MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

HRA Stage 1 Screening Report

September 2024
Rev: F01

MOR001-FLO-CON-ENV-RPT-0125
MRCNS-J3303-RPS-10056

PINS Reference: EN020028
APFP Regulations: 5(2)(a)

Document reference: E3

Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
F01	For issue	AS	September 2024	IM	September 2024

Prepared by:

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Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Candidate Special Areas of Conservation	Areas that were submitted to the European Commission as candidates for designation as a Special Area of Conservation before the end of the Transition Period following the UK's exit from the European Union, but not yet formally designated. See also Special Areas of Conservation.
Cumulative Effects	The combined effect of the Transmission Assets in-combination with the effects from other proposed developments, on the same receptor or resource.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
EIA Scoping Report	A report setting out the proposed scope of the Environmental Impact Assessment process. The Transmission Assets Scoping Report was submitted to the Planning Inspectorate (on behalf of the Secretary of State) for the Morgan and Morecambe Offshore Windfarms Transmission Assets in October 2022.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
European sites	Designated nature conservation sites which include the National Site Network (designated within the UK) and Natura 2000 sites (designated in any European Union country). This includes Sites of Community Importance, Special Areas of Conservation and Special Protection Areas.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to, and information to support, the EIA and Habitats Regulations Assessment processes for certain topics.
Expert Working Group	A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan process.
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).
Intertidal Infrastructure Area	The temporary and permanent areas between MLWS and MHWS.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).

Term	Meaning
Marine licence	The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities. Section 149A of the Planning Act 2008 allows an applicant for to apply for 'deemed marine licences' in English waters as part of the development consent process.
Marine elements of the Transmission Assets	Works being undertaken from Mean Low Water Springs and below.
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Mitigation measures	This term is used interchangeably with Commitments. The purpose of such measures is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects.
Morecambe Offshore Windfarm: Generation Assets	The offshore generation assets and associated activities for the Morecambe Offshore Windfarm.
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
Morecambe OWL	Morecambe Offshore Windfarm Ltd is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) and Flotation Energy Ltd.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the National Grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy Investments Ltd. and Energie Baden-Württemberg AG (EnBW).
Offshore export cables	The cables which would bring electricity from the offshore substation platform to the landfall.
Offshore Permanent Infrastructure Area	The area within the Transmission Assets Offshore Order Limits (up to MLWS) where the permanent offshore electrical infrastructure (i.e. offshore export cables) will be located.
Offshore Order Limits	See Transmission Assets Order Limits: Offshore (below).
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Order limits	The limits within which the Transmission Assets may be carried out.
Potential Special Protection Areas	A site identified as potentially qualifying for Special Protection Area classification and for which a decision to classify has yet to be taken pending consultation.

Term	Meaning
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Ramsar sites	Wetlands of international importance that have been designated under the criteria of the Ramsar Convention. In-combination with Special Protection Areas and Special Areas of Conservation, these sites contribute to the national site network.
Scoping Opinion	Sets out the Planning Inspectorate's response (on behalf of the Secretary of State) to the Scoping Report prepared by the Applicants. The Scoping Opinion contains the range of issues that the Planning Inspectorate, in consultation with statutory stakeholders, has identified should be considered within the Environmental Impact Assessment process.
Special Areas of Conservation	A site designation specified in The Conservation of Habitats and Species Regulations 2017. Each site is designated for one or more of the habitats and species listed in the Regulations. The legislation requires a management plan to be prepared and implemented for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated. In-combination with Special Protection Areas and Ramsar sites, these sites contribute to the national site network.
Special Protection Areas	A site designation specified in The Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.
Transmission Assets Order Limits: Offshore	The area within which all components of the Transmission Assets seaward of Mean Low Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning. Also referred to in this report as the Offshore Order Limits, for ease of reading.
Transmission Assets Order Limits: Onshore	The area within which all components of the Transmission Assets landward of Mean High Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds). Also referred to in this report as the Onshore Order Limits, for ease of reading.

Acronyms

Acronym	Meaning
AL	Action Level
BDMPS	Biologically defined minimum population size
Cefas	Centre for Environment, Fisheries and Aquaculture Science
cSAC	Candidate Special Area of Conservation
CEA	Cumulative Effects Assessment
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EnBW	Energie Baden-Württemberg AG
ES	Environmental Statement
EU	European Union
EWG	Expert Working Group
FCS	Favourable Conservation Status
HRA	Habitats Regulations Assessment
HNDR	Holistic Network Design Review
IAQM	Institute of Air Quality Management
IMWWG	Inter-agency Marine Mammal Working Group
INNS	Invasive Non-Native Species
ISAA	Information to Support Appropriate Assessment
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
MDS	Maximum Design Scenario
MMO	Marine Management Organisation
MU	Management Unit
NGESO	National Grid Electricity System Operator
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
OSPAR	Oslo and Paris Conventions
OTNR	Offshore Transmission Network Review
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls

Acronym	Meaning
PEIR	Preliminary Environmental Information Report
pSAC	Possible Special Area of Conservation
pSPA	Potential Special Protection Area
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SCI	Site of Community Importance
SCOS	Special Committee on Seal
SMU	Seal Management Unit
SNCBs	Statutory Nature Conservation Bodies
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSSI	Sites of Special Scientific Interest
TCE	The Crown Estate
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
ZOI	Zone of Influence

Units

Unit	Description
km	kilometres
km^2	Square kilometres
mm	Millimetres
MW	Megawatt
mg/l	Milligrams per litre
nm	Nautical mile

1 HRA stage 1 screening report

1.1 Introduction

1.1.1 Overview

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

1.1.1.2 Morecambe Offshore Windfarm Ltd (Morecambe OWL), a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd, is developing the Morecambe Offshore Windfarm, also located in the east Irish Sea.

1.1.1.3 Both the Morgan Offshore Wind Project and Morecambe Offshore Windfarm will have a capacity of over 100 megawatts (MW) and are located wholly in English waters. They are therefore Nationally Significant Infrastructure Projects (NSIPs) under the Planning Act 2008, as amended (referred to here as 'the Planning Act 2008').

1.1.1.4 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm have been awarded licences during The Crown Estate's Offshore Wind Leasing Round 4 process. Each project is being proposed by separate joint venture partners and is electrically separate from the other in line with the maximum design scenarios identified for the construction scenarios.

1.1.1.5 Both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm were scoped into the 'Pathways to 2030' workstream under the Offshore Transmission Network Review (OTNR). The OTNR aims to consider, simplify, and wherever possible facilitate a collaborative approach to offshore wind projects connecting to the National Grid.

1.1.1.6 Under the OTNR, the National Grid Electricity System Operator (NGESO) is responsible for assessing options to improve the coordination of offshore wind generation connections and transmission networks and has undertaken a Holistic Network Design Review (HNDR). In July 2022, the United Kingdom (UK) Government published the 'Pathway to 2030 Holistic Network Design' documents, which set out the approach to connecting 50 GW of offshore wind to the National Grid (NGESO, 2022). A key output of the HNDR process was the conclusion the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively in connecting their two wind farms to the National Grid electricity transmission network at Penwortham in Lancashire.

1.1.1.7 The Applicants, being in agreement with the output from the HNDR, are jointly seeking a single consent for their electrically separate transmission assets comprising aligned offshore export cable corridors to landfall and aligned onshore export cable corridors to separate onshore substations, and onward connection to the National Grid at Penwortham, Lancashire.

1.1.1.8 The design philosophy is for the transmission infrastructure for each wind farm to remain electrically independent (i.e., each wind farm to have its own sets of cabling and substation infrastructure). However, the location of the infrastructure has been aligned within offshore and onshore cable corridors (where practicable) to minimise impacts to the environment and the community.

1.1.1.9 The Morecambe Offshore Windfarm: Generation Assets and the Morgan Offshore Wind Project: Generation Assets (Generation Assets) fall within the definition of an NSIP (see **paragraph 1.1.1.3**). They both therefore require applications for development consent to be made to the Planning Inspectorate: one for the Morecambe Offshore Windfarm: Generation Assets and the other for the Morgan Offshore Wind Project: Generation Assets.

1.1.1.10 Following a request from the Applicants, on 4 October 2022 the Secretary of State issued a direction under section 35 of the Planning Act 2008 that the Transmission Assets should be treated as a 'development for which development consent is required'.

1.1.1.11 Applications for development consent under the Planning Act 2008 are submitted to and examined by the Planning Inspectorate and determined by the relevant Secretary of State. At the time of writing, this is the Secretary of State for Energy Security and Net Zero.

1.1.1.12 The Environmental Statement (ES) accompanies an application for a single Development Consent Order (DCO) that authorises two co-ordinated but electrically separate sets of transmission works.

1.1.1.13 In addition to the draft development consent applications, marine licences (i.e., two for the Morgan Offshore Wind Project: Transmission Assets and two for the Morecambe Offshore Windfarm: Transmission Assets) are required before carrying out any licensable marine activity under the Marine and Coastal Access Act 2009. Marine licences can be deemed under the DCO for licensable activities in English waters.

1.1.1.14 This report is the Habitats Regulations Assessment (HRA) Stage 1 Screening for Likely Significant Effects (LSE) and has been prepared to accompany the ES for the Transmission Assets.

1.1.2 Habitats Regulations Assessment

1.1.2.1 This document comprises Stage 1 of the HRA process for the Transmission Assets. It provides information to enable the screening of the Transmission Assets with respect to its potential to have LSE on designated nature conservation sites (hereafter 'European sites'). The scope of this document covers all relevant European sites (which include Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs), Sites of Community Importance (SCI), Special Protection Areas (SPAs) and as a matter of policy, possible SACs (pSACs), potential SPAs (pSPAs) and Ramsar sites and relevant qualifying interest features. European sites are proposed to be screened out where no LSE from the Transmission Assets is predicted alone or in-combination. Where LSE cannot be ruled out at this stage, the European sites are screened in and assessed further.

1.1.2.2 The requirement and process for the consideration of potential impacts of plans and projects on European sites have followed the European Union's (EU) Habitats Directive (Directive 92/43/EEC). In terrestrial areas of the UK and territorial waters out to 12 nm, the land and marine aspects of Habitats Directive and certain elements of the Wild Birds Directive (Directive 2009/147/EC) are transposed into UK law through The Conservation of Habitats and Species Regulations 2017 (as amended). In waters beyond 12 nm, The Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Offshore Habitats Regulations) apply, which transpose the Habitats and Birds Directives into national law. These regulations are together referred to as the Habitats Regulations.

1.1.2.3 The Habitats Regulations require that an HRA must be carried out on all plans and projects that are likely to have significant effects on European sites, which include SACs, cSACs, SCI, SPAs and as a matter of policy, pSACs, pSPAs and Ramsar sites (listed under the Ramsar Convention on Wetlands of International Importance – where also designated as a European site).

1.1.2.4 In this report, and in accordance with guidance issued by the UK Government on the changes made by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, the term 'European site' has been retained to refer to the above sites protected in European Member States, England and Wales (Department for Environment, Food and Rural Affairs (Defra), 2021). However, where these sites are located in the UK, they no longer form part of the EUs Natura 2000 ecological network and now form part of the National Site Network. However, this has not resulted in any changes as to how these sites are assessed as part of the HRA process. The National Site Network covers both the inshore and offshore marine areas in the UK and includes existing SACs and SPAs as well as new SACs and SPAs designated under the 2019 Regulations. European sites are defined in full in **section 1.4**.

1.1.2.5 The Defra (2021) guidance identifies that the HRA process can have up to three stages as outlined below.

1. Screening - to check if the proposal is likely to have a significant effect on the site's conservation objectives.
2. Appropriate Assessment - to assess the potential likely significant effects of the proposal on the integrity of the site and its conservation objectives and to consider ways to avoid or minimise any effects.
3. Derogation - to consider whether proposals that would have an adverse effect on the integrity of a European site qualify for an exemption, subject to three legal tests being satisfied (i.e. alternative solutions, imperative reasons of overriding public interest and compensatory measures).

1.1.3 Purpose of the report

1.1.3.1 This document represents the Applicants' HRA Stage 1 Screening Report under the Habitats Regulations for the Transmission Assets (as described in **section 1.1.5**). It comprises the screening stage and therefore provides

information to enable the screening of the Transmission Assets with respect to its potential to have an LSE on European sites.

1.1.3.2 The screening exercise presented in this report is based on the understanding of the baseline environment and proposed activities associated with the Transmission Assets following analysis of site-specific environmental surveys, assessment work, consultee responses and Expert Working Group (EWGs), (see **Table 1.1**) undertaken for the Transmission Assets.

1.1.3.3 In summary, the purpose of this report is as follows.

- To identify the relevant European sites which may include features (Annex I habitats, Annex I birds and Annex II species) which may be sensitive or vulnerable to potential impacts arising from the construction, operation and maintenance, and decommissioning phases of the Transmission Assets.
- To consider the features of the relevant European sites and to identify those which are not considered likely to be at risk of significant effects arising from the Transmission Assets, either alone or in-combination with other plans or projects, so that they can be eliminated from further consideration within the process.
- To consider the features of the relevant European sites and to identify those which are considered likely to be at risk of significant effects arising from the Transmission Assets, either alone or in-combination with other plans or projects, so that they can be taken forward for appropriate assessment.
- To consider which of the potential impacts arising from the Transmission Assets are considered likely to result in LSEs to features of European sites and which impacts can be eliminated from consideration in further stages of the HRA.

1.1.4 Structure of the report

1.1.4.1 The structure of this HRA Stage 1 Screening Report is as follows.

- **Section 1.1** - a brief introduction to the Transmission Assets Project, purpose of the document and summary of consultation undertaken.
- **Section 1.2** - a summary of the key changes to the HRA Stage 1 Screening Report since Preliminary Environmental Information Report (PEIR).
- **Section 1.3** - a brief summary of the HRA process and legislative framework including implications of the UK's departure from the EU.
- **Section 1.4** - the initial identification of European sites and features which have the potential to be affected by the Transmission Assets.
- **Section 1.5** - HRA screening tables and the determination of the potential for LSEs to arise with regard to European sites and Ramsar sites with relevant Annex I habitat features, Annex II fish, Annex II marine

mammal, offshore ornithology and onshore and intertidal ornithology features under consideration.

