SSC. The removal of the cable during decommissioning would also be expected to increase SSC. This can create a sediment plume in the water column that can travel away from the Offshore Scheme before the sediment is deposited on the seabed. Any mobilised sediment associated with the Proposed Project activities is anticipated to be short-term.

1.7.73 There are several potential effects to migrating smelt, associated with increased SSC and sediment deposition including:

- the clogging of respiratory apparatus;
- reduced feeding success of visual predators due to decreased visibility;
- effects related to toxic conditions if sediments in suspension are contaminated; and
- potential barrier to the movement and migration of fish from increased SSC.

1.7.74 As summarised in Section 1.5 and Table 1.3, modelling to estimate the extent of sediment dispersion before deposition as a result of cable installation activities was undertaken, concluding fine sediment fractions may be transported beyond the Offshore Scheme, with concentration increases of up to 100 mg/l were found to be limited to a dispersal range of 11 km. These finer fractions may be carried in suspension, with calculations concluding that fine sands would deposit on the seabed at a thickness of less than 0.5 mm which is unlikely to be detectable in the field (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**).

1.7.75 Smelt have been shown to spend the majority of their time in the upper layers of the water column, so are unlikely to encounter mobilised sediment close to the seabed (roughly <5 m) (**Application Document 6.2.4.1 Part 4 Marine Chapter 1 Physical Processes**). Therefore, it is unlikely that increased SSC would act as a barrier to migration between marine and freshwater environments. Furthermore, the Medway Estuary is 42 km west of the Offshore Scheme, and as a highly mobile receptor, it is assumed that any smelt moving through the Offshore Scheme area would be able to avoid or move away from less favourable conditions. Therefore, it is assumed that the SSC concentrations are not likely to pose a significant risk to the 'smelt *O. eperlanus'* protected feature.

1.7.76 An increase in SSC could result in any sediment contaminants becoming mobilised. The concentration of heavy metal, organic content, and PAHs were found to vary throughout the but at levels consistent with general background levels for this region of the North Sea (**Application Document 6.2.4.2 Part 4 Marine Chapter 2 Benthic Ecology**). Therefore, an impact to the conservation objectives of the 'smelt *O. eperlanus'* protected feature of Medway Estuary MCZ is not anticipated.

Underwater noise

1.7.77 Vessel activity and cable installation activities could generate underwater sound which has the potential to directly affect fish. Sensitivity to underwater noise varies according to the frequency. For most fish, noise above 1 kHz is not audible (Popper, et al., 2014) (Popper, et al., 2014). This suggests that of the activities associated with the Proposed Project, only SBP activities that may be required during pre-installation geophysical surveys, and the use of some vessels, are thought to generate noise that may impact fish species.

1.7.78 Fish have been grouped into three categories by Popper *et al.,* (2014), based on their physiology: low sensitivity; medium sensitivity; and high sensitivity. Smelt is considered to have a medium sensitivity as they have a swim bladder that is not directly involved with hearing. Smelt are susceptible to barotrauma although hearing only involves particle motion, not sound pressure.

1.7.79 The noise generated by SBP activities will be in a frequency range of 0.5 to 12 kHZ and is expected to be temporary, only associated with installation works. Similarly, as vessels associated with activities are expected to be continuously moving, the underwater noise generated will be transient and short term and highly localised to the vessel itself.

1.7.80 Moreover, smelt are understood to be highly mobile within the wider Thames estuary, transiting through the marine environment in small numbers so have the potential to be within the vicinity of the Offshore Scheme, and thus are expected to have moved away from any sources of underwater noise before entering the potential injury zone, returning to normal activities once the sound source has stopped/moved away. Therefore, underwater noise is not anticipated to hinder the conservation objectives of the ‘smelt *O. eperlanus’* feature of Medway Estuary MCZ.

Operation and maintenance phase

Effects from thermal emissions

1.7.81 Submarine power cables are known to produce heat during operation which, when buried in the seabed, can increase the temperature of surrounding sediment and water column (Emeana, et al., 2016). Migratory fish, have the potential to be sensitive to temperature changes, which can influence migration timing and routes.

1.7.82 Table 1.3 indicates that the influence of thermal emissions is expected to be negligible within 8 to 10 m of the cable. Although there is some evidence that migratory fish, such as smelt, may be sensitive to temperature changes, smelt usually swim in the water column, away from the seabed. Seawater at the seabed surface will have a cooling effect and will dissipate any temperature increases in the water column. They are unlikely to experience the small temperature increase near the seabed (Table 1.3). Studies show that localised temperature increases near the seabed have minimal effects on migratory fish compared to broader changes in water temperature and currents (Westerberg & Lagenfelt, 2008).

