Marine Conservation Zone Assessment Screening

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Contents

Glossary of Project Terminology

This Glossary has been provided to define terms used across a number of the LionLink Proposed Scheme documents.

Term	Definition
Applicant, the	National Grid Lion Link Limited (NGLLL)
Co-ordination	The process of people or entities working together.
Co-location	Where different elements of a project, or various projects, are located in one place.
Development Consent Order (DCO)	An order made by the Secretary of State pursuant to the Planning Act 2008 (as amended) granting development consent for a Nationally Significant Infrastructure Project. It grants consent to develop the approved project and may include (among other things) powers to compulsorily acquire land and rights where required and deemed marine licences for any offshore works.
Draft Order Limits	The area of land identified as being subject to the DCO application. The Draft Order Limits are made up of the land required both temporarily and permanently to allow for the construction, operation and maintenance, and decommissioning of the Proposed Scheme. All onshore parts of the Proposed Onshore Scheme are located within England and offshore parts of the Proposed Offshore Scheme are located within English territorial waters to 12 Nautical Miles and then up to the United Kingdom (UK) Exclusive Economic Zone (EEZ) boundary at sea.
Dutch Offshore Components	Is the term used when referring to the offshore elements of the Project within Dutch waters.
Environmental Impact Assessment (EIA)	The EIA is a systematic regulatory process that assesses the potential likely significant effects of a proposed project or development on the environment.
EIA Scoping Report	An EIA scoping report defines the proposed scope and methodology of the EIA process for a particular project or development. The EIA Scoping Report for the Proposed Scheme was submitted to the Planning Inspectorate with a request for the Secretary of State to adopt a scoping opinion in relation to the Proposed Scheme on 6 March 2024.

Term	Definition
Environmental Statement (ES)	The ES is a document that sets out the likely significant effects of the project on the environment. The ES is the main output from the EIA process. The ES is published as part of the DCO application.
Exclusive Economic Zone (EEZ)	The zone in which the coastal state exercises the rights under Part V of the United Nations Convention on the Law of the Sea. These rights relate principally to the water column and may extend to 200 nautical miles from baselines. This is distinct from territorial waters, which for the UK extend 12 nautical miles from the coast.
Landfall	The proposed Landfall is where the proposed offshore HVDC Submarine Cables are brought ashore and meets with the onshore proposed Underground HVDC Cables. This includes the Transition Joint Bay (TJB). The proposed Landfall will be located at Walberswick, and there will be no permanent above ground infrastructure at the proposed Landfall.
Landfall Site	The area where the Landfall may be located.
Multi-purpose interconnector (MPI)	A project where GB interconnection is combined with transmission of offshore generation within GB (and optionally within a connecting state).
National Grid Lion Link Limited (NGLLL)	The Applicant, a joint venture between National Grid Ventures and TenneT. NGLLL is a business within the wider National Grid Ventures portfolio.
National Grid Ventures (NGV)	Operates and invests in energy projects, technologies and partnerships to accelerate the development of a clean energy future. This includes interconnectors (such as the LionLink Project), allowing trade between energy markets and the efficient use of renewable energy resources.
Nationally Significant Infrastructure Projects (NSIP)	Major infrastructure developments in England and Wales for which development consent is required, as defined within Section 14 of the Planning Act 2008 (as amended). This includes any development which is subject to a direction by the relevant Secretary of State pursuant to Section 35 of the Planning Act 2008.
Offshore Hybrid Asset (OHA)	A project that combines cross-border interconnection with the transmission of offshore generation, this is an overarching term which covers both multi-purpose interconnectors (MPI) and non-standard interconnectors (NSI).
Order Limits	The maximum extent of land within which the Proposed Scheme may take place, as consented.

Term	Definition
Outline Offshore Construction Environmental Management Plan (Outline Offshore CEMP)	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Offshore Scheme.
Outline Onshore Code of Construction Practice (Outline Onshore CoCP)	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Onshore Scheme.
Planning Act 2008	The Planning Act 2008 being the relevant primary legislation for national infrastructure planning.
Planning Inspectorate (PINS)	The Planning inspectorate review DCO applications and make a recommendation to the Secretary of State, who will then decide whether to approve the DCO.
Preliminary Environmental Information Report (PEIR)	The PEIR is a document, compiled by the Applicant, which presents preliminary environmental information, as part of the statutory consultation process. This is defined by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 as containing information which "is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)" (Section 12 2. (b)). This PEIR describes the Proposed Scheme, sets out preliminary findings of the EIA undertaken to date, and the mitigation measures proposed to reduce effects. The PEIR is published at Statutory Consultation stage for information and feedback.
Project (the)	The LionLink Project (hereafter referred to as the 'Project') is a proposal by National Grid Lion Link Limited (NGLLL) and TenneT. The Project is a proposed electricity link between Great Britain (GB) and the Netherlands with a capacity of up to 2.0 gigawatts (GW) of electricity and will connect to Dutch offshore wind via an offshore platform in Dutch waters. The Project is the collective term used to refer to the proposal for all aspects (onshore and offshore) of the proposed interconnector between GB and the Netherlands.
Proposed Offshore Scheme	The term used when referring to the offshore elements of the Proposed Scheme, seaward of the