- **Section 1.6** - a summary of the approach to the in-combination assessment.
- **Section 1.7** - a summary of the European sites and features for which the screening process has identified potential for LSEs.

1.1.4.2 For the purposes of this HRA Stage 1 Screening Report, ornithological features have been split into offshore ornithology and onshore and intertidal ornithology based on the location of the impact. The offshore ornithology section identifies ornithological features which have the potential to interact with marine elements of the Transmission Assets (i.e. works seaward of Mean Low Water Springs). The onshore and intertidal ornithology section identifies ornithological features which have the potential to interact with onshore/intertidal elements of the Transmission Assets (i.e. works landward of Mean Low Water Springs (MLWS)).

1.1.4.3 This means that in some cases a feature may be assessed in both offshore ornithology and onshore and intertidal ornithology sections in relation to different impacts. For example, terns are classified as seabirds but they nest terrestrially and therefore onshore works may disturb nesting terns in the vicinity of the works. Nesting tern would be assessed in the onshore and intertidal ornithology section, whilst disturbance to foraging tern, which forage over open waters, would be assessed in the offshore ornithology section.

1.1.5 Project overview

1.1.5.1 An overview of the Transmission Assets is outlined in the paragraphs below, and the full project description is provided in Volume 1, Chapter 3: Project description of the ES (document reference F1.3).

1.1.5.2 The Transmission Assets will be located within the Transmission Assets Order Limits as shown on **Figure 1.1**. It is noted that the Transmission Assets Order Limits includes the Generation Assets boundaries, in order to include the locations within which part of the offshore export cables will be located.

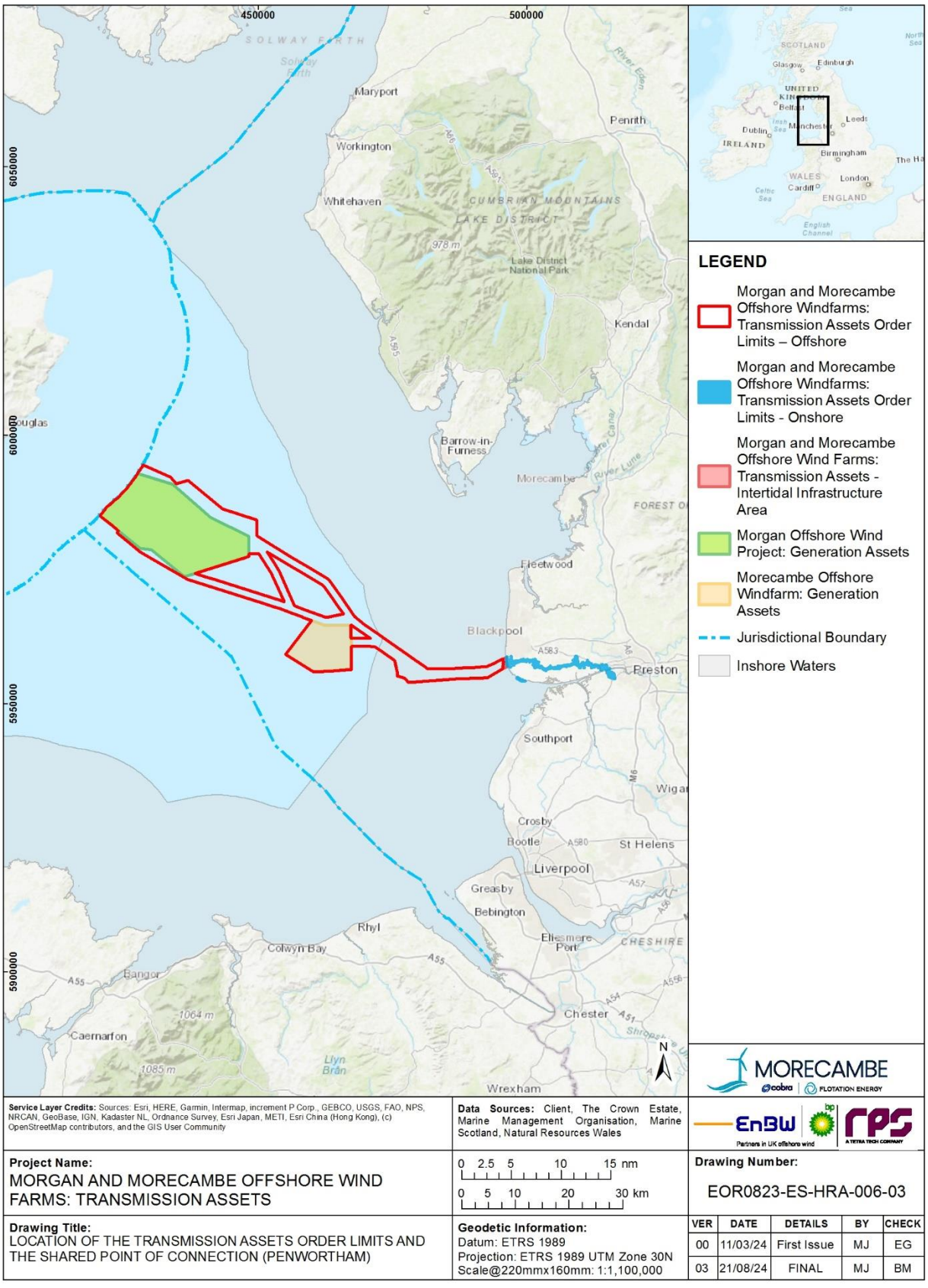

Figure 1.1: Location of the Transmission Assets Order Limits and the Point of Connection (Penwortham) (not to scale)

1.1.5.3 The offshore elements of the Transmission Assets are located in the east Irish Sea within English offshore waters (beyond 12 nm from the English coast) and inshore waters (within 12 nm from the English coast). The onshore elements of the Transmission Assets are located within the local authority areas of Fylde Council, Blackpool Council, South Ribble Borough Council, Preston City Council and Lancashire County Council.

1.1.5.4 The order limits can be further divided and referred to based on where they are located as follows (see **Figure 1.1**):

- Offshore Order Limits: The area seaward of MLWS within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.
- Intertidal Infrastructure Area: the temporary and permanent areas between MLWS and Mean High Water Springs (MHWS). This includes temporary working areas, and temporary and permanent accesses.
- Onshore Order Limits: The area landward of MHWS within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).

1.1.5.5 The onshore, intertidal and offshore infrastructure has been identified for both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. A description of all infrastructure is provided in Volume 1, Chapter 3: Project description of the ES (document reference: F1.3). The locations of the infrastructure are presented in Location Plans (document reference B1-B3) and Works Plans (document reference: B7-B10). All of the infrastructure are located within the Transmission Assets Order Limits shown in **Figure 1.1.**

1.1.6 Relevant consultations

1.1.6.1 A summary of the key comments raised during consultation activities undertaken to date specific to the HRA Stage 1 Screening Report are presented in **Table 1.1**. It should however be noted that formal responses are provided for all consultation responses received and can be accessed in the Consultation report (document reference E1).

1.1.6.2 The Scoping Opinion from the Planning Inspectorate was received on 8 December 2022 for the Transmission Assets (document reference J25). These scoping responses have been considered in the topic-specific ES chapters and have in turn been accounted for in the HRA Stage 1 Screening Report. **Table 1.1** presents relevant Scoping Opinion responses which have been identified as being directly applicable to the HRA Stage 1 Screening Report.

1.1.6.3 In addition, section 42 and 47 responses on the PEIR were received on the 23 November 2023. Responses relevant to the HRA Stage 1 Screening Report are included below in **Table 1.1.**

1.1.6.4 EWG meetings for the relevant receptors considered within the HRA Stage 1 Screening Report are also included in **Table 1.1**.

Table 1.1: Summary of key consultation on the HRA Stage 1 Screening Report for the Transmission Assets raised during consultation activities

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
Scoping Opinion				
8 December 2022	Natural England	Scoping Opinion	Applicants to use the most up to date information on the foraging distances of grey and harbour seals as presented in Carter *et al.* (2022) in order to establish connectivity with the SACs for these species.	Carter *et al.* (2022) foraging distances were used to inform the initial screening of sites designated for Annex II marine mammal features in **section 1.5.4.**
8 December 2022	Natural Resource Wales (NRW)	Scoping Opinion	NRW advise that diadromous fish migration routes are also included even if located outside relevant SAC.	Migration routes for diadromous fish (Annex II fish features) are considered in **section 1.4.3.**
			NRW advise to use the large Oslo and Paris Conventions (OSPAR) Region III area (west coast of UK and Ireland) as an interim Management Unit (MU) for seals which adequately captures the connectivity between seal colonies and the range of grey/harbour seal movement.	OSPAR Region III was considered (alongside the Carter *et al.* (2022) foraging distances) to inform the initial screening of sites designated for Annex II marine mammal features in **section 1.4.4.**
			Cross-border designations are taken into consideration in relation to the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA).	Where relevant, (e.g. for identification of SACs/SPAs with Annex I fish in **section 1.4.3**, Annex II marine mammal features in **section 1.4.4 and offshore ornithology in section 1.4.7**) cross-border designations, such as SACs/SPAs in Welsh waters and French SCIs (for Annex II marine mammals only) have been considered.

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
8 December 2022	South Ribble Borough Council	Scoping Opinion	HRA will be required for potential impacts of the development on European designated sites, including the Ribble and Alt Estuaries SPA and Ramsar site. An important element of the HRA should be consideration of functionally linked land.	Potential impacts on designated sites (including the Ribble and Alt Estuaries SPA and Ramsar site) are included in **section 1.5.** Consideration has also given to the functionally linked land where birds are likely to use land within their foraging ranges (e.g., Criterion 2, see **Table 1.2**).
8 December 2022	The Planning Inspectorate	Scoping Opinion	Advice has been provided on impacts to be scoped in and out from the ES.	This advice has been considered in the relevant chapters of the ES, and this HRA Stage 1 Screening Report has been aligned with the following. • Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2). • Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference F2.3). • Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4). • Volume 2, Chapter 5: Offshore ornithology of the ES (document reference F2.5). As such, please refer to the reports listed above for more details.
			For benthic receptors, consideration of European sites should also include SPAs, which have benthic habitats that are supporting habitats for designated features of SPAs.	Given that supporting habitats for designated features of the SPAs encompass various environments other than benthic (e.g. water column), impacts on all supporting habitats of the potentially affected SPAs have been assessed

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
				alongside the ornithology receptors in **section 1.4.7** and **1.4.8.**
Section 42 responses				
Annex I habitats, Annex II fish and Annex II marine mammals				
23 November 2023	Department of Agriculture, Environment and Rural Affairs	Statutory consultation	Due to the location of the wind farm, we would like to highlight that the North Channel SAC, designated for harbour porpoise, should be considered within the HRA carried out for this proposal. This is due to the screening range used for Harbour porpoise – all SACs within 100 km of the project should be screened in, and the North Channel SAC lies approximately 60 km from the proposal's location.	The North Channel SAC is considered and fully assessed for the potential for a LSE in this HRA Stage 1 Screening Report, see **section 1.4.4 and 1.5.4** and within the HRA Stage 2 ISAA Part 2 (document reference E2.2).
23 November 2023	Natural England	Statutory consultation	Natural England broadly agrees that the relevant sites have been screened in, correct features and pathways identified within the HRA Screening Report.	Noted, no action required.
			Both species of shad are screened out of the HRA Screening Report despite their presence in the region. Include shad within all assessments of impacts on diadromous fish, particularly underwater sound, or provide a justification for excluding them. The species is regionally present (Joint Nature Conservation Committee (JNCC), 2024).	The nearest SAC for shad species is the Pembrokeshire Marine/ Sir Benfro Forol SAC (designated for both Allis shad *Alosa alosa* and Twaite shad *Alosa fallax*) which is located approximately 239 km from the Offshore Order Limits, this is beyond the Zone of Influence (ZOI) used to identify SACs with Annex II diadromous fish features and is therefore not considered within this report (see **section 1.4.3)**.
			Agreement that all relevant marine mammal SACs in English waters have been screened in.	Noted, no action required. Although see discussions in Marine Mammals EWG03 in this table, below.

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
			The maximum foraging ranges for grey seals and harbour seals from Carter *et al*., 2022 should be used as a screening range instead of the average foraging distances of 100 km and 40-50 km respectively. Use Carter *et al.*, 2022 maximum foraging distances for screening in the submitted report.	Reference to the 100 km and 40 – 50 km foraging ranges for grey seal and harbour seal respectively have been removed. Relevant Seal Management Units (SMU) and Carter *et al.*, 2022 foraging ranges have been used to inform the screening of European sites designated for Annex II marine mammals undertaken in **section 1.4.4**.
			Agreement that appropriate potential impact pathways are identified for marine mammal sites.	Noted, no action required.
			Natural England agree with the conclusions in the LSE matrices. Natural England also note that the screening assessment concluded that a risk of LSE on the Shell Flat and Lune Deep SAC could not be ruled out due to impacts to the Annex I habitat: sandbanks which are slightly covered by sea water all the time. Natural England have concerns about the volume of sand wave clearance required and the subsequent effects on Shell Flat and Lune Deep SAC. Please refer to upfront comments in Table 1 for further advice on mitigating sandwave clearance. The submitted ES should carefully assess the impacts of sandwave clearance on the SAC and identify any mitigation measures needed to rule out adverse effects.	Noted, no action required regarding the conclusions in the LSE matrices. The Maximum Design Scenario (MDS) for sandwave clearance has been refined post-PEIR. These refinements have significantly reduced the requirements for sandwave clearance from 60% to 9% for the Morgan export cables and from 30% to 9% for the Morecambe export cables The Shell Flat and Lune Deep SAC has been screened into the Information to Support Appropriate Assessment (ISAA) Part 2 (document reference E2.2). The impacts associated with sandwave clearance on the Shell Flat and Lune Deep SAC and any necessary mitigation measures will be assessed and considered as part of the ISAA Part 2

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
				(document reference E2.2), accounting for project refinements post-PEIR.
23 November 2023	North West Wildlife Trust	Statutory consultation	There is no mention in the HRA Screening Report of fishing or fisheries as activities that have the potential for cumulative impacts on the marine environment and ecology in-combination with the scheme. We consider that fishing should be included in both cumulative and in-combination assessments. Fishing is a licensable activity that has the potential to have an adverse impact on the marine environment.	It is not feasible to consider each fishing vessel as a separate project within the Cumulative Effects Assessment (CEA). It is well understood that the area has been subject to extensive fishing activity long-term, therefore it would be remiss to not consider this part of the baseline scenario. The assessment has been undertaken proportionately, taking into consideration the regional characteristics prior to any project construction, based upon the current baseline environment which encompasses a relatively high degree of commercial fishing activity.
23 November 2023	NRW	Statutory consultation	NRW does not agree with the use of Special Committee on Seal (SCOS) (2018) for screening. We advise the use of Carter *et al.,* (2022).	Reference to the 100 km and 40 – 50 km foraging ranges for grey seal and harbour seal respectively have been removed. Relevant SMUs and Carter *et al.* 2022 foraging ranges have been used to inform the screening of European sites designated for Annex II marine mammals undertaken in **section 1.4.4**.
Onshore Ornithology				
23 November 2023	Natural England	Statutory consultation	A key part of the HRA assessment is correctly identifying SPA/Ramsar site features as breeding, non-breeding, and assemblage features. With SPA/ Ramsar sites, correctly identify features as breeding, non-breeding and	Features of SPAs and Ramsar sites have been checked and listed as breeding, non-breeding or assemblage features, where relevant, in **Table 1.8** and **Table 1.9**.