1.7.83 Therefore, given that thermal emissions from the Proposed Project are considered to be highly localised to the cable, the potential to affect smelt is extremely limited and no barrier effects are expected to occur. Moreover, smelt are understood to be mobile within the wider Thames estuary, possibly transiting through the Offshore Scheme in low numbers, and thus are expected to have moved away from any sources of thermal emissions. Therefore, disturbance from thermal emissions are not anticipated to impact the conservation objectives of the ‘smelt *O. eperlanus’* protected feature of Medway Estuary MCZ.

Effects of EMF emissions

1.7.84 Subsea cables options associated with the Proposed Project, are known to produce EMF emissions (Hutchison, Gill, Sigray, He, & King, 2020) and have the potential to affect the migratory success and behaviour of migratory fish such as smelt.

1.7.85 There is some evidence to suggest that migratory fish species change their direction and geographic position to avoid features which fall in the main magnetic field of cables (Klimley, Putman, Keller, & Noakes, 2021). Moreover, migratory fish have shown distinct directional and behavioural reactions to magnetic fields, such as reduced swimming speed in European eels (Westerberg & Lagenfelt, 2008; Westerberg & Begout-Anras, 2000). Conversely, studies of juvenile salmon which had to cross a cable emitting EMF showed no significant differences in behavioural reactions and migration success (Wyman, et al., 2018). In addition, biotelemetry studies of migrating European eels showed that the location of a subsea cable did not create a strong barrier to migration movements, with only brief changes in direction shown in small numbers of fish (Westerberg & Begout-Anras, 2000).

1.7.86 EMF will be emitted for the duration of operational life of the Proposed Project, from the subsea cables. A project-specific EMF assessment (**Application Document 6.3.4.7.B ES Appendix 4.7.B Electromagnetic Deviation Study**) indicated that the influence of EMF emissions is expected to be highly localised to the cable (Table 1.3). On this basis, although disturbance to migratory fish is not well understood, a review of literature suggests that significant responses are expected to be limited to the immediate area of the Offshore Scheme. Thus, during operation of the cable, smelt may respond by changes in swimming speed or adjustments in swimming direction. However, migratory species spend most of their time in the upper reaches (top 5 m) of the water column, therefore smelt are unlikely to experience EMFs above background levels in water depths less than 30 m.

1.7.87 Moreover, smelt are understood to be highly mobile within the wider Thames estuary, possibly transiting through the Offshore Scheme in low numbers, and thus are expected to have moved away from any sources of EMF.

1.7.88 Due to the localised effect of the EMF emissions, and the design controls in place to reduce any impacts, it is not anticipated that there will be any impact to smelt in the vicinity of the Offshore Scheme. Therefore, EMF emissions are not anticipated to impact the conservation objectives of the 'smelt *O. eperlanus'* protected feature of Medway Estuary MCZ.

Decommissioning phase

1.7.89 As discussed in Section 1.5, following the completion of the Operational phase, the Decommissioning phase will take place. Although the exact methodology for decommissioning will be evaluated nearing the time of decommission, the worst-case scenario to be considered is the full removal of the cable.

1.7.90 The full removal of the cable would have the potential to cause similar impacts to the Construction Phase of the Proposed Project. Therefore, as it has been concluded that impacts associated with the construction phase will not hinder the conservation objectives of the protected features of Medway Estuary MCZ, it is not anticipated that decommissioning effects will hinder the conservation objectives of the protected features of Medway Estuary MCZ.

Assessment conclusion

1.7.91 The potential impact pathways associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Project activities are not anticipated to hinder the conservation objectives of this MCZ. Therefore, it is concluded that **Medway Estuary MCZ does not require a Stage 2 assessment** and will not be assessed further.

1.8 Cumulative Effects

1.8.1 The MCAA (2009) does not provide any explicit legislative requirement for consideration of cumulative effects on the protected features of MCZs. However, the MMO guidelines

(2013) state that the MMO considers that for the MMO to fully discharge its duties under Section 69 of the MCAA, cumulative effects must be considered.

1.8.2 This section discusses the other relevant plans and projects that could occur simultaneously and sequentially (depending on timelines) with the Proposed Project Offshore Scheme. A full assessment cumulative effects are assessed in **Application Document 6.2.4.11 Part 4 Marine Chapter 11 Inter-Project Cumulative Effects**.

1.8.3 Fourteen developments have been identified with pathways that may affect MCZs. All the potential cumulative effects discussed below would be construction or decommissioning period impacts on the MCZs mentioned below. Once the schemes are operational the only potential for in combination effects would be if they required maintenance simultaneously.