Term	Definition
	mean high-water springs to the EEZ boundary at sea.
Proposed Scheme	Used when referring to the GB scheme components of the Project, not including Dutch components. This includes both the onshore and offshore scheme components which are within UK territorial waters and up to the UK EEZ boundary at sea.
Scoping Opinion	A scoping opinion is requested from the Planning Inspectorate on behalf of the Secretary of State, to inform the requirements of EIA process and ultimately the ES which will be submitted as part of the application for development consent. Through the scoping process, the views of the statutory consultees and other relevant organisations on the proposed scope of the EIA are sought. A Scoping Opinion for the Proposed Scheme was issued by the Planning Inspectorate (on behalf of the Secretary of State) on 16 April 2024. The Applicant received a separate EIA Scoping Opinion from the Marine Management Organisation (MMO) (Reference DCO/2024/00005, dated 04 September 2024) as the MMO were unable to provide opinion to the Planning Inspectorate in time for the April 2024 deadline.
Scottish Power Renewables (SPR) East Anglia One North (EA1N) and East Anglia 2 (EA2) Consents (SPR EA1N and EA2 Consents)	The Orders made following the Scottish Power Renewables applications for development consent for the following projects: The East Anglia ONE North Offshore Wind Farm Order 2022; and East Anglia TWO Offshore Wind Farm Order 2022
Statutory Consultation	Consultation undertaken with the community and stakeholders in advance of the application for development consent being submitted to the Planning Inspectorate, on behalf of the Secretary of state, in accordance with the PA 2008.
TenneT	Operator of the electricity transmission network across the Netherlands.
Transition Joint Bay (TJB)	An underground structure at the Landfall Site that house the joints between the offshore cables and the onshore cables.

1 Introduction

1.1 Scope of this Report

1.1.1 This report is part of National Grid Ventures' (NGV) (the 'Applicant') Development Consent Order (DCO) and deemed Marine Licence (dML) application to the Secretary of State (SoS) for the construction and operation of the proposed LionLink interconnector (the 'Project'). As part of the application process, the SoS (as the public authority) is required to complete a Marine Conservation Zone (MCZ) Assessment for the Project under the Marine and Coastal Access Act 2009 (as amended) (MCAA). This report aims to support the MCZ Assessment process and provide the necessary information to the SoS to assist them in making an informed decision on the likely impact of this proposed Project on MCZs and Highly Protected Marine Areas (HPMA) and their protected features.

1.1.2 This report has been prepared during the pre-application stage, to accompany the Preliminary Environmental Information Report (PEIR). The report sets outs the MCZ assessment process, presents the findings of the initial screening process and records the reasoning and conclusions in relation to the screening of the Project.

1.1.3 Where (and if) it is considered that the Project is capable of hindering the achievement of the conservation objectives stated for an MCZ/HPMA or the ecological or geomorphological processes on which the protected features are dependent, the site will be 'screened in' and will progress to the next stage in the MCZ/HPMA assessment process. Where the Project is not considered capable of affecting any of the protected features of an MCZ/HPMA due to a lack of pathway, an assessment of the MCZ/HPMA and associated features is not required.

1.1.4 The aim of the report is to seek agreement from the statutory nature conservation bodies (SNCB) (Natural England and the Joint Nature Conservation Committee [JNCC]) on the screening assessment presented and the content of the MCZ Assessment to be submitted with the application for development consent. Opinion is sought as to whether Natural England and JNCC agree with the findings and conclusions of this report.

1.1.5 This MCZ screening assessment considers all phases of the Project; construction, operation (including repair and maintenance) and decommissioning. It is a preliminary screening of the Project based on the Draft Order Limits and indicative project description. It is being undertaken ahead of detailed engineering and the finalisation of the project description to provide information to Natural England and JNCC to inform their Opinion. All assumptions made with respect to the project description are clearly outlined.

1.2 Overview of the Project

1.2.1 NGV together with joint venture partner TenneT are developing proposals for LionLink, a high voltage electricity link with a capacity of up to two gigawatts (GW), between the national transmission systems of Great Britian (GB) and the Netherlands (NL) and a connection to an offshore wind farm located in Dutch waters.

1.2.2 The proposed Project has been granted a direction under Section 35 of the Planning Act 2008 (PA2008) from the Secretary of State and will be applying for development consent under Section 37 of the PA2008 to the Planning Inspectorate. The application will provide details of the Project and will be accompanied by an Environmental Statement.

1.2.3 The United Kingdom (UK) portion of the Project comprises the following key components:

a. The proposed Kiln Lane Substation.
b. Proposed high voltage alternating current (HVAC) underground cables between the proposed Converter Station in Suffolk and the proposed Kiln Lane Substation.
c. The proposed Converter Station in Suffolk, east of Saxmundham.
d. Proposed high voltage direct current (HVDC) underground cables between the proposed converter station in Suffolk, and a proposed landfall site at Walberswick.
e. Submarine electricity cables from a proposed landfall site (at Walberswick) at the mean high-water mark at the UK coast to the edge of the UK Exclusive Economic Zone (EEZ).