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
			assemblage features throughout the submitted ES.	
			Natural England broadly agreed with the sites which were screened in at PEIR.	The sites included within this document (**section 1.4.8**) replicate what was presented at PEIR and agreed with Natural England as part of Section 42 consultation.
Expert Working Groups (EWG)				
Marine mammals				
April 2023	Marine Management Organisation (MMO), Centre for Environment, Fisheries and Aquaculture Science (Cefas), Environment Agency, The Wildlife Trusts and Natural England	EWG 1	RPS provided an update on the LSE Screening for the Transmission Assets following the approach taken and agreed with the Morgan Generation Assets and Mona Offshore Wind Project EWG. Feedback on the approach previously outlined was that RPS should look at the seal screening distances, considering Carter foraging ranges and some of the telemetry data (which we have looked at in the Baseline). Based on these screening ranges, for grey seals the following SACs are now included Isles of Scilly SAC, Lambay Island SAC, Saltee Islands SAC and The Maidens SAC and for harbour seal – although very low numbers expected in the area and it's at the limit of foraging ranges from Strangford Lough, this SAC has been considered on a precautionary basis.	Natural England have provided a formal response and confirmed that they broadly agree with the suggested approach to the marine mammal assessment. The formal response was received in a letter to the RPS Project Team and is included within the Consultation Report submitted alongside the Application (document reference: E1). The HRA Stage 1 Screening Report identified 33 SACs with Annex II marine mammal features which may have potential connectivity to the Transmission Assets, these are listed in **Table 1.5.** The approach to the HRA Screening has been carried out in section **1.4.4** and **1.5.4** of this report.
February 2024	MMO, Cefas, Environment Agency, The Wildlife Trusts,	EWG 3	This EWG presented the updated approach to HRA Screening for Annex II marine mammals to the relevant stakeholders following post-PEIR	Natural England have provided a formal response via email on 22 March 2024 and confirmed that they agree with the

Date	Consultee	Type of Consultation	Summary of Consultation	Response to comment raised and/or where considered in this report
	Inshore Fisheries and Conservation Authority and Natural England		refinement of the Project Design Envelope (PDE) to include removal of piling and reduced numbers of vessels associated with all phases. This resulted in only "injury and disturbance from underwater sound generation from UXO detonation" being screened into the ISAA Part 2 (document reference E2.2), see **Table 1.17.**	suggested approach to LSE screening and the sites screened in for Annex II harbour porpoise and grey seal features (see SACs listed in **Table 1.17)**. The agreed approach to the HRA Screening has been carried out in section 1.4.4 and 1.5.4 of this report.
Offshore Ornithology				
February 2024	MMO and Natural England	EWG 3	The impact 'lighting and potential collision risk' was considered in PEIR; however, following the removal of all surface infrastructure from the PDE this impact is now not considered in the HRA Stage 1 Screening submitted with the final application.	Following the removal of all surface infrastructure from the PDE **section 1.5.5,** has been updated to screen out this impact.

1.2 Key changes to the HRA Stage 1 Screening Report since PEIR

1.2.1.1 The draft HRA Stage 1 Screening Report that accompanied the PEIR has been updated following stakeholder feedback and additional data analysis for the Application. The main changes, which are reflected in the HRA Stage 1 Screening Report submitted with the application, are detailed below.

- Removal of Offshore Substation Platforms (OSPs) from the Project Design Envelope (PDE), resulting in piling being screened out of the HRA Stage 2 ISAA Part 2 (document reference E2.2) for Annex II fish and marine mammal features.
- 'Effects on marine mammals due to changes in prey availability' has also now been screened out of the HRA Stage 2 ISAA Part 2 (document reference E2.2) for all Annex II marine mammal features, as any potential underwater sound impacts resulting from construction on marine mammal prey resources will be localised and largely restricted to the boundaries of the Transmission Assets; only a small area will be affected when compared to available foraging habitat in the Irish and Celtic Seas (see **Table 1.17** for further information).
- The impact 'disturbance to marine mammals from pre-construction surveys' has also been screened out of the HRA Stage 2 ISAA Part 2 (document reference E2.2) for all Annex II marine mammal features as surveys will not be undertaken nearby or within any of the SACs identified and potential disturbance impact zones will not overlap with the SAC (see **Table 1.17** for further information).
- Reduction in the number of vessels associated with all phases of the Transmission Assets, therefore the impact 'disturbance to marine mammals from vessel use and other sound-producing activities' is now screened out of the HRA Stage 2 ISAA Part 2 (document reference E2.2) for all Annex II marine mammal features (see HRA Stage 1 Screening Report (see **Table 1.17** for further information).
- Inclusion of physical processes assessment in the HRA Stage 1 Screening Report, which resulted in 'changes in physical processes' on Annex I habitats features being screened out of the HRA Stage 2 ISAA Part 2 (document reference E2.2) (see **Table 1.11** for further information).

1.3 The Habitats Regulations Assessment process

1.3.1 Legislative context

1.3.1.1 Information on the legislative context of the Habitats Regulations Assessment is outlined in **paragraph 1.1.2.2**.

1.3.1.2 The UK is no longer an EU Member State. Notwithstanding, the Habitats Directive as implemented by the Habitats Regulations continues to provide the legislative framework for HRA in the UK (see also Volume 1, Chapter 2: Policy and legislative context of the ES; document reference F1.2). The HRA

process implemented under the Habitats Regulations continues to apply (subject to minor changes affected by the EU Exit Regulations) and the UK is bound by HRA judgments handed down by The Court of Justice of the European Union prior to 31 December 2020[1]. The objective of the Habitats Regulations is to conserve, at a Favourable Conservation Status (FCS), those habitats and species listed in Annexes I and II of the Habitats Directive and Annex I of the Wild Birds Directive. Post EU Exit, the Habitats Regulations continue to refer to Annexes I and II of the Habitats Directive and Annex I of the Birds Directive and as such, reference is made to the annexes of the Habitats and Birds Directives in this report.

1.3.2 European sites post EU exit

1.3.2.1 The Europe-wide network of nature conservation areas that are the subject of the HRA process was established under the Habitats Directive. The Habitats Directive establishes a network of internationally important sites, designated for their ecological status. European sites located within an EU Member State combine to create a Europe-wide network of designated sites known the Natura 2000 network. In the UK, since exiting the EU, these are now referred to as European sites and together with other designated sites, these form part of the National Site Network.

1.3.3 The process

1.3.3.1 HRA is generally recognised as a progressive, staged process built around the wording of Article 6(3) of the Habitats Directive, with the outcome at each stage defining the requirement for and scope of the next. Compliance with the requirements of the Directive can be demonstrated if the stages are followed in the correct and particular sequence. These stages are summarised in **Figure 1.2**.

[1] The UK Supreme Court may depart from binding pre-EU Exit case law if they consider it 'right to do so' and the Inner House of the Court of Session may depart from such case law in certain circumstances

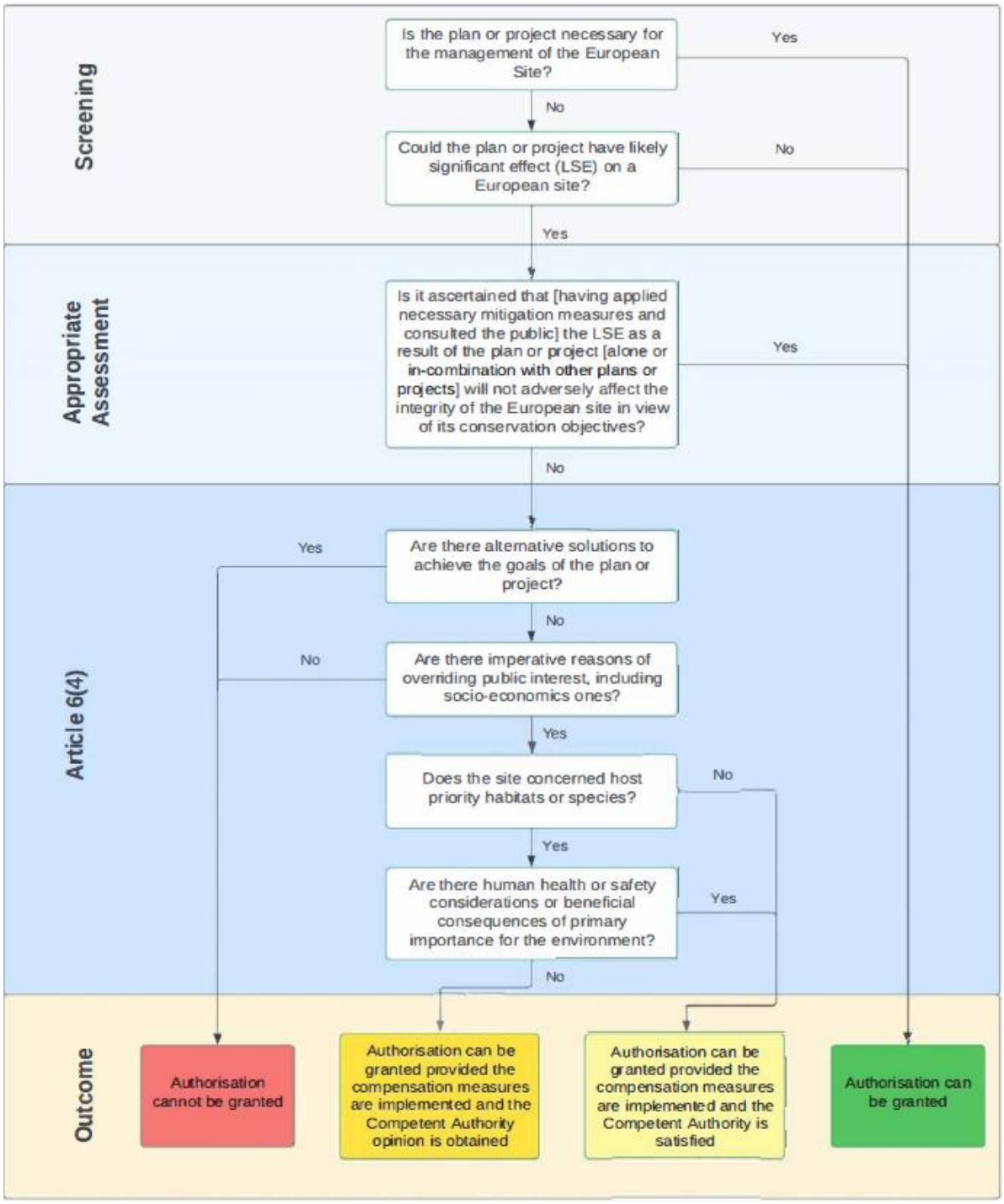

Figure 1.2: Stages in the Habitats Regulations Appraisal Process (adopted from European Commission, 2021)

1.3.3.2 Article 6(3) of the Habitats Directive requires that:

'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon either individually or in-combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after

having ascertained that it will not adversely affect the integrity of the site concerned and if appropriate, after having obtained the opinion of the general public'.

1.3.3.3 This report considers the first 'screening for LSE' step in the HRA process which encompasses the 'screening' stage shown in **Figure 1.2**.

1.3.3.4 The Habitats Regulations make it clear that the person applying for the consent of the plan or project must provide such information as the Competent Authority may reasonably require for the purposes of the assessment. It is intended that this report and the subsequent HRA reporting including the HRA Stage 2 ISAA (document references: E2.1, E2.2 and E2.3) provide this information. For clarity and ease of navigation, the HRA Stage 2 ISAA is structured in three 'Parts', as follows.

- Part 1 – Introduction and Background (document reference: E2.1).
- Part 2 – Special Area of Conservation (SAC) Assessments (document reference: E2.2).
- Part 3 – Consideration of Special Protection Area (SPA) and Ramsar Sites Assessments (document reference: E2.3).

1.3.3.5 To determine whether an appropriate assessment is required it must first be ascertained whether or not the plan/project is directly connected with or necessary to the management of the European site. As the Transmission Assets is not directly connected with or necessary to the management of the European site, it must therefore be determined whether the plan or project, either alone or in-combination with other plans and projects, is likely to have a significant effect on a European site(s). This process constitutes the HRA Stage 1 Screening stage. This removes from the assessment protected features of European sites which have no connectivity to the Transmission Assets or those where the impacts are immaterial or inconsequential and the conservation objectives for the site's qualifying interests would not be undermined (i.e. they are not significant). All other European sites, including those where there is reasonable doubt as to the magnitude and nature of the relevant impact(s), are passed through to the next stage (appropriate assessment).

1.3.3.6 The Habitats Regulations establish management objectives for the national site network. These are called the network objectives. The objectives in relation to the National Site Network are to:

- maintain or restore certain habitats and species listed in the Habitats Directive to FCS; and
- contribute to ensuring the survival and reproduction of certain species of wild bird in their area of distribution and to maintaining their populations at levels which correspond to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements.