1.8.4 In relation to other fully operational projects, developments that will be completed prior to the Proposed Project construction activities where little to no operation and maintenance activities are expected are not considered as part of the cumulative assessment. This includes the following developments:

- Atlantic Crossing 1;
- Mercator;
- Pan European Crossing; and
- Tangerine.

Sizewell C Nuclear Power Station

1.8.5 A proposed expansion of the Sizewell nuclear licence site north of Sizewell B Nuclear Power Station. This will accommodate two new European pressurised reactors with a 3.2 GW electricity generation capacity. This will provide electricity for 6 million homes. The DCO application for Sizewell C was submitted in 2022, with construction due to commence in 2024 with a duration of 9 -15 years (EDF, 2020).

1.8.6 Currently, there are three parts of this development that could result in cumulative effects with the Offshore Scheme, which are the proposed sea defences, a temporary jetty and cooling water system. The boundary for all offshore developments at Sizewell C is 5.38 km north east of the Offshore Scheme. This falls within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Therefore, any observable cumulative effects are extremely unlikely pose a significant cumulative effect on any MCZs.

NeuConnect Interconnector

1.8.7 A proposed 1.4 GW capacity offshore multipurpose HVDC interconnector project from Wilhemshaven, Germany to the Isle of Grain, Kent developed by Meridam, Allianz Capital and Kansai Electric Power. This project aims to be the first energy connection between the UK and Germany to transfer energy between the two countries and increase grid capacity for increased electricity demand and supply from offshore wind assets. The offshore aspects of this development are the HVDC subsea cable and cable landfall location. Construction commenced in 2023 with full operation in 2028.

1.8.8 An Environmental Statement was written in 2019, and an Environmental Appraisal Report in 2020 (AECOM, 2020)), concluding that as the NeuConnect Interconnector is anticipated to pass through the Medway Estuary MCZ, there is potential for cumulative effects with the Proposed Project on the features of Medway Estuary MCZ.

1.8.9 The NeuConnect HVDC subsea cable crosses the Offshore Scheme at KP50.7. However, as the Medway Estuary MCZ is over 42 km from the Offshore Scheme, significantly beyond any ZOI for the Proposed Project activities, it has therefore, been concluded that there will be no cumulative effect on the benthic features. However, the Medway Estuary MCZ was assessed in Stage 1 (Section 1.7) for any impacts on the smelt feature. It was concluded that there is no likely significant risk posed by the Proposed Project due to the high mobility of smelt and their low abundance and transient presence in the vicinity of the Offshore Scheme. Additionally, as construction activities for both projects would only be at any location for a short period of time, it can be concluded that the Proposed Project and the NeuConnect Interconnector would not pose a significant cumulative effect on the MCZ.

GridLink Interconnector

1.8.10 A proposed 1.4 GW capacity offshore project from Dunkerque, France to Kingsnorth, Kent developed by iCON Infrastructure LLP, aims to transfer energy between UK and France. Additionally, it aims to improve grid capacity for increases in offshore wind electricity generation. The offshore, coastal, and intertidal components of the project will consist of HVDC subsea cable and landfall location. The offshore licence for the British EEZ was issued in May 2022, with construction planned to commence in 2026 and commercial operations to commence in 2030.

1.8.11 A Marine Environmental Report for the GridLink Interconnector was completed in 2020 (Interek Energy & Water Consultancy Services, 2020)). Due to its location, there was reported to be potential for ‘in combination’ effects with the Proposed Project on features of Goodwin Sands MCZ and Thanet Coast MCZ as GridLink passes directly through each of these MCZs.

1.8.12 The Offshore Scheme runs directly adjacent to Goodwin Sands MCZ for approximately 3.2 km and is 1.2 km from Thanet Coast MCZ. Both of these sites are designated for benthic habitat features. Moreover, the Gridlink HVDC subsea cable crosses the Offshore Scheme at KP101.3. However, the GridLink route is over 3 km away from both MCZ areas. This falls within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Additionally, the features of the MCZs are not considered to be sensitive to the effects of SSC (Section 1.7). Therefore, any observable cumulative effects are extremely unlikely pose a significant cumulative effect on any MCZs.

North Falls Offshore Windfarm

1.8.13 The main Offshore Wind Array, developed by Scottish and Southern Electricity Networks and Rheinisch-Westfälische Elektrizitätswerk, will be located off the Essex and Suffolk coastline. Following consultation in summer 2023 the northern offshore array area has been removed, reducing the array area from 150 km^2 to 95 km^2 and likewise the number of turbines from 72 to 57. The closest point to shore will now be 42 km as opposed to a previous 22 km (North Falls Offshore Windfarm, 2023) (North Falls Offshore Wind Farm, 2023).