1.2.4 The Proposed Offshore Scheme would consist of two HVDC submarine cables, one dedicated metallic return (DMR) cable, one fibre optic cable (used for control and monitoring purposes) and associated external cable protection (e.g., rock berm, concrete mattresses etc.) where the required burial into the seabed cannot be achieved. As the Proposed Offshore Scheme would consist of multiple cables it is likely that the two HVDC cables (Pole 1 and Pole 2) and conditional monitoring fibre optic cable, and DMR would be bundled together in one trench. Burial depth is typically 1-2m below seabed level and would be determined by a cable burial risk assessment.

1.2.5 The submarine cable installation at the proposed landfall site would be via a trenchless technique (such as horizontal directional drill (HDD)). The landfall site has environmental constraints such as substantial height difference between landfall and intertidal area which mean open cut trenching will not be used.

1.2.6 The Project is in line with the Offshore Transmission Network Review (OTNR) which seeks to “ensure that transmission connections for offshore wind generation are delivered in the most appropriate way” (Ref 1) and the Interconnector Policy Review decision (Ref 2) which aims “to enable investment

in low carbon infrastructure at a fair cost for UK consumers and enable the more effective coordination in the delivery of low-cost offshore network".

1.2.7 This report relates to the UK marine components of the Project. The Proposed Offshore Scheme Draft Order Limits extends from the mean high-water springs (MHWS) mark at Walberswick, Suffolk, across English territorial waters to the boundary between the UK and the Netherlands EEZ. It is nominally 500m wide but has been widened in places to allow for vessel anchoring and avoidance of seabed features.

2 Overview of MCZ Assessment Process

2.1 Legislative Context

2.1.1 Section 126 (6) of the MCAA requires that applicants seeking to undertake an activity must satisfy the competent authority that there is no significant risk of the proposed activity hindering the achievement of the conservation objectives stated for the MCZ/HPMA. Guidance published by the MMO (Ref 3) recommends a three staged sequential assessment process for assessing the effects of a project on an MCZ/HPMA, with the outcome of each staging informing whether the assessment progresses to the next stage, as follows:

a. Screening: The process of identifying whether Section 126 (6) should apply to the project. Screening identifies whether the licensable activity is taking place within or near to an MCZ/HPMA; and identifies whether the activity is capable of affecting (other than insignificantly) either the protected features of the MCZ/HPMA or the ecological or geomorphological processes on which the protected features are dependent.
b. Stage 1 assessment: This stage considers whether there is a significant risk of the licensable activity hindering the achievement of the conservation objectives stated for the MCZ/HPMA. It considers whether there are alternative options of undertaking the licensable activity that would create a substantially lower risk of hindering the achievement of the conservation objectives.
c. Stage 2 assessment: This stage looks at whether there are benefits to the public of proceeding with the project that clearly outweigh the damage to the environment and what measures the applicant will take to provide equivalent environmental benefit to compensate for the damage which the project will have on the MCZ/HMPA.

2.1.2 The MCZ Assessment is undertaken by the competent authority, which for this Project is the SoS, based on information provided by the Applicant, usually in the form of a MCZ Assessment Report.

3 Screening Approach

3.1 Approach

3.1.1 To determine whether S.126 of the MCAA applies to any MCZs it is necessary to understand and assess whether the Protected Features of an MCZ/HPMA:

a. Can come into contact with the licensable activity; and
b. Are sensitive to the proposed activities i.e., the activity is likely to have a significant adverse effect on the protected feature(s).

3.1.2 MMO (Ref 3) guidance recommends a risk-based approach when determining the 'nearness' of an activity with respect to MCZs/HPMAs, advocating the application of appropriate buffer zones to the protected feature(s) and consideration of risks of activities which lie further removed from features. The likelihood of an activity causing an effect, the magnitude of that effect should it occur and the potential of the effect to hinder the achievement of the conservation objectives for the protected feature should also be considered.

3.1.3 To identify relevant MCZs/HPMA to include in this assessment the following approach has been adopted:

a. Identify potential impact pathways and zones of influence (the spatial extent over which the impact may be experienced by receptors and therefore an effect may occur) between the Project and protected features using the source-pathway receptor model.
b. Define search areas for protected features based on the zone of influence of potential impact pathways.
c. Identify any relevant MCZs/HPMAs within the search areas.
d. Assessment of whether, in the absence of mitigation measures, the identified potential impact pathway is likely to hinder the achievement of the conservation objectives for the protected feature and give rise to significant environmental effects.