1.3.4 The Crown Estate Plan Level HRA

1.3.4.1 The Crown Estate (TCE), in its role as Competent Authority, conducted a Round 4 Plan Level HRA (TCE, 2022). The Plan Level HRA assessed the potential impacts of the six potential offshore wind projects identified through the Round 4 tender process (the 'Round 4 plan'), including both the Generation Assets (and associated infrastructure of Transmission Assets), on the National Site Network.

1.3.4.2 The Plan Level HRA process involved engagement and consultation with the EWGs consisting of relevant UK statutory marine planning authorities, Statutory Nature Conservation Bodies (SNCBs) and relevant non-governmental organisations.

1.3.4.3 TCE's Plan Level HRA concluded that the possibility of an adverse effect on site integrity as a result of the Round 4 Plan could not be ruled out for two protected sites forming part of the National Site Network. The two protected sites, and relevant features, are:

1. sandbank features of the Dogger Bank SAC alone and in-combination; and
2. kittiwake feature of the Flamborough and Filey Coast SPA in-combination only.

1.3.4.4 It should be noted, however, that the Generation Assets (and associated Transmission Assets) were not required to be considered in the appropriate assessment for either of these sites, due to the sites' location on the East coast of England. Therefore, no adverse effect on site integrity was identified for the Transmission Assets in the Plan Level HRA.

1.3.4.5 On the basis of these conclusions, TCE considered derogation and concluded that:

- there are no alternative solutions to deliver the Round 4 objectives;
- there are clear imperative reasons of overriding public interest to proceed under the government's targets for offshore wind and net zero; and
- the Round 4 plan provides a robust framework for the delivery of compensatory measures. TCE therefore considered that the three derogation tests have been met and the Secretary of State has since agreed that TCE can proceed with the plan, and Welsh Ministers have not raised any objection to the notice.

1.3.4.6 The Plan Level HRA notes that TCE expects developers to undertake project-specific environmental assessments, including a detailed project-level HRA, as part of their application for development consent. This document comprises Stage 1 of the HRA, which carries out the screening of the Transmission Assets with respect to its potential to have an LSE on European sites. This HRA Stage 1 Screening Report has taken into account the information and approach taken by the Plan Level HRA as set out below.

1.3.4.7 TCE also established a Steering Group including government and SNCBs to oversee the development and delivery of strategic environmental compensation plans for each of the two affected sites. As projects progress

before and during the planning process, developers will be required to work with the Steering Group - which will consult with the Round 4 HRA Expert Working Group - to develop detailed individual site compensation plans, noting that this will not be required for the Transmission Assets.

1.3.5 Process for identifying sites and features

1.3.5.1 To facilitate the identification of the European sites and features to be considered in the HRA Stage 1 Screening Report for the Transmission Assets, pre-screening of sites has been undertaken to identify European sites and Ramsar sites with potential for connectivity with the Transmission Assets. This is considered to be appropriate due to the spatial scale of the Transmission Assets, the wide-ranging nature of many of the features of European sites which may be affected (i.e. birds and marine mammals) and therefore the number of European sites which could potentially be affected.

1.3.5.2 The criteria adopted for the initial identification of European sites are outlined in **Table 1.2**. This approach takes account of the location of the European sites (including Ramsar sites) in relation to the Transmission Assets, the anticipated ZOI of potential impacts associated with the Transmission Assets, and the ecology and distribution of qualifying interest features.

1.3.5.3 **Table 1.2** outlines the order of consideration given to the criteria used for the identification of the list of sites to be taken forward for determination of LSE. Initial consideration (criterion 1) is given to whether there is a spatial overlap between the Transmission Assets Order Limits and any European sites; all sites with an overlapping boundary are screened in to be taken forward for determination of LSE.

1.3.5.4 Pre-screening criterion 2 next identifies any European sites, not already screened in using criterion 1, where there is an overlap between the Transmission Assets Order Limits and the range of any qualifying mobile species of the site. All sites where the Transmission Assets Order Limits overlaps with the range of one (or more) of its features, are taken forward for determination of LSE.

1.3.5.5 Criterion 3 identifies any European sites, not already screened in by criterion 1 or 2, where the potential ZOI buffer around the Transmission Assets Order Limits overlaps with a European site and/or mobile qualifying interests of the site, which due to their foraging ranges may travel into the ZOI. For onshore/intertidal ornithology receptors, consideration is also given to a range of factors that inform the likely extent to which the different qualifying features will occur within the Transmission Assets Order Limits (e.g. scarcity of records of the relevant species during the baseline surveys).

Table 1.2: Criteria for initial identification of relevant European sites

Order of consideration	Criteria used for initial Identification of relevant European sites
1	The Transmission Assets Order Limits overlaps with one or more European or Ramsar sites.
2	European or Ramsar sites with qualifying mobile features/species (e.g. Annex I birds, Annex II marine mammals, migratory fish, otter) whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Transmission Assets Order Limits.
3	European or Ramsar sites located within the potential ZOI of impacts associated with the Transmission Assets, and/or qualifying interest features of European sites or Ramsar sites, whose foraging ranges overlap with the predicted ZOI of impacts associated with the Transmission Assets (e.g. habitat disturbance, sound and disturbance/displacement).

1.3.5.6 The outcome of this initial screening is that sites with no potential for LSEs due to a lack of potential overlap of receptor-impact pathway are excluded from further consideration in this report. Sites not excluded on the basis of any of the criteria outlined in **Table 1.2** (i.e. where there is a potential for a receptor-impact pathway to occur) have been taken forward for determination of LSE in **section 1.5**.

1.3.6 Legislation and guidance

1.3.6.1 The HRA Stage 1 Screening Report has drawn upon a number of information sources, HRA principles, regulations and guidance documents, including the following.

- The Conservation of Habitats and Species Regulations 2017 (as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Offshore Habitats Regulations) (as amended).
- EC (2006) Nature and Biodiversity Cases Ruling of the European Court of Justice.
- EC (2012) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification on the Concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission.
- EC (2019) Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC'.
- EC (2020) Guidance document on wind energy developments and EU nature legislation. European Commission Notice Brussels (2020) 7730 final.
- EC (2021) Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats

Directive 92/43/EEC. European Commission Notice Brussels C(2021) 6913 final.

- Joint Defra, Welsh Government, Natural England and NRW guidance (2021) 'Habitats regulations assessments: protecting a European site'.
- The Planning Inspectorate Advice Note Ten: Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects (the Planning Inspectorate, 2022).
- The Planning Inspectorate Advice Note Seventeen: Cumulative effects assessment relevant to Nationally Significant Infrastructure Projects (the Planning Inspectorate, 2019).
- The Habitats Regulations Assessment Handbook (DTA Publications Limited, 2013).
- TCE Plan Level HRA (TCE, 2022).
- A guide to the assessment of air quality impacts on designated nature conservation sites (Institute of Air Quality Management (IAQM), 2020)).
- Design Manual for Roads and Bridges (National Highways, 2019).

1.4 Identification of European sites and features

1.4.1 Approach

1.4.1.1 This section provides a list of European sites (including Ramsar sites), and their features, for which there is the potential for connectivity with the Transmission Assets, using the criteria outlined in **Table 1.2**, and therefore those which should be taken forward for consideration of LSE in **section 1.5**.

1.4.1.2 Each of the following receptor groups are considered in turn.

- Annex I habitats (offshore and coastal) (see **section 1.4.2**).
- Annex II diadromous fish species (see **section 1.4.3**).
- Annex II marine mammals (see **section 1.4.4**).
- Annex I habitats (onshore) (see **section 1.4.5**).
- Annex II species (onshore) (see **section 1.4.6**).
- Offshore ornithological features (see **section 1.4.7**).
- Onshore and intertidal ornithological features (see **section 1.4.8**).

1.4.2 Sites designated for Annex I habitats (offshore and coastal)

Overview

1.4.2.1 The following section details the results of the stepwise process to identify the European sites with relevant Annex I habitats (offshore and coastal) to be taken forward for detailed determination of LSE.

1.4.2.2 The criteria-based approach adopted has focussed on the Annex I benthic habitat qualifying interest features for which there is a potential for impact as

a result of the Transmission Assets based on the methodology and criteria outlined in **section 1.3.5** and **Table 1.2**. In the Scoping Opinion, stakeholders requested that for benthic ecology consideration should also include SPAs, which have supporting benthic habitats for designated features (see **Table 1.1**). Given that '*supporting habitats*' for designated features of the SPAs encompass various environments (e.g. water column), impacts on all supporting habitats for designated features of the potentially affected SPAs (including benthic habitats) will be assessed alongside the ornithology receptors in **section 1.4.7** and **1.4.8**.

1.4.2.3 Whilst pathways to individual features may be identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

Initial identification for Annex I habitats (offshore and coastal)

Criterion 1

1.4.2.4 Criterion 1 for the identification of European or Ramsar sites to be taken forward for consideration of LSE considers those sites which overlap with the offshore and coastal boundaries of the Offshore Order Limits (**Table 1.3**). As there are no European sites with relevant qualifying Annex I (offshore and coastal) benthic habitats, up to MHWS, which overlap with the Offshore Order Limits, no sites are screened in for further consideration for benthic habitats on the basis of this criterion.

Criterion 2

1.4.2.5 Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Offshore Order Limits. There are no European sites which meet this criterion for Annex I (offshore and coastal) benthic habitats and so no sites are screened in for further consideration on this basis.

Criterion 3

1.4.2.6 Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Offshore Order Limits. There is the potential for indirect effects to benthic habitats, as a result of impacts associated with increased Suspended Sediment Concentration (SSC) arising from construction activities or from changes to the hydrodynamic regime as a result of the presence of offshore infrastructure associated with the Transmission Assets.

1.4.2.7 The extent of these impacts is considered likely to extend beyond the Offshore Order Limits. The ZOI for such indirect effects associated with the offshore elements of the Transmission Assets is typically defined from the outputs of physical processes modelling to determine, for example, the fate of sediments resuspended during the construction process. A buffer of one mean spring tidal excursion has been used to inform this area, which applies a reasonable and suitable level of precaution.

1.4.2.8 One mean spring tidal excursion in the vicinity of the Offshore Order Limits is up to approximately 8 km (ABPmer, 2008). For the purposes of HRA Stage 1 Screening Report, a precautionary approach has been adopted and this buffer has been increased to 15 km. This buffer is considered to be sufficiently precautionary to capture all sites likely to be in the ZOI from indirect effects associated with construction activities.

1.4.2.9 On the basis of this criterion, one European site, the Shell Flat and Lune Deep SAC has been identified (**Figure 1.3**) and screened in for consideration of LSE in **section 1.5**. However, only the Annex I sandbank feature (Shell Flat of the Shell Flat and Lune Deep SAC) has been screened in for further consideration. The Annex I reef feature (Lune Deep of the Shell Flat and Lune Deep SAC) is located 16 km from the Offshore Order Limits and is therefore not considered further in this HRA Stage 1 Screening Report.

Summary of initial screening of sites for Annex I habitats (offshore and coastal)

1.4.2.10 The initial screening process identified one European site, the Shell Flat and Lune Deep SAC (see **Table 1.3** and **Figure 1.3**), to be taken forward for determination of LSE in **section 1.5.2** of this report. The relevant Annex I habitat features identified in the initial screening are outlined in **Table 1.3**. The only Annex I habitat feature of this SAC identified through the initial screening of sites and taken forward to the determination of LSE is the sandbanks which are slightly covered by sea water all the time.

1.4.2.11 Whilst only these qualifying interest features have been screened in for further consideration, it is acknowledged that the Competent Authority must undertake the HRA Stage 1 Screening, and any subsequent appropriate assessment, at the site level and not for individual qualifying interest features. However, the Shell Flat and Lune Deep SAC does not have any other qualifying features other than Annex I habitats which were taken forward to the consideration of LSE (**Table 1.3**).

Table 1.3: European sites designated for Annex I habitats (subtidal and coastal) taken forward for determination of LSE

European site	Relevant Annex I habitat features identified through initial screening of sites taken forward to the determination of LSE on Annex I Habitats	Distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex I Habitats
Shell Flat and Lune Deep SAC	Sandbanks which are slightly covered by sea water all the time	5.7	Reefs (>15 km from Offshore Order Limits)