1.8.14 The DCO application was submitted to Planning Inspectorate in July 2024 with construction commencing in 2025/2026 under the current programme. Commercial operation of the array and associated infrastructure is scheduled by 2030.

1.8.15 The North Falls Offshore Windfarm consists of an array, two export cables and up to two offshore substations. The northern export cable corridor crosses the Offshore Scheme at approximately KP52.0 and the southern corridor at KP 53.0. and is located in the Outer Thames Estuary, 40 km from the coastline (North Falls Offshore Windfarm, 2023). The subsea export cable will make landfall between Clacton-on-Sea and Frinton-on-Sea, Essex.

1.8.16 A Preliminary Environmental Impact Report was produced for the North Falls Offshore Windfarm in 2023 (Royal HaskoningDHV, 2023), including an MCZ Assessment (Royal HaskoningDHV, 2024). This Assessment concluded that there is potential for 'in combination' effects with other projects on features of Kentish Knock East MCZ.

1.8.17 The Proposed Project is located 1 km from the boundary of Kentish Knock East MCZ, within the ZOI for underwater sound and a temporary increase in SSC and deposition. There are no receptors designated for this MCZ that are sensitive to underwater sound and so this pathway can be screened out. For temporary increase in SSC and deposition, the MCZ is just over 6.5 km from the North Falls project area and which falls within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase of SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Additionally, the features of the MCZs are not considered to be sensitive to the effects of SSC (Section 1.7). Therefore, cumulative effects from the Proposed Project and North Falls Offshore Wind are highly unlikely to occur.

East Anglia ONE North Offshore Windfarm

1.8.18 A proposed 208 km^2 wind farm developed by Scottish Power Renewables consisting of 67 turbines with a combined electricity generation capacity of 800 MW. This project is an extension of the existing East Anglia ONE array and is part of the East Anglia Hub which includes three arrays off the coast of Suffolk.

1.8.19 The East Anglia ONE North Order Limit is located approximately 0.36 km north east of the Offshore Scheme. This project was consented in 2022, with offshore construction due to commence in 2025 and become operational in 2027/early 2028. Therefore, it is not anticipated that there will be temporal overlap in construction activities of the Proposed Project and East Anglia ONE North Offshore Windfarm, and so any cumulative effects are considered unlikely and cumulative effects on MCZs can be ruled out.

East Anglia TWO Offshore Windfarm

1.8.20 A proposed 218.4 km^2 wind farm developed by Scottish Power Renewables consisting of 75 turbines. Each turbine will have an electricity generation capacity of 19 MW and stand 22 m high above MHWS.

1.8.21 Construction on the East Anglia TWO Offshore Windfarm is planned for 2025 and become operational in 2027/early 2028. The export cable corridor is approximately 350 m from the northern extent of the Offshore Scheme, in shallow waters close to the Suffolk Landfall. Thus, there is potential for some overlap in the ZOI for the potential impact of a temporary increase in SSC and deposition. However, the closest MCZ, the Orford Inshore MCZ, is almost 12 km away, falling within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Additionally, the features of the MCZs are not considered to be sensitive to the effects of SSC (Section 1.7). Thus, it is not anticipated that there will be any cumulative effects on any MCZs.

East Anglia THREE Offshore Windfarm

1.8.22 A proposed 305 km^2 wind farm developed by Scottish Power Renewables (SPR) and Vattenfall. It consists of between 100 and 172 offshore wind turbines with a combined electricity generation capacity of up to 1200 MW. It is part of the East Anglia Hub which includes three arrays off the coast of Suffolk, with the East Anglia THREE array being 79 km from Lowestoft, Suffolk. All the wind turbines are located in a water depth of 35 m to 45 m. The East Anglia THREE Offshore Windfarm will consist of four export cables bundled into two cable corridors. The northern export cable corridor crosses the Offshore Scheme at KP11.4 and southern export cable corridor at KP14.5.

1.8.23 Construction on the project commenced in July 2022 and is scheduled to be completed by 2026, with no temporal interaction with the Proposed Project anticipated. However, should East Anglia THREE be delayed the Proposed Project Offshore Scheme is 8.6 km away from the nearest MCZ, the Orford Inshore MCZ, falling within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Additionally, the features of the MCZs are not considered to be sensitive to the effects of SSC (Section 1.7). Thus, any cumulative effects are considered highly unlikely.

Nautilus Offshore Interconnector

1.8.24 A 1.4 GW capacity connection between Belgium with the UK being developed by National Grid Ventures. The aim will be to increase transfer in offshore wind electricity generation and improve grid capacity in both countries to achieve this. The offshore aspect of the development includes Subsea HVDC connecting the Belgian landfall with the UK and Offshore HVDC converter platform.