3.1.4 MCZs are designated to conserve nationally important, rare, or threatened habitats and species and / or features of geological and geomorphological interest. Each of these features can be considered as receptors and can broadly be broken down into the following categories:

a. Habitats
b. Benthic species
c. Fish & shellfish
d. Birds
e. Marine mammals
f. Geological interests
g. Geomorphological interests

3.1.5 HPMAs are areas of the sea designated for the protection and recovery of marine ecosystems. They prohibit extractive, destructive, and depositional uses,

allowing only non-damaging levels of other activities to the extent permitted by international law. By setting aside some areas of sea with high levels of protection, HPMAs allow nature to recover to a more natural state, allowing ecosystems to thrive. Their key purpose is biodiversity recovery and as such they protect the entire ecosystem within their boundary (JNCC, 2023) (Ref 19).

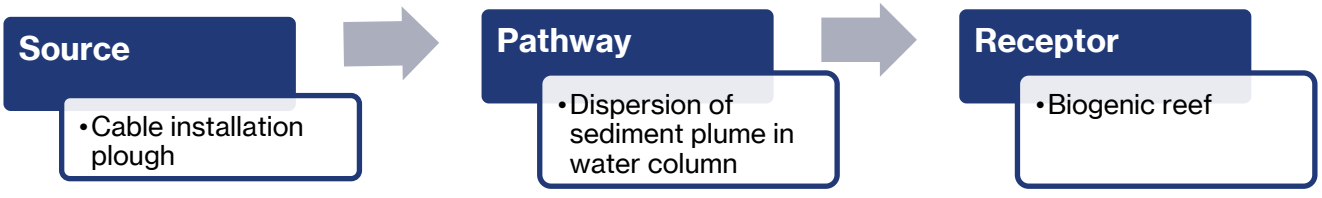
3.1.6 An initial high-level screening using the JNCC Marine Protected Area (MPA) mapper identified that there are no MCZs/HPMAs designated for birds, fish and shellfish, or marine mammals within the wider area of interest (the southern North Sea) for the Project. These receptors have therefore been screened out of the assessment.

3.1.7 This report has been informed by a review of the publicly available datasets and the available literature that allowed the characterisation of the receiving environment and supported the identification and assessment of potential effects and their significance. The sources of the information used are cited throughout the report and listed in the reference section.

3.1.8 The examination, analysis and evaluation of the relevant information that supported the screening process conducted and documented in this report followed the precautionary principle throughout.

3.2 Source-Pathway-Receptor Model

3.2.1 The potential for likely significant effects has been assessed using a source-pathway-receptor model. This approach identifies likely environmental effects resulting from the proposed licensable activities of the Project. For instance, a project activity (source) may entail a predicted change in environmental conditions affecting either directly or indirectly (the pathway) a specific component of the baseline environment (the receptor / protected feature). If the receptor / protected feature is sensitive to the change it could result in either a positive or negative effect. **Inset 3.1** presents this model with a specific example to illustrate the concept.