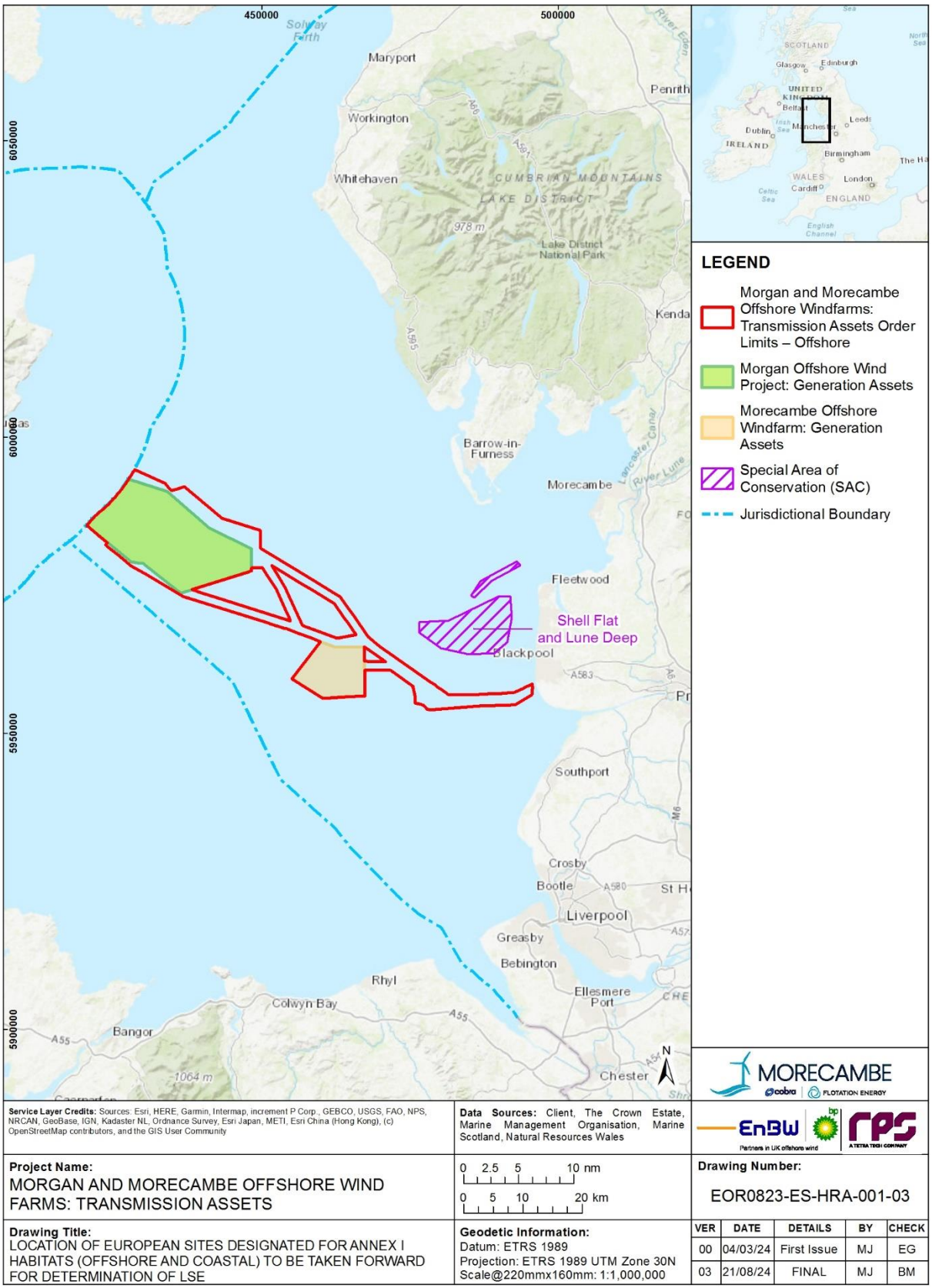

Figure 1.3: Location of European sites designated for Annex I Habitats (offshore and coastal) to be taken forward for determination of LSE (not to scale)

1.4.3 Sites designated for Annex II diadromous fish

Overview

1.4.3.1 The following sections detail the results of the stepwise process to identify the European sites (including Ramsar sites) with relevant Annex II diadromous fish species to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in **section 1.3.5** and **Table 1.2**.

1.4.3.2 The approach adopted for this HRA Stage 1 Screening Report focuses on the Annex II diadromous fish qualifying interest features for which there is considered to be a potential for impact as a result of the Transmission Assets. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

Initial identification for Annex II fish

Criterion 1

1.4.3.3 Criterion 1 considers European or Ramsar sites which overlap with the Offshore Order Limits. As there are no European sites with Annex II diadromous fish species as qualifying features which overlap with the Offshore Order Limits, no sites are screened in for further consideration for diadromous fish on the basis of this criterion.

Criterion 2

1.4.3.4 Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Offshore Order Limits.

1.4.3.5 There is the potential for activities associated with the construction, operation and maintenance and decommissioning phases of the Transmission Assets to result in impacts on Annex II diadromous fish species at a distance from the European sites for which they are qualifying interest features on the basis that these species are mobile and utilise both freshwater and marine environments throughout their life cycles.

1.4.3.6 A precautionary approach to the identification of relevant sites has been adopted in order to capture all sites with the potential for connectivity with the Transmission Assets, and in particular to consider the potential for disruption to migration (e.g. barriers to migration) of diadromous fish (including but not limited to Atlantic salmon *Salmo salar*) to/from natal rivers (river of origin). For the purposes of HRA Stage 1 Screening Report, a precautionary approach has been adopted using a preliminary buffer of 100 km (in line with The Crown Estate, 2021) from the Transmission Assets for all Annex II diadromous fish species except Atlantic salmon and freshwater pearl mussel *Margaritifera margaritifera* where the 'west' regional area has been considered (see **Figure 1.4**). These screening buffers take into account the likely migratory routes and distances for anadromous fish (e.g. Atlantic

salmon) as outlined in ABPmer (2014) (see **Figure 1.4**), and follow the methodology outlined in the Plan Level HRA (The Crown Estate, 2021) and following feedback from stakeholders.

1.4.3.7 Given the location of the Transmission Assets within the east Irish Sea it is unlikely that any SACs located along the west Irish Sea coast (or further north or south) would be affected by any of the predicted impacts. For example, SACs located on the east coast of Ireland (e.g. River Slaney SAC and River Boyne and River Blackwater SAC), will be unaffected by the Transmission Assets due to its location within the east Irish Sea not presenting a barrier to migration. Similarly, only SACs located along the east Irish Sea coast have been included where the Transmission Assets has the potential to create a barrier to migration for designated Annex II fish features (**Figure 1.5**).

1.4.3.8 The nearest SAC for shad species is the Pembrokeshire Marine/Sir Benfro Forol SAC (designated for both Allis shad *Alosa alosa* and Twaite shad *Alosa fallax*) which is located approximately 239 km from the Offshore Order Limits, this is beyond the ZOI (see **paragraph 1.4.3.6**) used to identify SACs with Annex II diadromous fish features and is therefore not considered within this report.

1.4.3.9 On this basis, a total of nine European sites have been screened in (see **Figure 1.5**) using this criterion and are taken forward for determination of LSE in **section 1.5.3**. These are:

- Dee Estuary/Aber Dyfrdwy SAC;
- River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC;
- River Kent SAC;
- River Ehen SAC;
- River Derwent and Bassenthwaite Lake SAC;
- Afon Gwyrfai a Llyn Cwellyn SAC
- Solway Firth SAC;
- River Bladnoch SAC; and
- River Eden SAC.

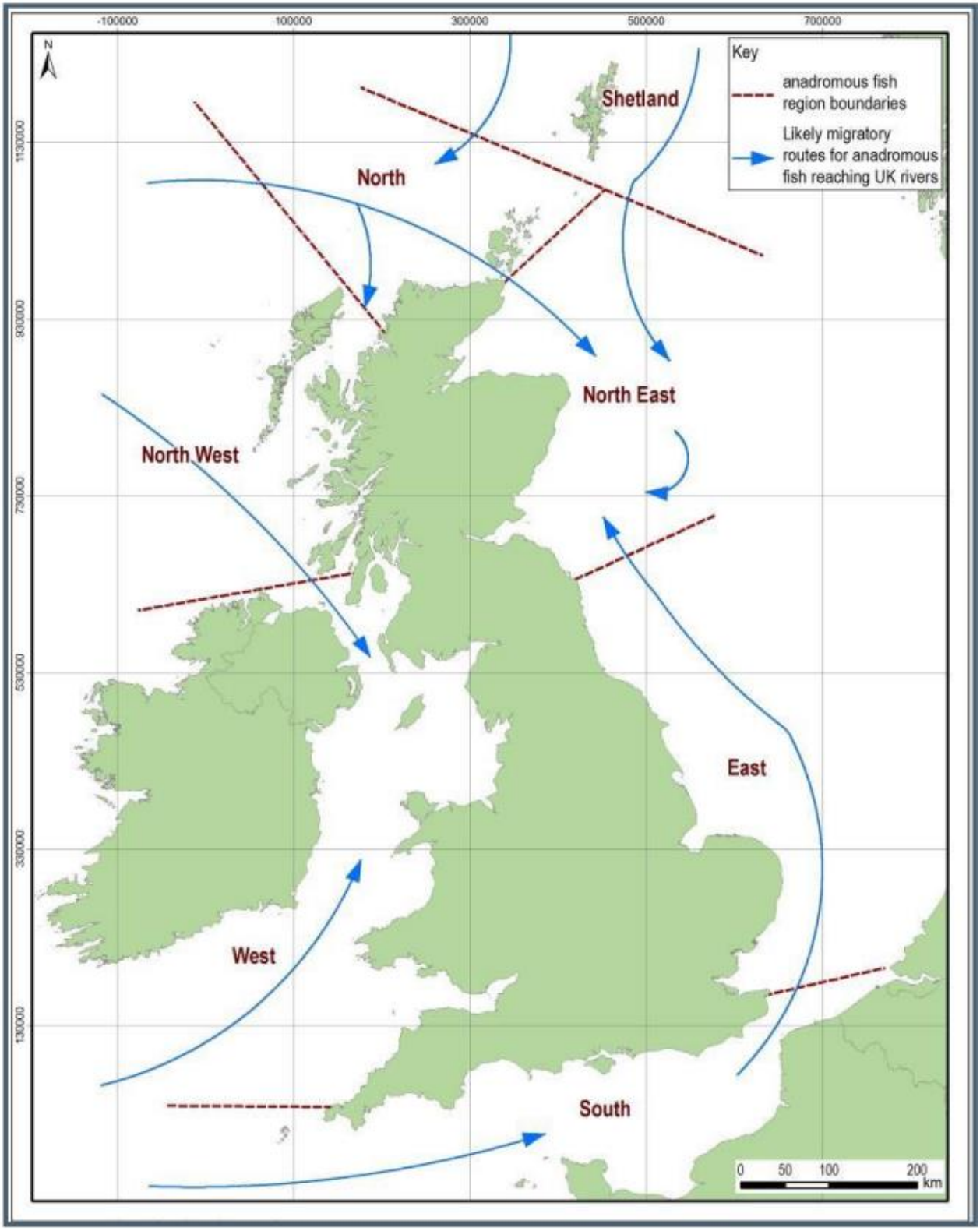

Figure 1.4: Likely migration routes for anadromous fish reaching UK rivers (ABPmer, 2014)

Criterion 3

1.4.3.10 Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Transmission Assets (e.g. habitat loss/disturbance, sound and risk of collision). Given the large buffer proposed for criterion 2 above (100 km), the ZOI for key impacts to migratory fish species (i.e. underwater sound, habitat loss and increased SSC) are anticipated to be well within this range. No additional European sites with Annex II diadromous fish as qualifying features, beyond those already identified for criterion 2, are therefore screened in for further consideration on the basis of criterion 3.

Summary of initial screening of sites for Annex II diadromous fish

1.4.3.11 The initial screening process has identified nine European sites with Annex II diadromous fish species as qualifying features to be taken forward for detailed determination of LSE in **section 1.5.3** of this report. The sites are listed in **Table 1.4** and illustrated in **Figure 1.5**.

1.4.3.12 Whilst only these qualifying interest features will be screened in for further consideration, it is acknowledged that the Competent Authority must undertake the HRA Stage 1 Screening, and any subsequent appropriate assessment, at the site level and not for individual qualifying interest features. Therefore, qualifying features that were considered but not taken forward to the consideration of LSE are also listed in **Table 1.4**.

Table 1.4: European sites designated for Annex II diadromous fish species taken forward for determination of LSE

European site	Relevant Annex II diadromous fish features	Approximate distance to Offshore Order Limits	Other qualifying features not taken forward to the determination of LSE on Annex II diadromous fish
Dee Estuary/Aber Dyfrdwy SAC	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*	32.8	Estuaries Mudflats and sandflats not covered by seawater at low tide *Salicornia* and other annuals colonising mud and sand Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Annual vegetation of drift lines Vegetated sea cliffs of the Atlantic and Baltic Coasts Embryonic shifting dunes Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') Fixed coastal dunes with herbaceous vegetation ('grey dunes') Humid dune slacks Petalwort *Petalophyllum ralfsi*i
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC	Sea lamprey *Petromyzon marinus* Atlantic salmon *Salmo salar* River lamprey *Lampetra fluviatilis*	59.1	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Floating water-plantain *Luronium natans* Brook lamprey *Lampetra planeri* [1] Bullhead *Cottus gobio* [1] Otter *Lutra lutra*
River Ehen SAC	Atlantic salmon *Salmo salar* Freshwater pearl mussel *Margaritifera margaritifera* [2]	62.5	N/A

European site	Relevant Annex II diadromous fish features	Approximate distance to Offshore Order Limits	Other qualifying features not taken forward to the determination of LSE on Annex II diadromous fish
River Kent SAC	Freshwater pearl mussel *Margaritifera margaritifera* [2]	65.2	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* Bullhead *Cottus gobio* [1]
River Derwent and Bassenthwaite Lake SAC	Sea lamprey *Petromyzon marinus* Atlantic salmon *Salmo salar* River lamprey *Lampetra fluviatilis*	72.3	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the Isoëto-Nanojuncetea Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia* Brook lamprey *Lampetra planeri*[4] Otter *Lutra lutra* Floating water-plantain *Luronium natans*
Afon Gwyrfai a Llyn Cwellyn SAC	Atlantic salmon *Salmo salar*	87.3	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the Isoëto-Nanojuncetea Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Floating water-plantain *Luronium natans* Otter *Lutra lutra*

European site	Relevant Annex II diadromous fish features	Approximate distance to Offshore Order Limits	Other qualifying features not taken forward to the determination of LSE on Annex II diadromous fish
Solway Firth SAC	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*	85.7	Sandbanks which are slightly covered by sea water all the time Estuaries Mudflats and sandflats not covered by seawater at low tide *Salicornia* and other annuals colonising mud and sand Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Reefs Perennial vegetation of stony banks 'Fixed coastal dunes with herbaceous vegetation (''grey dunes'')'
River Bladnoch SAC	Atlantic salmon *Salmo salar*	89.5	N/A
River Eden SAC	Sea lamprey *Petromyzon marinus* Atlantic salmon *Salmo salar* River lamprey *Lampetra fluviatilis*	127.7	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the Isoëto-Nanojuncetea Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* Brook lamprey *Lampetra planeri* [1] Bullhead *Cottus gobio* [1] Otter *Lutra lutra*

Note: Where applicable, distances are measured as the marine route to the site.

[1] Site is also designated for brook lamprey *Lampetra planeri* and bullhead *Cottus gobio*, but as these are not diadromous fish species (i.e. confined to the freshwater section of the river and do not migrate to the marine environment) there is no potential for connectivity with the Transmission Assets and the features are screened out.

[2] Although the freshwater pearl mussel is not a diadromous fish, Atlantic salmon are host species during a critical parasitic phase of the mussel's lifecycle. There could therefore be an indirect impact upon the freshwater pearl mussel feature of the site if the salmon population is adversely affected.