1.8.25 NGV have recently sought to connect into the Grain Substation at the Isle of Grain in Medway, a proposed approach that was agreed by Ofgem as part of its Initial Project Assessment (IPS) published in November 2024. Although it is understood that the proposed connection agreement for connection to the proposed Friston substation has not yet been cancelled, this is likely to happen in 2025.

1.8.26 Whether the Nautilus project pursues the proposed connection to the Isle of Grain or reverts to the Friston connection site (though this is considered to be highly unlikely), it will need to cross the Offshore Scheme in the offshore environment. However, there was no detailed ecological impact assessment in the public domain at time of writing, with non-statutory consultation and community engagement closed in October 2021 with the application expected to be submitted in 2028.

1.8.27 The closest MCZ to the Proposed Project Suffolk Landfall is Kentish Knock East MCZ, located 1 km from the Offshore Scheme Boundary. This falls within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase of SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Additionally, the features of the MCZs are not considered to be sensitive to the effects of SSC (Section 1.7). Therefore, any observable cumulative effects are extremely unlikely pose a significant cumulative effect on any MCZs.

Five Estuaries Offshore Windfarm

1.8.28 A proposed 128 km^2 wind farm, 37 km off the Suffolk Coast is being developed. The array consists of 79 turbines with a combined electricity generation capacity of 50 GW. The Five Estuaries northern export cable crosses the Offshore Scheme at KP 50.181 and southern corridor at KP 52.719. Construction is due to commence in 2027 with full operation in 2030.

1.8.29 The application for this project was accepted in April 2022, with construction due to commence in 2027 with full operation in 2030. The associated MCZ Assessment was completed that due to the location of the offshore aspects of the project, HVDC subsea cable and landfall location, the project reported there is potential for cumulative effects on features of Kentish Knock East MCZ.

1.8.30 The Proposed Project is located 1 km from the boundary of Kentish Knock East MCZ, within the ZOI for underwater sound and a temporary increase in SSC and deposition. There are no receptors designated for this MCZ that are sensitive to underwater sound and so this pathway can be screened out. For the temporary increase in SSC and deposition, the MCZ is just over 6.2 km from the Five Estuaries Offshore Windfarm project area, falling within the ZOI for the temporary increase of SSC and deposition (Section 1.6), thus there is the potential for some overlap in a temporary increase in SSC and sediment deposition. However, at this distance any increase of SSC will be very minor, and any sediment deposition will be limited to a thickness which is unlikely to be detectable in the field. Additionally, the features of the MCZs are not considered to be sensitive to the effects of SSC (Section 1.7). Therefore, cumulative effects from the Proposed Project and Five Estuaries Offshore Windfarm are highly unlikely to occur.

Lionlink Offshore Interconnector

1.8.31 A 1.8 GW MPI connecting the Netherland, and the UK. The aim will be to increase the transfer of offshore wind electricity generation and improve grid capacity in both countries to achieve this. The offshore aspect of the development includes a subsea HVDC connecting the Belgian landfall with the UK landfall in Suffolk. Construction is due to commence in 2027 with the final connection date being in 2029 under the current schedule based on project engagement with National Grid Ventures.

1.8.32 The marine cables are unlikely to cross the Offshore Scheme due to the direction of the Lionlink cable and the current emerging landfall preference for Lionlink is at Southwold/Reydon and an alternative location at Walberswick, approximately 20 km from the Proposed Project Suffolk landfall (LionLink, 2024).

1.8.33 The closest MCZ to the Proposed Project Suffolk Landfall is Kentish Knock East MCZ, located 1 km from the Offshore Scheme Boundary. This is within the ZOI for underwater sound and a temporary increase in SSC and deposition. There are no receptors designated for this MCZ that are sensitive to underwater sound and so this pathway can be screened out. For the temporary increase in SSC and deposition, the MCZ is just over 24 km from the Lionlink Offshore Windfarm landfall location and so any interaction in relation to SSC is highly unlikely. Additionally, the features of the MCZs are considered to have no sensitivity to the effects of SSC (Section 1.7). Therefore, cumulative effects from the Proposed Project and Lionlink Offshore Interconnector are highly unlikely to occur.

Hanson Aggregate Marine Ltd Area 528/2

1.8.34 An application and option area for the exploration and extraction of marine aggregates (The Crown Estate, 2021). The option area is 47.37 km^2 and is located immediately outside the Thames Estuary, 0.1 km east of the Offshore Scheme.

1.8.35 The application for this site was submitted in 2016, with a commencement date of 01 August 2017, and an end date of 31 July 2024. Therefore, there will be no temporal interaction with the Proposed Project anticipated, and any cumulative effects on MCZs are considered highly unlikely.