Inset 3.1: Source – Pathway - Receptor model example

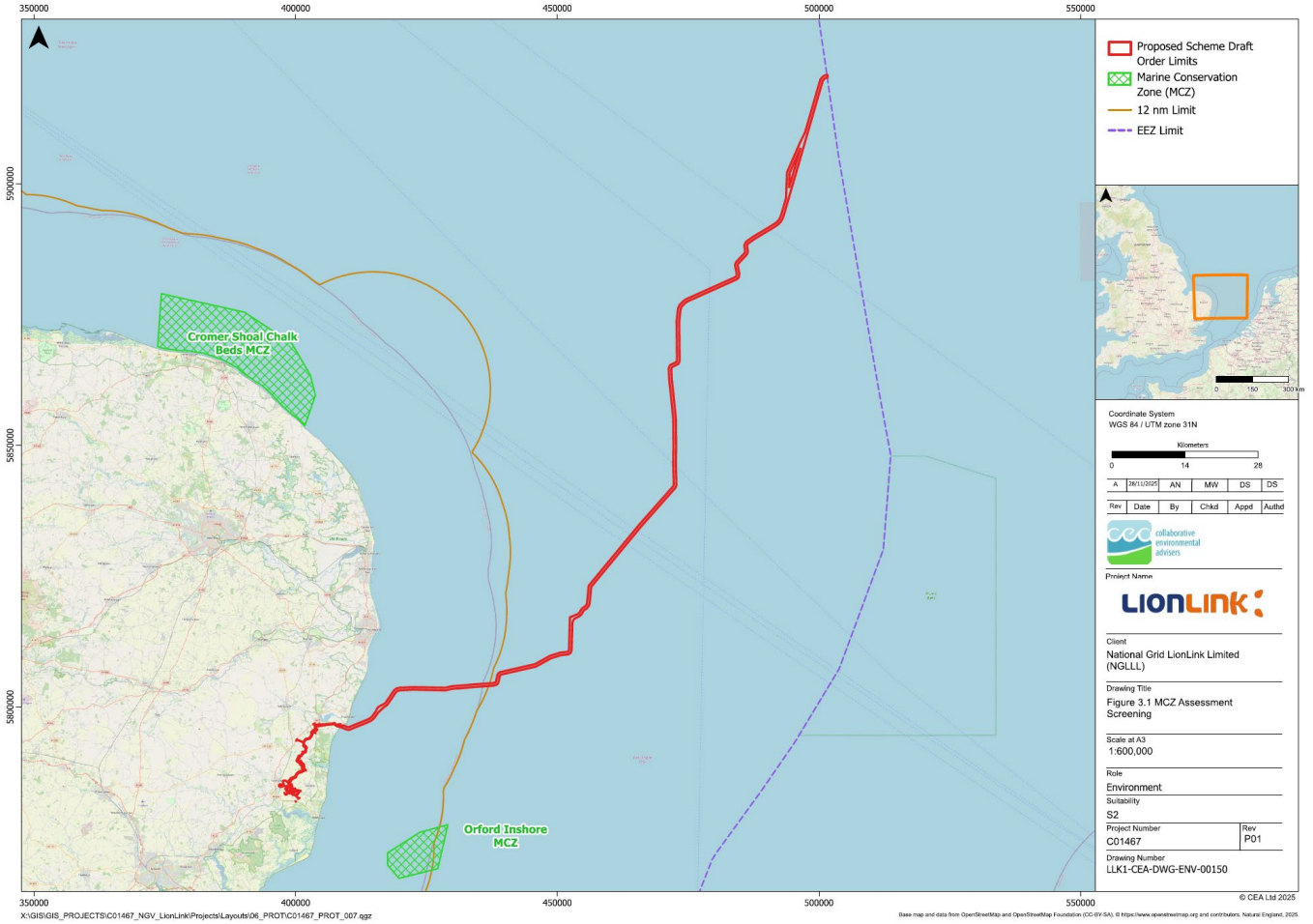
3.3 Identification of Relevant MCZs

3.3.1 A geographical information system (GIS) was used to identify the closest MCZ to the Draft Order Limits which was Orford Inshore MCZ located 25 km away. The next closest MCZ was Cromer Shoal Chalk Beds MCZ which is located 61 km away; there are no HPMAs within proximity of the Proposed Offshore Scheme. **Table 3.1** is an overview of the designated features and conservation objectives of both of these sites. An illustration of the Proposed Offshore Scheme Draft Order Limits and the closest MCZs are presented in **Figure 3.1.**

Table 3.1: Overview of assessed MCZs

Marine Conservation Zone	Designated Feature/s	Conservation objectives
Orford Inshore (Ref 17)	• Subtidal mixed sediments	To recover and maintain the designated feature.
Cromer Shoal Chalk Beds (Ref 18)	• High energy circalittoral rock • High energy infralittoral rock • Moderate energy circalittoral rock • High energy circalittoral rock • North Norfolk coast (Subtidal) • Peat and clay exposures • Subtidal chalk • Subtidal coarse sediment • Subtidal mixed sediment • Subtidal sand	To recover and maintain the designated features.

Figure 3.1: MCZs in vicinity of the Project



4 Potential Impact Pathways

4.1.1 Impacts have been established by CEA based on industry experience and consultation with relevant stakeholders. Where applicable the list of marine pressures established by the JNCC Marine Pressures-Activities Database v1.5 (Ref 4), Oslo Paris (OSPAR) Intercessional Correspondence Group on Cumulative Effects (ICG-C) pressures (Ref 5) and Natural England's advice on operations for relevant designated sites has been used to establish impacts to be screened. The impacts considered relevant for the installation, operation, and decommissioning of subsea cables are presented in **Table 4.1**. The potential impact pathways are only considered for the relevant receptors identified in **Table 3.1**.

4.2 Defining a Zone of Influence and a Search Area

4.2.1 The zone of influence for each of the impacts associated with the Project will be used during the screening assessment to determine whether there is likely to be a source-receptor pathway between the Project and any MCZ Protected Features. Rationale for establishing the zone of influence is provided in **Table 4.1**. Note that impacts are given in black text, while the corresponding JNCC pressures are provided in grey text in the first column of the table. Conservative estimates have been used when calculating the final search area for each impact to ensure that all potentially sensitive receptors are accounted for in the MCZ Assessment process and that the 'worst-case scenario' is taken into consideration.

4.2.2 Following the examination of relevant data and information relating to each of the Project activities, the search area for relevant MCZs containing habitats and benthic species has been set at 15km and 1km for geomorphological receptors.