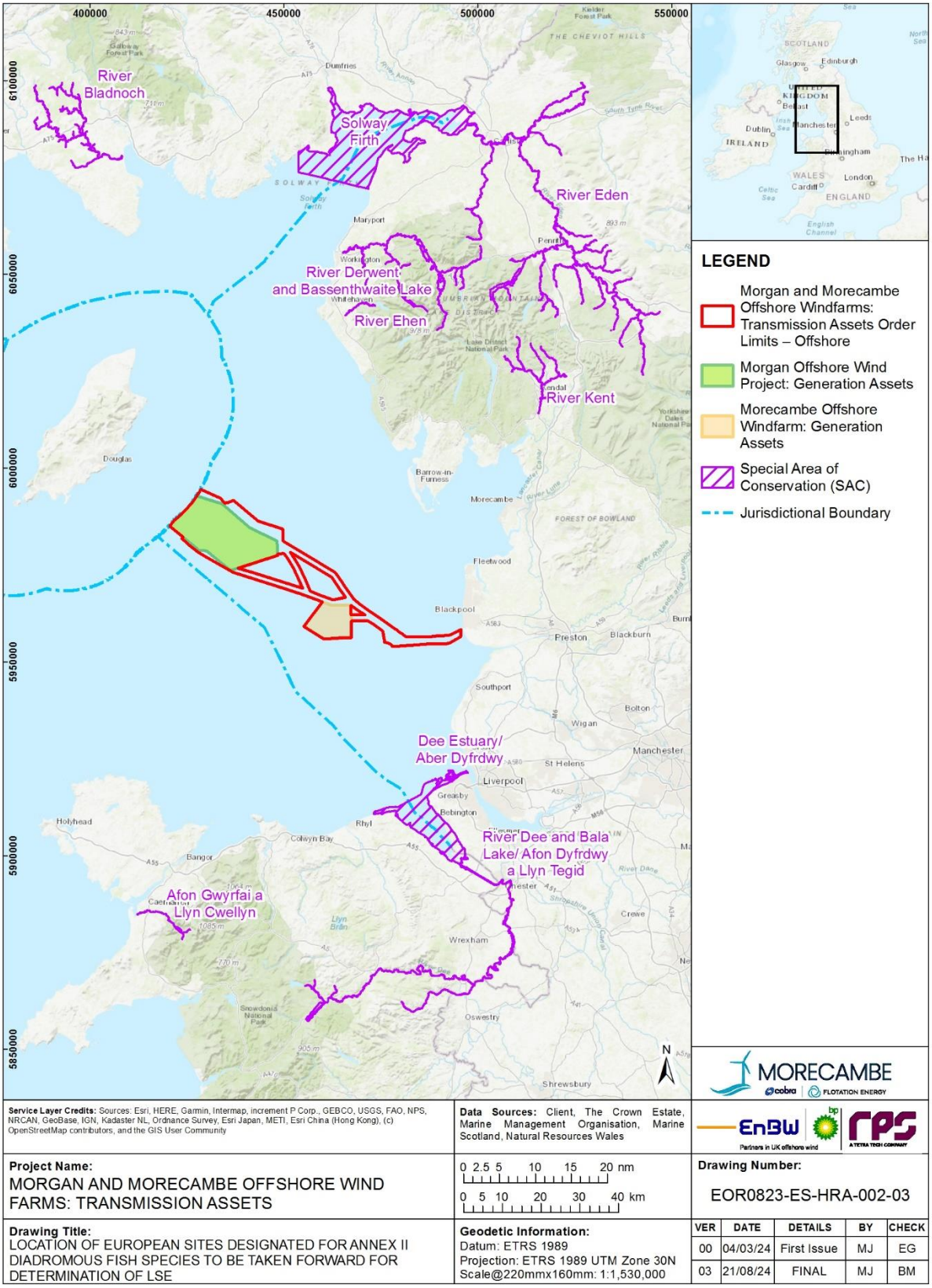

Figure 1.5: Location of European sites for Annex II diadromous fish species to be taken forward for determination of LSE (not to scale)

1.4.4 Sites designated for Annex II marine mammals

Overview

1.4.4.1 The following marine mammal species are listed under Annex II of the Habitats Directive and require the designation of SACs:

- harbour porpoise *Phocoena phocoena*;
- bottlenose dolphin *Tursiops truncatus*;
- grey seal *Halichoerus grypus*; and
- harbour seal *Phoca vitulina*.

1.4.4.2 No site-specific surveys have been undertaken for the Transmission Assets. However, two sets of site-specific aerial digital survey results that overlap with the Transmission Assets have informed the baseline characterisation presented in Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4). One survey covered the Morgan Offshore Wind Project: Generation Assets plus a buffer of 10 km to 13.3 km, which commenced monthly in April 2021 and was completed in March 2023 (Appendix A of Volume 2, Annex 4.1, Marine mammal technical report of the ES; document reference F2.4.1) and the other survey covered the Morecambe Offshore Windfarm: Generation Assets plus a buffer of 4 km to 10 km, where monthly surveys commenced in March 2021 for 24 months (Appendix B of Volume 2, Annex 4.1, Marine mammal technical report of the ES; document reference F2.4.1).

1.4.4.3 Based on data collected during aerial surveys and information on marine mammal species in the Irish Sea from desk-based studies for the Transmission Assets, all four of the Annex II marine mammal species outlined in **paragraph 1.4.4.1** have been considered in the HRA Stage 1 Screening Report.

Initial identification for Annex II marine mammals

1.4.4.4 The following sections detail the results of the stepwise process to identify the European sites with relevant Annex II marine mammals as qualifying features to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in **section 1.3.5** and **Table 1.2**.

1.4.4.5 The approach adopted for this HRA Stage 1 Screening Report focuses on the Annex II marine mammal qualifying interest features for which there is considered to be a potential for impact as a result of the Transmission Assets. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

Criterion 1

1.4.4.6 Criterion 1 considers European or Ramsar sites which overlap with the Offshore Order Limits. There are no sites with Annex II marine mammal species as qualifying features which overlap with the Offshore Order

Limits, therefore no sites are screened in for further consideration for marine mammals on the basis of this criterion.

Criterion 2

1.4.4.7 Criterion 2 considers European or Ramsar sites with qualifying mobile species whose range (e.g., foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Offshore Order Limits. There is the potential for activities associated with the construction, operation and maintenance, and decommissioning phases of the Transmission Assets to result in impacts on Annex II marine mammal species at distance from the sites for which they are qualifying interest features on the basis that these are highly mobile species which potentially forage over wide areas. The relevant ranges for the different marine mammal receptors are discussed in the following paragraphs.

Harbour porpoise

1.4.4.8 A precautionary approach (as outlined below) to the identification of relevant sites for harbour porpoise has been adopted in order to capture all sites with the potential for connectivity with the Transmission Assets based on criterion 2. The precautionary approach followed advice received from relevant stakeholders and considers that sites with harbour porpoise as qualifying interest features which are located within the same MU defined by the Inter-agency Marine Mammal Working Group (IAMWWG) (2022) as the Offshore Order Limits will be screened for LSE. For harbour porpoise all sites within the Celtic and Irish Seas MU will be considered. Therefore, 24 European sites for harbour porpoise have been identified for consideration in the HRA Stage 1 Screening Report (see **Table 1.5** and **Figure 1.6**).

Bottlenose dolphin

1.4.4.9 A precautionary approach (as outlined below) to the identification of relevant sites for bottlenose dolphin has been adopted in order to capture all sites with the potential for connectivity with the Transmission Offshore Order Limits based on criterion 2. The precautionary approach followed advice received from relevant stakeholders and considers sites with bottlenose dolphin as qualifying interest features which are located within the same MU defined by the Inter-agency Marine Mammal Working Group (IMWWG (2015)) as the Offshore Order Limits will be screened for LSE. For bottlenose dolphin therefore all sites within the Irish Sea MU will be considered. Therefore, two European sites for bottlenose dolphin have been identified for consideration in the HRA Stage 1 Screening Report (see **Table 1.5** and **Figure 1.6**).

Grey seal

1.4.4.10 A precautionary approach (as outlined below) to the identification of relevant sites for grey seal has been adopted in order to capture all sites with the potential for connectivity with the Offshore Order Limits based on criterion 2. All SACs designated for grey seal located within

the same Seal MUs (SCOS, 2021) as the Transmission Assets Offshore Order Limits (i.e. the Wales MU, North West England MU, South West Scotland and Northern Ireland MU) are screened for LSE. Recent sources on seal foraging ranges presented in Carter *et al.* (2022) have also been considered as well as information in relation to OSPAR III populations. In line with the sources noted above, there is considered to be potential connectivity with the Cardigan Bay/Bae Ceredigion SAC, Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC, The Maidens SAC, Pembrokeshire Marine/Sir Benfro Forol SAC, Lambay Island SAC, Isles of Scilly Complex SAC and Saltee Islands SAC. Therefore, seven European sites for grey seal have been identified for consideration in the HRA Stage 1 Screening Report (see **Table 1.5** and **Figure 1.6**).

Harbour seal

1.4.4.11 A precautionary approach (as outlined below) to the identification of relevant sites for harbour seal has been adopted in order to capture all sites with the potential for connectivity with the Transmission Assets based on criterion 2. All SACs designated for harbour seal located within the same seal MUs (SCOS, 2021) as the Offshore Order Limits (the Wales and North West England MU) have been considered in the screening for LSE.

1.4.4.12 In addition, to identify sites for inclusion in the assessment of LSE for harbour seal the typical foraging range of this species has also been considered such as seal foraging ranges presented in Carter *et al.* (2022) as well as information about OSPAR III populations. In line with the sources noted above, there is considered to be potential connectivity with the Strangford Lough SAC and Murlough SAC.

1.4.4.13 Two European sites for harbour seal have therefore been screened in using this criterion (see **Table 1.5**).

Criterion 3

1.4.4.14 Criterion 3 considers European sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Transmission Assets. Given the large buffers proposed (MUs as outlined in IAMWWG, 2022 and SCOS, 2022) above for both cetaceans and pinnipeds in criterion 2, the ZOI for key impacts to marine mammals (i.e., underwater sound and changes to prey species) are anticipated to be well within this area. No additional European sites have marine mammal species as qualifying features, beyond those already identified for criterion 2; therefore, no additional sites have been screened in for further consideration on the basis of this criterion.

Summary of initial screening of sites for Annex II marine mammals

1.4.4.15 The initial screening process has identified 33 European sites with Annex II marine mammals as qualifying features to be taken forward for detailed determination of LSE in **section 1.5** of this report. The sites are listed in **Table 1.5** and shown in **Figure 1.6**.

1.4.4.16 Whilst only these qualifying interest features have been screened in for further consideration, it is acknowledged that the Competent Authority must undertake the HRA Stage 1 Screening, and any subsequent appropriate assessment, at the site level and not for individual qualifying interest features. Therefore, qualifying features that were considered but not taken forward to the consideration of LSE due to the distance from the Offshore Order Limits (and therefore no receptor-impact pathway) were also listed in **Table 1.5**.

Table 1.5: European sites designated for Annex II marine mammals taken forward for determination of LSE

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
UK				
1	North Anglesey Marine/Gogledd Môn Forol SAC	Harbour porpoise	28.5	N/A
2	North Channel SAC	Harbour porpoise	62.7	N/A
3	Strangford Lough SAC	Harbour seal	93.6	Mudflats and sandflats not covered by seawater at low tide Coastal lagoons* Priority feature Large shallow inlets and bays Reefs Annual vegetation of drift lines Perennial vegetation of stony banks *Salicornia* and other annuals colonising mud and sand Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
4	Murlough SAC	Harbour seal	98.5	'Fixed coastal dunes with herbaceous vegetation (''grey dunes'')'* Priority feature Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) * Priority feature Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Embryonic shifting dunes 'Shifting dunes along the shoreline with *Ammophila arenaria* (''white dunes'')' Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*)

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*
5	Cardigan Bay/Bae Ceredigion SAC	Bottlenose dolphin Grey seal	183.4	Sandbanks which are slightly covered by sea water all the time Reefs Submerged or partially submerged sea caves Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*
6	Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC	Bottlenose dolphin Grey seal	111.2	Sandbanks which are slightly covered by sea water all the time Estuaries Coastal lagoons Large shallow inlets and bays Reefs Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonising mud and sand Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Submerged or partially submerged sea caves Otter *Lutra lutra*
7	West Wales Marine/Gorllewin Cymru Forol SAC	Harbour porpoise	111.4	N/A
8	The Maidens SAC	Grey seal	142.3	Sandbanks which are slightly covered by sea water all the time Reefs
9	Pembrokeshire Marine/Sir Benfro Forol SAC	Grey seal	233.7	Estuaries Large shallow inlets and bays Reefs

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Coastal lagoons * Priority feature Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Submerged or partially submerged sea caves Shore dock *Rumex rupestris* Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Allis shad *Alosa alosa* Twaite shad *Alosa fallax*
10	Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC	Harbour porpoise	296.9	N/A
11	Lambay Island SAC	Grey seal	130.4	Reefs Sandbanks which are slightly covered by sea water all the time Submerged or partially submerged sea caves
12	Isles of Scilly Complex SAC	Grey seal	465.2	Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Reefs Shore dock *Rumex rupestris*
Republic of Ireland				
13	Rockabill to Dalkey Island SAC	Harbour porpoise	123.6	Reefs
14	Saltee Islands SAC	Grey seal	259.3	Mudflats and sandflats not covered by seawater at low tide

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Large shallow inlets and bays Reefs Vegetated sea cliffs of the Atlantic and Baltic coasts Submerged or partially submerged sea caves
15	Roaringwater Bay and Islands SAC	Harbour porpoise	473.7	Grey seal *Halichoerus grypus* [1] Large shallow inlets and bays Reefs Vegetated sea cliffs of the Atlantic and Baltic coasts European dry heaths Submerged or partially submerged sea caves Otter *Lutra lutra*
16	Blasket Islands SAC	Harbour porpoise	591.7	Grey seal *Halichoerus grypus* [1]
France				
17	Mers Celtiques - Talus du golfe de Gascogne SCI	Harbour porpoise	559.0	Bottlenose dolphin *Tursiops truncatus 1* Fen orchid *Liparis loeselii* Southern damsel fly *Coenagrion mercurial* Jersey tiger *Euplagia quadripunctaria*
18	Abers - Côte des legends SCI	Harbour porpoise	626.7	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1]
19	Ouessant-Molène SCI	Harbour porpoise	629.3	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Otter *Lutra lutra*