NEMO Link

1.8.36 Nemo Link is a 1 GW HVDC submarine interconnector connecting Richborough Energy Park in Kent, UK to Zeebrugge, Belgium via two 130 km HVDC subsea cables. The UK landfall is situated in Richborough, Kent with the subsea cables running through Pegwell Bay, intersecting the Offshore Scheme at KP113.1.

1.8.37 Nemo Link has been fully operational since 31 January 2019. Therefore, there is no temporal interaction with the Proposed Project anticipated, and any cumulative effects on MCZs are considered highly unlikely.

1.8.38 During consultation, it was noted that Nemo Link led to the degradation of saltmarsh habitats in Pegwell Bay during its installation (Section 1.2). To avoid any impacts, the Proposed Project will use trenchless solutions, such as HDD, that will completely avoid the sensitive saltmarsh habitats in the upper intertidal area of Pegwell Bay (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**). Moreover, it was also noted that the Nemo Link route overlapped with Goodwin Sands MCZ (Section 1.2). Following consultation, the Proposed Project, Offshore Scheme has been re-routed to avoid the Goodwin Sands MCZ (**Application Document 6.2.1.4 Part 1 Introduction Chapter 4 Description of the Proposed Project**) and will avoid direct impacts on the site, thereby reducing the impacts to the known and potential receptors located within the area.

Thanet Offshore Windfarm

1.8.39 Constructed Thanet Offshore Windfarm is located approximately 11 km off the coast of Thanet district in Kent, England. The windfarm covers an area of 35 km^2, and at the closest point sits 0.6 km^2 from the Offshore Scheme. The Thanet Offshore Windfarm export cables intersect the Offshore Scheme on approach to the Kent Landfall, at KP 107.594 and KP 107.647. Planning permission for the project was granted in 2006 with the windfarm officially opening in 2010. Therefore, there is no temporal interaction with the Proposed Project anticipated, and any cumulative effects on MCZs are considered highly unlikely.

London Array Offshore Windfarm

1.8.40 London Array offshore windfarm, lying 1.2 km to the west of the Proposed Project Offshore Scheme, covers an area of 122.5 km^2. The Project consists of 175 turbines. This also includes the Blue Transmission London Array export cable, approximately 8.3 km from the Offshore Scheme boundary. This windfarm export cable does not cross the Offshore Scheme boundary. Construction of phase 1 of the wind farm began in 2011 and inaugurated in 2013. Therefore, there is no temporal interaction with the Proposed Project anticipated, and any cumulative effects on MCZs are considered highly unlikely.

1.9 Summary and Conclusions

1.9.1 This report has been produced to provide the necessary information to allow the Regulator to meet their specific duty for MCZs as outlined in Section 126 of the MCAA (2009). The first stage of the assessment process was screening to identify if the MCZs should be taken through the full assessment in the stage 1 assessment process. The screening concluded that there was a likely significant risk of the Offshore Scheme affecting the designated features and/or conservation objectives of one or more MCZs. Stage 1 assessments were completed for Goodwin Sands MCZ, Thanet Coast MCZ, Kentish Knock East MCZ, Orford Inshore MCZ, Dover to Deal MCZ, and Medway Estuary MCZ due to their sites falling within the ZOIs of the following impact pathways:

- temporary physical disturbance to benthic habitats and species (Goodwin Sands MCZ only);
- temporary increase in SSC and deposition;
- underwater noise (Goodwin Sands MCZ and Medway Estuary MCZ only);
- direct loss of benthic habitats and species (Goodwin Sands MCZ only);
- effects from thermal emissions (Goodwin Sands MCZ and Medway Estuary MCZ only);
- effects of EMF emissions (Goodwin Sands MCZ and Medway Estuary MCZ only); and
- decommissioning effects

1.9.2 The Stage 1 assessment found that these impact pathways are not considered to have significant effects on the designated features or conservation objectives of these MCZs.

1.9.3 It has been concluded that the conditions of Section 126 of the MCAA (2009)) as determined under Stage 1 of the MCZ assessment process, will be met and that there is not a likely significant risk to any of the identified designated features or conservation objectives of the sites as a result of Proposed Project related activities.