Table 4.1: Potential impact pathways

Key: C = Construction, O&M = Operation & Maintenance, D = Decommissioning

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
Temporary habitat loss / seabed disturbance Abrasion/disturbance of the substrate on the surface of the seabed Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	• HDD • Anchoring • Pre-sweeping • PLGR • Boulder clearance • Cable lay and burial • Cable repair • Cable removal • Temporary seabed deposits	✓	✓	✓	The laying of cables will lead to seabed abrasion and disturbance of the substrate on the surface of the seabed (Ref 6). Ploughing, trenching, the placement of temporary seabed deposits, anchor placement and pre-sweep of sandwaves will all result in abrasion and disturbance. Depending on the installation method used, the maximum clearance width on the seabed would be 30m. Beyond this direct footprint, low intensity physical disturbance may also occur due to anchor handling inside the anchor corridor which may be up to 0.5–1km from the vessel (Ref 7). Most Project activities that penetrate the seabed will present a temporary impact i.e., will only be undertaken once and the seabed will be able to recover after the activity. Some activities will occur in the same footprint and will be separated by a couple of months e.g., pre-lay grapnel run (PLGR) followed by trenching. Abrasion could result in the localised loss or damage to habitats and benthic species within the direct footprint of this impact.	IN	IN	IN	1 km from Draft Order Limits

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					Geomorphological features could be permanently damaged by abrasion, particularly softer substrates such as chalk and clay beds. As such, this impact has been screened in for all receptors.				
Temporary increase and deposition of suspended sediments Changes in suspended solids (water clarity) Smothering and siltation rate changes	• HDD • Anchoring • Pre-sweeping • PLGR • Boulder clearance • Cable lay and burial • Cable repair • Cable removal • Deposit of external cable protection • Temporary seabed deposits	✓	✓	✓	This impact relates to changes in water clarity (or turbidity) due to changes in suspended sediment concentrations and smothering of seafloor habitats as a result of settled-out suspended sediments. During cable installation sediment re-suspension will occur followed by subsequent re-deposition on the seabed. The siltation rates will depend on the hydrological conditions and the sediment particle size distribution. A greater sediment dispersion distance means the sediment will be more thinly dispersed over a wider area, whilst a smaller sediment dispersion distance gives a high deposition depth over a smaller distance (Ref 6). Sediment dispersion modelling was carried out for the Proposed Offshore Scheme by Port and Coastal Solutions and can be seen in **Appendix 18.1 Sediment Modelling Report** of the PEIR. For pre-sweeping using a TSHD, results show that increases in SSC of more than 5mg/l are constrained within 15km and are short lived	IN	IN	OUT	15km from Draft Order Limits

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					(generally occurring for less than 2.4 hours). Sedimentation is predicted to be less than 1mm except for a localised area along the dredge track (constrained to within the proposed offshore HVDC Submarine Cable Corridor) and around placement locations, where sedimentation exceeds 10mm. Sedimentation of more than 0.1mm is constrained to within 15km. As such, a maximum zone of influence for this potential impact is set at 15km. Increased sedimentation following installation, maintenance and decommissioning activities may impact benthic communities which are often sessile and unable to avoid the effects of increased sediment load. As such, these impacts have been screened in for benthic species and habitats. Due to the predicted low magnitude of this impact, there is not considered to be a source-receptor pathway for geomorphological receptors, hence this receptor has been screened 'out'.				
Permanent habitat loss Physical change (to another seabed or sediment type	Deposit of external cable protection	✓	✓	x	This impact relates to the permanent change of one marine habitat type to another marine habitat type, through the change in substratum, including to artificial material (e.g., concrete). This involves the permanent loss of one marine habitat type and the creation of another.	IN	IN	IN	Within the Draft Order Limits

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					Associated activities include the installation of infrastructure (e.g., surface laid cables) and the placement of cable and scour protection where soft sediment habitats are replaced by hard/coarse substrates. The materials used for external protection of cables such as concrete mattresses, rock placement, grout or rock bags, fronded concrete mattresses, etc. will result in a change of habitat type within the footprint of this activity. The change of the seabed to another substrate will result in a permanent loss of habitat in locations where external cable protection is required – at cable crossings, in areas of insufficient burial or cable exposure. The placement of external protection may result in the mortality of benthic and epibenthic fauna and algae where directly disturbed. Due to the permanent nature of this impact, it has the potential to impact geomorphological features. Therefore, this impact has been screened in for all receptors.				
Temperature changes – local	Operational cables		✓		During the operation of an HVDC cable heat losses occur because of the resistance in the cable/conductor. This can cause localised heating of the surrounding environment (i.e., sediment for buried cables, or water in the	OUT	IN	OUT	Within the Draft Order Limits

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					interstitial spaces of external cable protection). There are no specific regulatory limits applied to temperature changes in the seabed, although a 2°C change between seabed surface and 0.2m depth is used as a guideline in Germany (Ref 6). **Appendix 2.4 Thermal Emissions Technical Note** of this PEIR reviewed several interconnector projects to analyse thermal emissions. It concludes that any temperature changes would be localised to the immediate environment surrounding the cable (1-2m) and undetectable against natural temperature fluctuations in the surrounding sediments and water column. Though no significant effects are predicted, it is acknowledged that subtidal benthos are less tolerant of temperature change than intertidal species as subtidal habitats are less exposed to temperature fluctuations (Ref 11). Lab experiments have shown that some benthic species display the tendency to avoid areas of increased sediment temperature, while some do not (Ref 12). Furthermore, sandeel a group of benthic fish, burrow in sandy substrates overnight and throughout the winter period (Ref 13). The sensitivity of sandeel to temperature increase is currently uncertain though a cautionary approach should be taken				