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Killarney Fern *Trichomanes speciosum* Shore dock *Rumex rupestris*
20	Côte de Granit rose-Sept-Iles SCI	Harbour porpoise	635.7	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1] Greater horseshoe bat *Rhinolophus ferrumequinum* Allis shad *Alosa alosa* Twaite shad *Alosa falax* Atlantic salmon *Salmo salar* Sea lamprey *Petromyzon marinus* Quimper snail *Elona quimperiana* European *Lucanus cervus* Killarney Fern *Trichomanes speciosum* Shore dock *Rumex rupestris*
21	Anse de Goulven, dunes de Keremma SCI	Harbour porpoise	639.1	Grey seal *Halichoerus grypus* [1] Fen orchid *Liparis loeselii* Southern *Coenagrion Coenagrion mercuriale* Jersey tiger *Euplagia quadripunctaria*
22	Tregor Goëlo SCI	Harbour porpoise	655.57	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1] Lesser horseshoe bat *Rhinolophus hipposideros* Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Geoffroy's bat *Myotis emarginatus*

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Bechstein's bat *Myotis bechsteinii* Greater mouse-eared bat *Myotis myotis* Otter *Lutra lutra* Sea lamprey *Petromyzon marinus* River lamprey *Lampetra planeri* Allis shad *Alosa alosa* Twaite shad *Alosa fallax* Atlantic salmon *Salmo salar* Chabot bullhead *Cottus perifretum* Qumiper snail *Elona quimperiana* Southern damselfly *Coenagrion mercuriale* European stag beetle *Lucanus cervus* Killarney Fern *Trichomanes speciosum* Shore dock *Rumex rupestris*
23	Côtes de Crozon SCI	Harbour porpoise	665.6	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Otter *Lutra lutra*
24	Chaussée de Sein SCI	Harbour porpoise	676.2	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Qumiper snail *Elona quimperiana* Southern damselfly *Coenagrion mercurial* Marsh fritillary *Euphydryas aurinia* Killarney Fern *Trichomanes speciosum*

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Shore dock *Rumex rupestris*
25	Cap Sizun SCI	Harbour porpoise	685.3	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1] Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Qumiper snail *Elona quimperiana* Southern damselfly *Coenagrion mercurial* Marsh fritillary *Euphydryas aurinia* Killarney fern *Trichomanes speciosum* Shore dock *Rumex rupestris*
26	Récifs du talus du golfe de Gascogne SCI	Harbour porpoise	712.4	Bottlenose dolphin *Tursiops truncatus* [1]
27	Anse de Vauville SCI	Harbour porpoise	732.0	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1]
28	Cap d'Erquy-Cap Fréhel SCI	Harbour porpoise	730.8	Bottlenose dolphin *Tursiops truncatus* [1] Harbour seal *Halichoerus grypus* [1] Lesser horseshoe bat *Rhinolophus hipposideros* Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Geoffroy's bat *Myotis emarginatus* Bechstein's bat *Myotis bechsteinii* Greater mouse-eared bat *Myotis myotis*

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Northern crested newt *Triturus cristatus* European stag beetle *Lucanus cervus* Shore dock *Rumex rupestris*
29	Baie de Saint-Brieuc – Est SCI	Harbour porpoise	729.4	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1] Lesser horseshoe bat *Rhinolophus hipposideros* Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Bechstein's bat *Myotis bechsteinii* Otter *Lutra lutra* Allis shad *Alosa alosa* Twaite shad *Alosa fallax* Shore dock *Rumex rupestris* Moss grass *Coleanthus subtilis*
30	Banc et récifs de Surtainville SCI	Harbour porpoise	730.1	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1]
31	Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SCI	Harbour porpoise	753.5	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1] Lesser horseshoe bat *Rhinolophus hipposideros* Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Geoffroy's bat *Myotis emarginatus*

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Bechstein's bat *Myotis bechsteinii* Greater mouse-eared bat *Myotis myotis* Otter *Lutra lutra* Allis shad *Alosa alosa* Twaite shad *Alosa fallax* European stag beetle *Lucanus cervus* Shore dock *Rumex rupestris*
32	Estuaire de la Rance SCI	Harbour porpoise	765.6	Harbour seal *Phoca vitulina* [1] Lesser horseshoe bat *Rhinolophus hipposideros* Western barbastelle *Barbastella barbastellus* Common bent-winged bat *Miniopterus schreibersii* Geoffroy's bat *Myotis emarginatus* Bechstein's bat *Myotis bechsteinii* Greater mouse-eared bat *Myotis myotis* Otter *Lutra lutra* Allis shad *Alosa alosa* Twaite shad *Alosa fallax* European stag beetle *Lucanus cervus*
33	Baie du Mont Saint-Michel SCI	Harbour porpoise	775.1	Bottlenose dolphin *Tursiops truncatus* [1] Grey seal *Halichoerus grypus* [1] Harbour seal *Phoca vitulina* [1] Lesser horseshoe bat *Rhinolophus hipposideros* Greater horseshoe bat *Rhinolophus ferrumequinum* Western barbastelle *Barbastella barbastellus* Geoffroy's bat *Myotis emarginatus*

ID	European site	Relevant Annex II marine mammal features	Approximate distance to Offshore Order Limits (km)	Other qualifying features not taken forward to the determination of LSE on Annex II marine mammals
				Bechstein's bat *Myotis bechsteinii* Greater mouse-eared bat *Myotis myotis* Otter *Lutra lutra* Northern crested newt *Triturus cristatus* Sea lamprey *Petromyzon marinus* River lamprey *Lampetra planeri* Brook lamprey *Lampetra fluviatilis* Allis shad *Alosa alosa* Twaite shad *Alosa fallax* Atlantic salmon *Salmo salar* European bullhead *Cottus gobio*

Note: If applicable, distances are measured as the marine route to the site.

[1] Additional Annex II marine mammal features have been screened out on the basis that the SAC is not located within the relevant MU for that species and so there will be no receptor-impact pathway.

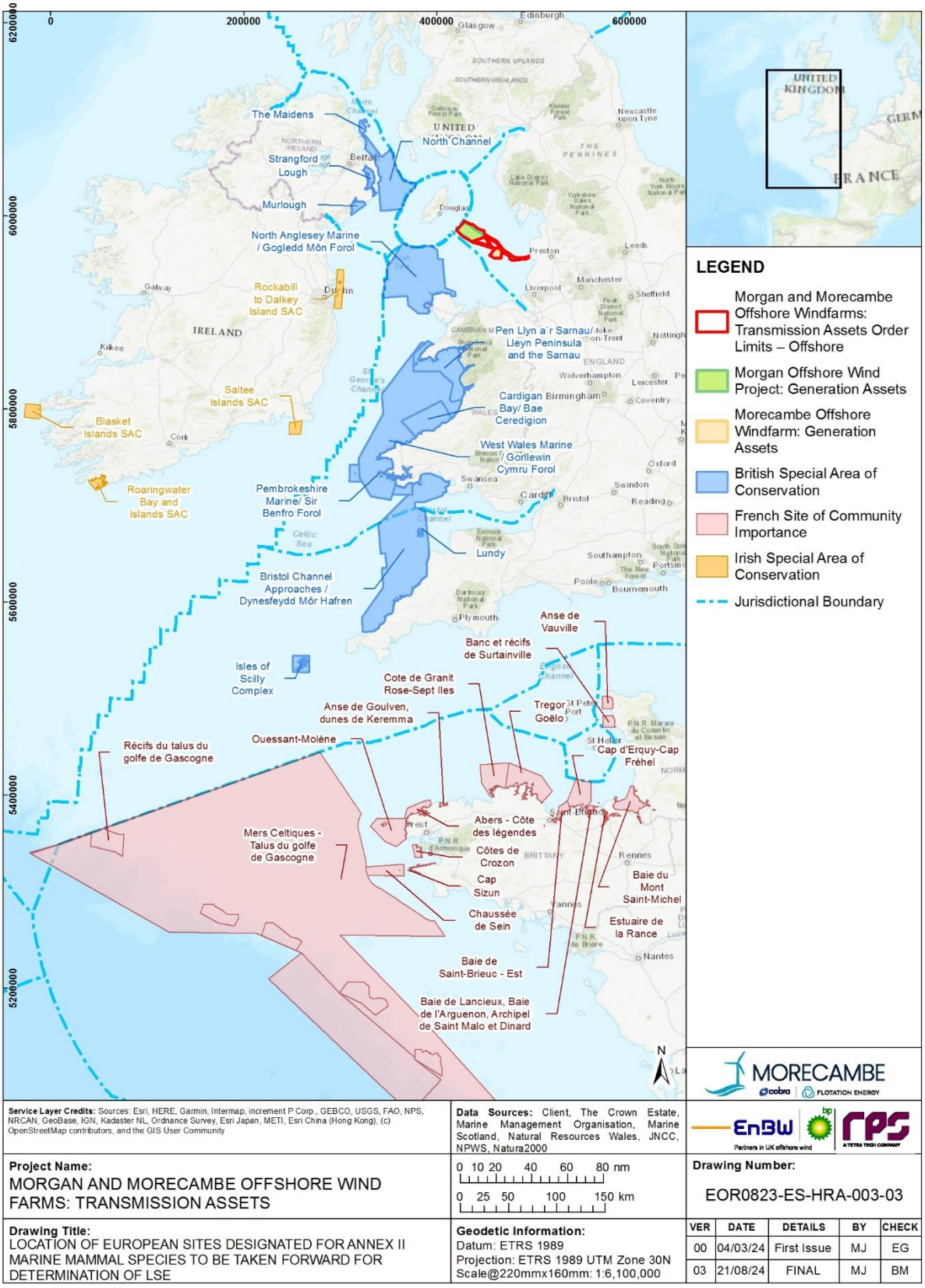

Figure 1.6: Location of European sites designated for Annex II marine mammal species to be taken forward for the determination of LSE (not to scale)

1.4.5 Sites designated for Annex I habitats (onshore)

Overview

1.4.5.1 The following section details the results of the stepwise process to identify the European sites with relevant onshore Annex I habitats, landward of MHWS, to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in **section 1.3.5** and **Table 1.2**.

1.4.5.2 The approach adopted for this HRA screening report focuses on the Annex I habitat qualifying interest features for which there is considered to be a potential for impact as a result of the Transmission Assets. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

Initial identification for Annex I habitats (onshore)

Criterion 1

1.4.5.3 Criterion 1 for the identification of European or Ramsar sites to be taken forward for consideration of LSE considers those sites which overlap with the Transmission Assets Order Limits: Onshore (hereafter referred to as Onshore Order Limits). There are no European sites with relevant onshore qualifying Annex I habitats which overlap with the Onshore Order Limits, therefore no sites are screened in for further consideration for onshore habitats on the basis of this criterion.

Criterion 2

1.4.5.4 Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Onshore Order Limits. There are no European sites which meet this criterion for Annex I habitats (onshore) and so no sites are screened in for further consideration on this basis.

Criterion 3

1.4.5.5 Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Transmission Assets. There is the potential for indirect effects to sites designated for onshore Annex I habitats as a result of airborne pollutants associated with construction or decommissioning activities.

1.4.5.6 According to guidance from the IAQM (IAQM, 2020), an assessment of air pollutant impacts arising from dust generated during the construction phase is required where there are sensitive receptors within 350 m of the site boundary. The guidance also states an assessment for ecological receptors should consider an impact zone of up to 50 m from the site boundary and 50 m either side of the route(s) used by

construction vehicles on the public highway, up to 500 m from the site entrance(s).

1.4.5.7 Regarding emissions from traffic generated by the development, National Highways (2019) refer to a 200 m impact zone from roads where the annual average daily traffic flow is greater than 1000 vehicles or 200 Heavy Duty Vehicles for ecological receptors in internationally (and nationally) designated sites. Therefore, a precautionary approach of 350 m buffer from the Onshore Order Limits has been adopted, which is considered large enough to encompass all direct and indirect impacts associated with the Transmission Assets. There are no European sites which meet this criterion for Annex I habitats (onshore) and so no sites are screened in for further consideration on this basis.

Summary of initial screening of sites for Annex I habitats (onshore)

1.4.5.8 The initial screening process has identified no European sites to be taken forward for determination of LSE in **section 1.5** of this report.

1.4.6 Sites designated for Annex II species (onshore)

Overview

1.4.6.1 The following section details the results of the stepwise process to identify the European sites with Annex II species (onshore) as a feature, to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in **section 1.3.5** and **Table 1.2**.

1.4.6.2 The terrestrial Annex II species which could be impacted by the Transmission Assets include otter *Lutra lutra*, bats (lesser horseshoe bat *Rhinolophus hipposideros, g*reater horseshoe bat *Rhinolophus ferrumequinum,* barbastelle bat *Barbastella barbastellus,* Bechstein's bat *Myotis bechsteinii)* and great-crested newts *Triturus cristatus.*

1.4.6.3 The approach adopted for this HRA screening report focuses on the Annex II terrestrial qualifying interest features for which there is considered to be a potential for impact as a result of the Transmission Assets. Whilst only these qualifying interest features will be screened in for further consideration, it is acknowledged that the Competent Authority must undertake the HRA Stage 1 Screening, and any subsequent appropriate assessment, at the site level and not for individual qualifying interest features.

Initial identification for Annex II terrestrial species

Criterion 1

1.4.6.4 Criterion 1 considers European or Ramsar sites which overlap with the Onshore Order Limits. As there are no European sites with any of the Annex II terrestrial species listed above as qualifying features which overlap with the Onshore Order Limits, no sites are screened in for further consideration for Annex II terrestrial species on the basis of this criterion.

Criterion 2

1.4.6.5 Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Onshore Order Limits.

1.4.6.6 Otters can have relatively large home ranges and can travel considerable distances in one night, particularly during dispersal (e.g. more than 20 km, Harris *et al*., 1995, cited in Chanin, 2003; or an estimated average home range of 27 km, Harris *et al*., 1995, cited in Chanin, 2003). However, territories and distances travelled can vary considerable depending on the resources available.