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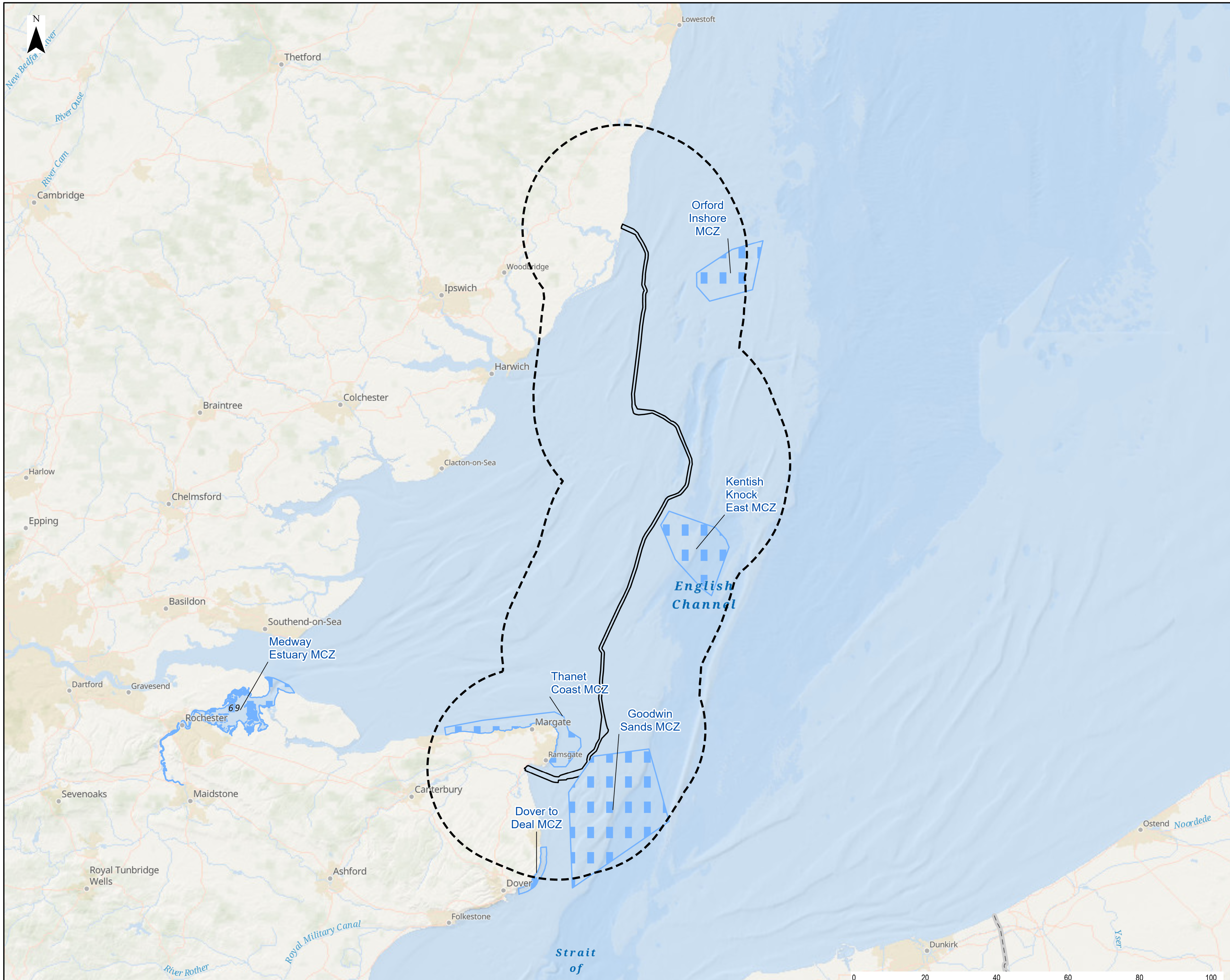
Appendix A Figures



Legend

- Offshore Scheme Boundary
- 17km Buffer of Offshore Draft Order Limits
- MCZ screened into Stage 1 Assessment