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					when assessing potential impacts on these species due to their importance as a component of the marine ecosystem. Therefore, this impact has been screened 'in' for benthic species. However, this impact has been screened 'out' of the assessment for habitats and geomorphological features due to a lack of a source-receptor pathway.				
Underwater noise changes	All Proposed Offshore Scheme vessel manoeuvres and equipment. Geophysical surveys	✓	✓	✓	During the Proposed Offshore Scheme, underwater noise would be generated through geophysical surveys and by vessels and equipment. The effect of anthropogenic sound on benthic invertebrates is poorly understood however, a study carried out in Germany identified that an isopod species (*Gammarus locusta*) has lower consumption rates in response to short term and long term added low frequency sound (Ref 14). Therefore, increased underwater noise may impact the growth and reproduction of invertebrates. As a result, benthic species have been screened in for this impact pathway. However, this impact has been screened 'out' of the assessment for habitats and geomorphological features due to a lack of a source-receptor pathway.	OUT	IN	OUT	5km from Draft Order Limits
EMF	Operational cables		✓		The burial and bundling of cables help to reduce the strength of EMF when compared to surface	OUT	IN	OUT	Within Draft

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					laid cables. **Appendix 2.3 Electromagnetic Field Assessment** of the PEIR calculates that the EMF from the operating cables combined with the earths geomagnetic field (around 49.9μT in the UK) will reach 99.3μT on the seabed. The EMF fields will decrease with vertical distance from the cable, attenuating to background levels at around 10m from the cables. The effects of EMF on invertebrates have not yet been well studied however, it is thought that some species of molluscs are also able to detect electric and magnetic fields. As benthic invertebrates are typically slow moving or sessile organisms that live on or within the seabed, they are exposed to the highest levels of EMF. As a result, benthic species have been screened in for this impact pathway. However, this impact has been screened 'out' of the assessment for habitats and geomorphological features due to a lack of a source-receptor pathway.				Order Limits
Introduction or spread of marine invasive non-native species (MINNS)	Deposit of external cable protection	✓	✓	✓	This impact refers to the direct or indirect introduction of non-native species, e.g., Chinese mitten crabs (*Eriocheir sinensis*), slipper limpets (*Crepidula fornicata*), Pacific oyster (*Crassostrea gigas*), and their subsequent spreading and out-	OUT	OUT	OUT	N/A

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
	Presence of Project vessels				competing of native species. Ballast water discharge, hull fouling and stepping stone effects from offshore structures may facilitate the spread of such species. The introduction of marine invasive non-native species (MINNS) (e.g., through discharge of ballast water from Project vessels) will be managed under the International Convention for the Control and Management of Ship's Ballast Water and Sediments. Vessel contractors will complete a biosecurity risk assessment prior to mobilisation. Best biosecurity practice for marine commercial operations will be followed by all vessels associated with the Project to minimise the risk of MINNS spread. All materials used for cable protection will be sufficiently sterilised prior to use and seabed deposits will be inert with no biologically active material. All materials used for remedial works will be procured from reputable sources. Nonetheless, there is potential for any external cable protection placed at cable crossings or during maintenance in areas of soft substrate to act as a stepping stone for MINNS that favour hard substrates. The placement of hard materials (such as rock protection) could introduce a new niche that increases connectivity with other natural or artificial hard habitats within the				

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					dispersal range of benthic species. MINNS may compete with native benthos for resources including food and space. However, taking into account the implementation of the control measures required to ensure legal compliance, significant effects are not anticipated. Therefore, this impact has been screened 'out' for benthic species and habitats and is not applicable for geomorphological features.				
Water flow (tidal current) changes, including sediment transport considerations	Deposit of external cable protection		✓		Structures placed in the marine environment immediately interact with the local current regime. The use of external cable protection which is elevated above the seabed can potentially result in localised changes in water flow resulting in turbulence (especially at peak flow) and the possible formation of scour pits around the structure. Though the impact of this is expected to be highly localised and negligible in magnitude there is a possibility that scour will result in localised degradation of soft sediment habitats and the associated benthic communities. As such, this impact has been screened 'in' for benthic species and habitats.	IN	IN	OUT	Within the Draft Order Limits
Accidental Spills Hydrocarbon & PAH contamination	Presence of Project vessels	✓	✓	✓	During construction, accidental spillage may occur directly into the water column. Materials spilled may disperse as a plume on the water surface, within the water column or fall directly	OUT	OUT	OUT	N/A

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					to the seabed. The primary chemicals of environmental concern in vessel oil and fuel are polycyclic aromatic hydrocarbons (PAHs). Deliberate discharges of oil or oil/water mixtures from ships are prohibited within the North West European Waters Special Area, established by the International Maritime Organization under MARPOL Annex I in 1999. This includes all waters around the UK and its approaches. However, accidental discharges still occur. Project vessels will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 which relate to pollution from oil from equipment, fuel tanks etc and release of sewage (black and grey waters). Compliance with International and National Regulations will be sufficient to minimise the risk to the environment and therefore this impact has been screened out of the assessment.				
In-combination effects	All activities	✓	✓	✓	In-combination effects are likely to result where localised disturbance from more than one activity either occurs simultaneously resulting in a wider zone of influence or consecutively within a restricted area resulting in an extension of the impact pathway. There is the possibility that the proposed Project could overlap temporally and	IN	IN	IN	15km from Draft Order Limits

Potential Impact	Relevant Activities	Phase			Pathway Description	Initial Screening by Receptor			Maximum Zone of Influence
		C	O&M	D		Habitats	Benthic species	Geomorphological features	
					spatially with other projects in the region or will occur within short succession of another project.				

4.2.3 Given the zone of influence for each impact and rationale provided in **Table 4-1,** search areas have been determined for MCZs and associated Protected Features. These are outlined in **Table 4-2**.

Table 4.2: Search area for impacts associated with the Project organised by receptor

Key: C = Construction, O&M = operation and maintenance, D = Decommissioning

Phase C	Phase O&M	Phase D	Potential Impact	Project activity	Zone of Influence	Search area and Justification
Habitats and Benthic Species						
✓	✓	✓	Temporary habitat loss / seabed disturbance	• HDD • Anchoring • Pre-sweeping • PLGR • Boulder clearance • Cable lay and burial • Cable repair • Cable removal • Temporary seabed deposits	Within Draft Order Limits, up to 1km for anchor placement.	**15km** The search area has conservatively been set at 15 km based sediment modelling results.
✓	✓	✓	Temporary increase and deposition of suspended sediments		Increases in SSC of more than 5mg/l are constrained within 15km and sedimentation of more than 0.1mm is constrained to within 15km.	
	✓		Water flow (tidal current) changes, including sediment transport considerations	• External cable protection	Within Draft Order Limits	
✓	✓		Permanent habitat loss		Within Draft Order Limits	
✓	✓	✓	Underwater noise	• All Proposed Offshore Scheme vessel manoeuvres and equipment. • Geophysical surveys	5km from Draft Order Limits	

Phase C	Phase O&M	Phase D	Potential Impact	Project activity	Zone of Influence	Search area and Justification
	✓		EMF	• Operational cables	Within Draft Order Limits	
Benthic species						
	✓		Temperature changes – local	• Operational cables	Within Draft Order Limits	
Geomorphological Features						
✓	✓	✓	Temporary habitat loss / seabed disturbance	• HDD • Anchoring • Pre-sweeping • PLGR • Boulder clearance • Cable lay and burial. • Cable repair • Cable removal • Temporary seabed deposits	Maximum 1km either side of the Project footprint (anchoring).	**1km** The search area has been conservatively set at 1km

5 Conclusions

5.1.1 GIS was used to identify MCZs / HPMAs within the search area for each impact. No MCZs or HPMAs were identified within the relevant search areas. The two closest MCZs to the Project Draft Order Limits were Orford Inshore MCZ and Cromer Shoal Chalk Beds MCZs, located 25km and 61km away respectively. These MCZs are only designated for Broadscale Habitats (BSH), see **Table 3.1**, and as such only impacts that could affect BSHs were considered.

5.1.2 Additionally, the MCZ Screening report was issued with the Scoping Report for Opinion. In regard to Indirect impacts to the Orford Inshore MCZ, the Planning Inspectorate noted that *'indirect impacts to the MCZ can be scoped out of the assessment based on its distance from the study area boundary'.* Given that Cromer Shoal Chalk Beds MCZ is located an additional 36km away from the Proposed Offshore Scheme Draft Order Limits, the Applicant concluded that indirect impacts to the Cromer Shoal Chalk Beds MCZ could also be scoped out.

5.1.3 Due to a lack of MCZs within the relevant search areas, there is no source-receptor pathway for any of the impacts identified. Therefore, Screening concluded that Stage 1 Assessment is not required.

Glossary

Acronym/ Phrase/ Abbreviation	Definition
BSH	Broadscale Habitat
DCO	Development Consent Order
DMR	Dedicated Metallic Return
dML	Deemed Marine Licence
EEZ	Exclusive Economic Zone
GB	Great Britain
GW	Gigawatt
HDD	Horizontal Directional Drilling
HPMA	Highly Protected Marine Area
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
JNCC	Joint Nature Conservation Committee
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCAA	Marine and Coastal Access Act 2009
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MINNS	Marine Invasive Non-Native Species
MMO	Marine Management Organisation
MPA	Marine Protected Area
NGV	National Grid Ventures
NL	Netherlands
OSPAR	Oslo and Paris Convention
OTNR	Offshore Transmission Network Review
PA2008	Planning Act 2008
PAH	Polycyclic Aromatic Hydrocarbons
PEIR	Preliminary Environmental Information Report
PLGR	Pre-lay Grapnel Run
SNCB	Statutory Nature Conservation Body
SoS	Secretary of State

Acronym/ Phrase/ Abbreviation	Definition
UK	United Kingdom

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