Rev	Date	Description	GIS	Chk	App
0	19/02/2025	ENVIRONMENTAL STATEMENT	EB	DF	EW

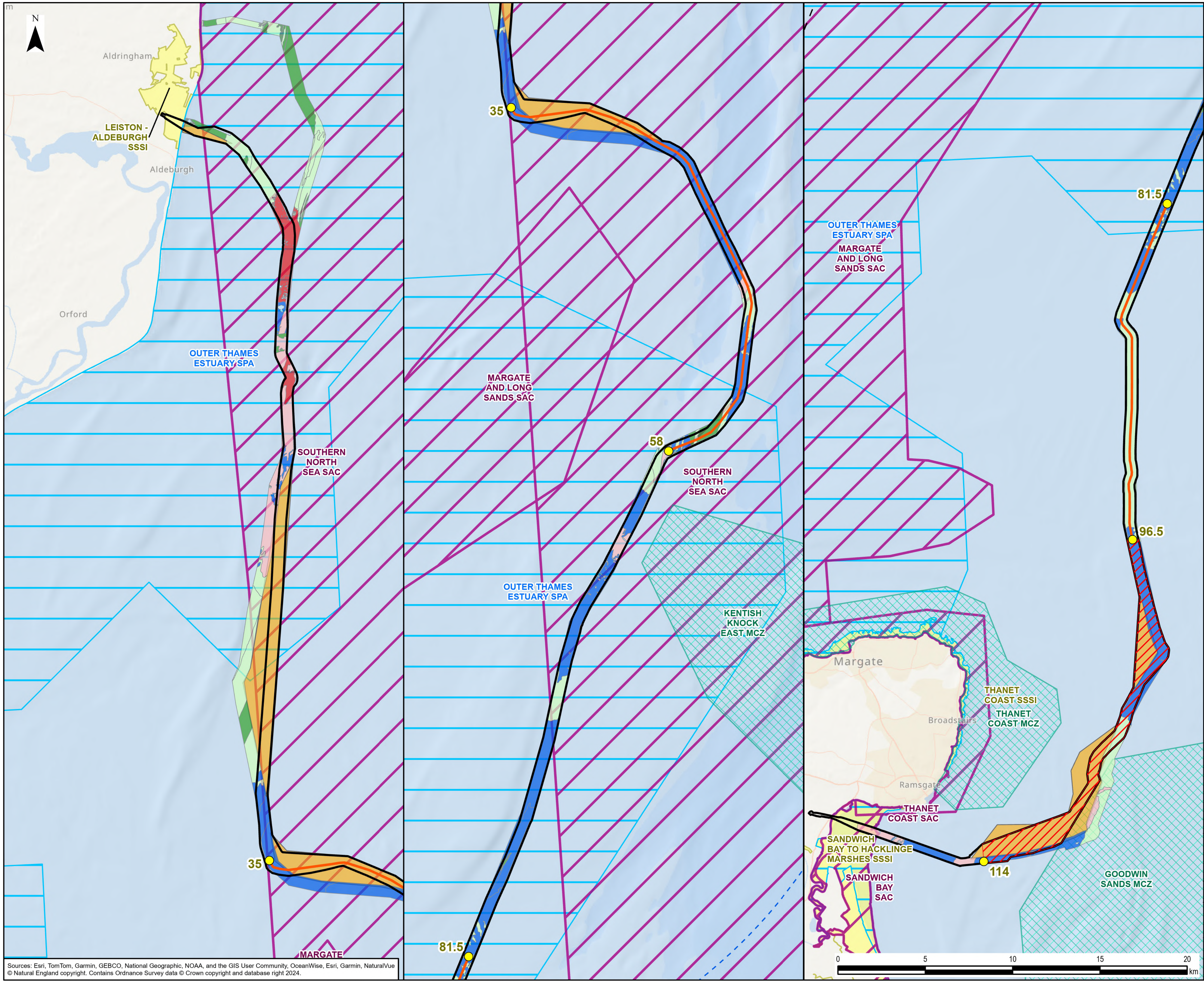
nationalgrid

Scheme: SEA LINK

Document Title: FIGURE 1
MARINE CONSERVATION ZONES (MCZ) WITHIN 17KM OF THE OFFSHORE SCHEME ORDER LIMITS, INCLUDING SITES BEYOND 17 KM WITH POTENTIAL INDIRECT EFFECTS

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	19/02/2025	DF	19/02/2025	EW	19/02/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 1	1:1,000,000	A3	1	0



Legend

- Offshore Scheme Boundary
- Benthic Ecology Study Area
- UK Territorial Sea Limit - 12 nm
- Backfill Kilometre Point
- DF4 Backfill Area
- Areas Requiring Sand Wave Lowering (Pre-Sweeping)
- Geophysical Survey Areas (2024)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Designated Marine Conservation Zone (MCZ)

Habitat Complexes

- A4.2 Atlantic and Mediterranean moderate energy circalittoral rock
- A5.1 Sublittoral coarse sediments
- A5.2 Sublittoral sand
- A5.3 Sublittoral mud
- A5.4 Sublittoral mixed sediments

Rev	Date	Description	GIS	Chk	App
0	03/11/2025	MARINE CONSERVATION ZONE ASSESSMENT	EB	DF	JH

nationalgrid

Scheme: SEA LINK

Document Title: MARINE HABITATS AND RELEVANT PROTECTED SITES AND AREAS OF ROCK BACKFILL WITHIN THE OFFSHORE SCHEME BOUNDARY

Creator:	Date:	Checker:	Date:	Approver:	Date:
EB	03/11/2025	DF	03/11/2025	JH	03/11/2025

Document Ref:	Scale:	Format:	Sheets:	Rev:
FIGURE 2	1:150,000	A3	1	0

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