1.4.6.7 For the purposes of the HRA Stage 1 Screening Report, a precautionary approach has been adopted using a preliminary buffer of 27 km from the Onshore Order Limits for Annex II otters. However, there are no European sites with Annex II otter as qualifying features located within 27 km of the Onshore Order Limits.

1.4.6.8 For bats, a ZOI of 10 km is considered appropriate, based on a 5 to 10 km typical home range (between summer and winter roosts) (Collins, 2016; cited: Bat Conservation Trust/BMT Cordah Ltd, 2005). However, no European sites designated for bats are located within a buffer of 10 km from the Onshore Order Limits.

1.4.6.9 For great-crested newt, 2 km is considered an appropriate buffer due to most great-crested newt activity being recorded within 250 m of a breeding pond, and dispersal distances being up to approximately 1.3 km (see English Nature, 2001). For the purposes of this HRA Stage 1 Screening Report, a precautionary approach has been adopted using a preliminary buffer of 2 km from the Onshore Order Limits for Annex II great-crested newt. However, no European sites designated for great-crested newt are located within a buffer of 2 km from the Onshore Order Limits.

1.4.6.10 Therefore, no sites are screened in for further consideration on the basis of criterion 2.

Criterion 3

1.4.6.11 Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Transmission Assets (e.g. habitat loss/disturbance). Given the large buffers associated with criterion 2 above, the ZOI for key impacts to Annex II terrestrial species are anticipated to be well within this range. No European sites with Annex II terrestrial species as qualifying features are therefore screened in for further consideration on the basis of criterion 3.

Summary of initial screening of sites for Annex II terrestrial species

1.4.6.12 The initial screening process has identified no European sites to be taken forward for determination of LSE in **section 1.5** of this report.

1.4.7 Sites considered for offshore ornithology

Overview

1.4.7.1 The following section details the results of the stepwise process to identify the European sites with ornithological features impacted by the offshore works (seaward of MLWS), to be taken forward for detailed determination of LSE in **section 1.5.**

1.4.7.2 The approach adopted for this HRA Stage 1 Screening Report focuses on the ornithology qualifying interest features for which there is considered to be a potential for impact as a result of the offshore activities associated with the Transmission Assets. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

Methodology

1.4.7.3 Bird species are highly mobile so both the potential ZOI for each impact and the ranging behaviour of the species (and their prey) are relevant to screening. The specific impacts relevant for this receptor group are detailed in **Table 1.6**.

1.4.7.4 The bird species likely to occur in the Offshore Order Limits can be grouped into a series of categories for the purposes of this screening exercise. This categorisation is based on biological relationships related to phenology, feeding, habitat use and migratory pathways with different spatial criteria applied for each category to identify connectivity. The categories are:

- breeding seabirds in the breeding season (e.g. gannet at the Ailsa Craig SPA);
- breeding seabirds in the non-breeding season (e.g. gannet at the Ailsa Craig SPA outside of the breeding season); and
- non-breeding seabirds (e.g. red-throated diver at the Liverpool Bay SPA).

1.4.7.5 The approach to screening for offshore ornithology incorporate two steps. Step 1 Screening for offshore ornithology (see **section 1.4.7**) will use a predefined set of screening criteria to identify SPAs and Ramsar sites with relevant ornithological features which have potential connectivity to the Transmission Assets. The approach applied is in accordance with the methodology described in **section 1.3.5** ((see **paragraph 1.4.7.8**). Potential connectivity does not necessarily equate to a potential LSE, with that determined in Step 2 Screening (or Determination of LSE; see **section 1.5**). Once potential connectivity has been determined with relevant SPAs and Ramsar sites and associated

relevant features, those sites and features will subsequently be progressed to the determination of potential LSE stage.

1.4.7.6 The impacts associated with the development of the Transmission Assets are identified in **Table 1.6**. The identification of connectivity uses the spatial extents of both the impacts and distribution of birds. **Table 1.6** identifies the spatial extents associated with each impact.

Table 1.6: Impacts associated with the Transmission Assets

Impact	Zone of influence of impact
Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure.	Footprint of the Offshore Order Limits plus 2 km buffer
Indirect impacts arising from underwater sound affecting prey species.	Footprint of the Offshore Order Limits plus 2 km buffer
Temporary habitat loss/disturbance and increased SSCs.	Footprint of the Offshore Order Limits plus 15 km buffer associated with tidal extent

Identification of potential connectivity

1.4.7.7 The spatial criteria applied for each of the bird categories are as follows.

- Breeding seabirds in the breeding season – the mean-maximum foraging ranges plus one standard deviation from Woodward *et al.* (2019) are applied from each SPA to identify connectivity with the Transmission Assets plus the relevant ZOI for each impact.
- Breeding seabirds in non-breeding seasons (Biologically Defined Minimum Population Size (BDMPS)) – breeding seabirds from SPAs and Ramsar sites in the non-breeding season are not constrained to specific areas due to the necessity to provide for young, and typically disperse to exploit areas far beyond their breeding colonies. During the non-breeding season, therefore, the birds present within the Offshore Order Limits may originate from sites that are further away than those considered in the breeding season. Furness (2015) considered how non-breeding birds dispersed, defining the regions within which those populations would be distributed and for each region a BDMPS was calculated. Screening has applied those BDMPS regions and populations. Where the Offshore Order Limits overlaps with a BDMPS region, potential connectivity is assumed with the population associated with that region (as defined by Furness, 2015) and the SPAs that contribute to that population.
- Non-breeding seabirds – Overlap between the Offshore Order Limits plus relevant ZOI for each impact and the SPA or Ramsar site boundary only (no foraging range is applied in the non-breeding season).

1.4.7.8 This initial screening, which involves identification of potential connectivity, has been undertaken using a modified version of the HRA screening tool developed by NIRAS for the Plan level HRAs recently undertaken by TCE (NIRAS Group (UK) Ltd 2021; (TCE, 2022). The

underlying parameters table has been modified to ensure consistency with the impacts scoped in which were included in the EIA Scoping Report for the Transmission Assets (RPS, 2022) using the foraging ranges and ZOI distances detailed above. The screening tool is run in a Geographic Information System to identify physical overlap between the spatial criteria associated with each impact and those associated with each bird category.

Initial identification for offshore ornithology

1.4.7.9 The initial screening process for offshore ornithological features has identified 61 European sites/Ramsar sites with marine ornithological features to be taken forward for detailed determination of LSE in **section 1.5** of this report. The European sites identified are listed in **Table 1.7** and shown in **Figure 1.7**.

Table 1.7: European sites designated for marine ornithological features with potential connectivity to the Transmission Assets Order Limits

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
Breeding seabirds in the breeding season and non-breeding seabirds				
1	Liverpool Bay SPA	UK9020294	0	**Breeding seabirds in the breeding season** – Little tern – Common tern **Non-breeding seabirds** – Red-breasted merganser – Common scoter – Little gull – Red-throated diver – Cormorant
2	Ribble and Alt Estuaries Ramsar	UK11057	0	**Breeding seabirds in the breeding season** – Black-headed gull – Lesser black-backed gull – Common tern **Non-breeding seabirds** – Cormorant – Common scoter
3	Ribble and Alt Estuaries SPA	UK9005103	0	**Breeding seabirds in the breeding season** – Black-headed gull – Lesser black-backed gull – Common tern **Non-breeding seabirds** – Common scoter

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
				– Cormorant – Scaup
4	Morecambe Bay and Duddon Estuary SPA	UK9020326	9.5	**Breeding seabirds in the breeding season** – Lesser black-backed gull – Herring gull – Sandwich tern – Common tern – Little tern **Non-breeding seabirds** – Eider – Red-breasted merganser – Cormorant – Mediterranean gull – Black-headed gull – Common gull
5	Morecambe Bay Ramsar	UK11045	9.5	**Breeding seabirds in the breeding season** – Black-headed gull – Lesser black-backed gull – Herring gull – Sandwich tern **Non-breeding seabirds** – Cormorant – Eider – Red-breasted merganser
6	Bowland Fells SPA	UK9005151	17.6	**Breeding seabirds in the breeding season** – Lesser black-backed gull

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
7	Mersey Narrows and North Wirral Foreshore SPA	UK9020287	31.0	**Breeding seabirds in the breeding season** – Common tern
8	Duddon Estuary Ramsar	UK11022	34.0	**Breeding seabirds in the breeding season** – Sandwich tern
9	The Dee Estuary Ramsar	UK11082	38.6	**Breeding seabirds in the breeding season** – Common tern
10	The Dee Estuary SPA	UK9013011	38.6	**Breeding seabirds in the breeding season** – Common tern
11	Anglesey Terns/ Morwenoliaid Ynys Môn SPA	UK9013061	49.9	**Breeding seabirds in the breeding season** – Sandwich tern – Arctic tern
12	Upper Solway Flats & Marshes Ramsar	UK11079	84.4	**Breeding seabirds in the breeding season** – Lesser black-backed gull – Herring gull
13	Strangford Lough Ramsar	UK12021	91.2	**Breeding seabirds in the breeding season** – Lesser black-backed gull
14	Copeland Islands SPA	UK9020291	112.4	**Breeding seabirds in the breeding season** – Manx shearwater
15	Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island SPA	UK9013121	125.2	**Breeding seabirds in the breeding season** – Manx shearwater
16	Ailsa Craig SPA	UK9003091	141.9	**Breeding seabirds in the breeding season** – Gannet – Lesser black-backed gull

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
				– Kittiwake – Guillemot
17	Lough Neagh & Lough Beg Ramsar	UK12016	147.0	**Breeding seabirds in the breeding season** – Lesser black-backed gull
18	Northumbria Coast Ramsar	UK11049	146.5	**Breeding seabirds in the breeding season** – Kittiwake
19	Northumberland Marine SPA	UK9020325	171.5	**Breeding seabirds in the breeding season** – Fulmar – Lesser black-backed gull
20	Rathlin Island SPA	UK9020011	186.0	**Breeding seabirds in the breeding season** – Fulmar – Lesser black-backed gull – Kittiwake – Puffin
21	Flamborough and Filey Coast SPA	UK9006101	171.3	**Breeding seabirds in the breeding season** – Gannet – Kittiwake – Puffin
22	Coquet Island SPA	UK9006031	193.4	**Breeding seabirds in the breeding season** – Fulmar – Lesser black-backed gull – Kittiwake – Puffin
23	Forth Islands SPA	UK9004171	216.5	**Breeding seabirds in the breeding season**

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
				– Gannet – Lesser black-backed gull – Kittiwake – Puffin
24	Severn Estuary Ramsar	UK11081	219.9	**Breeding seabirds in the breeding season** – Lesser black-backed gull
25	The Wash Ramsar	UK11072	205.2	**Breeding seabirds in the breeding season** – Lesser black-backed gull
26	Farne Islands SPA	UK9006021	219.2	**Breeding seabirds in the breeding season** – Kittiwake – Puffin
27	Loch Leven Ramsar	UK13033	232.7	**Breeding seabirds in the breeding season** – Lesser black-backed gull
28	St Abb's to Fast Castle SPA	UK9004271	232.7	**Breeding seabirds in the breeding season** – Kittiwake
29	Skomer, Skokholm and the Seas off Pembrokeshire SPA	UK9014051	245.9	**Breeding seabirds in the breeding season** – Manx shearwater – Storm petrel – Lesser black-backed gull – Kittiwake – Puffin
30	Grassholm SPA	UK9014041	255.5	**Breeding seabirds in the breeding season** – Gannet

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
31	North Colonsay and Western Cliffs SPA	UK9003171	256.7	**Breeding seabirds in the breeding season** – Kittiwake
32	Treshnish Isles SPA	UK9003041	303.0	**Breeding seabirds in the breeding season** – Storm petrel
33	Fowlsheugh SPA	UK9002271	331.7	**Breeding seabirds in the breeding season** – Fulmar
34	Rum SPA	UK9001341	339.6	**Breeding seabirds in the breeding season** – Manx shearwater
35	Mingulay and Berneray SPA	UK9001121	369.6	**Breeding seabirds in the breeding season** – Fulmar
36	Buchan Ness to Collieston Coast SPA	UK9002491	382.3	**Breeding seabirds in the breeding season** – Fulmar
37	Troup, Pennan and Lion`s Heads SPA	UK9002471	411.3	**Breeding seabirds in the breeding season** – Fulmar
38	The Shiant Isles SPA	UK9001041	441.1	**Breeding seabirds in the breeding season** – Fulmar
39	East Caithness Cliffs SPA	UK9001182	447.4	**Breeding seabirds in the breeding season** – Fulmar
40	Alderney West Coast & the Burhou Islands Ramsar	UK22002	451.0	**Breeding seabirds in the breeding season** – Gannet
41	Isles of Scilly SPA	UK9020288	458.4	**Breeding seabirds in the breeding season** – Fulmar – Manx shearwater

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
42	Handa SPA	UK9001241	478.7	**Breeding seabirds in the breeding season** – Fulmar – Great skua
43	St Kilda SPA	UK9001031	489.6	**Breeding seabirds in the breeding season** – Fulmar – Manx shearwater – Leach's petrel – Gannet – Great skua
44	North Caithness Cliffs SPA	UK9001181	496.8	**Breeding seabirds in the breeding season** – Fulmar
45	Cape Wrath SPA	UK9001231	500.7	**Breeding seabirds in the breeding season** – Fulmar
46	Flannan Isles SPA	UK9001021	509.7	**Breeding seabirds in the breeding season** – Fulmar – Leach's petrel
47	Hoy SPA	UK9002141	520.6	**Breeding seabirds in the breeding season** – Fulmar – Great skua
48	Copinsay SPA	UK9002151	537.5	**Breeding seabirds in the breeding season** – Fulmar
49	Sule Skerry and Sule Stack SPA	UK9002181	547.0	**Breeding seabirds in the breeding season** – Leach's petrel
50	Rousay SPA	UK9002371	564.7	**Breeding seabirds in the breeding season**

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
				– Fulmar
51	North Rona and Sula Sgeir SPA	UK9001011	567.4	**Breeding seabirds in the breeding season** – Fulmar – Leach's petrel
52	Calf of Eday SPA	UK9002431	574.6	**Breeding seabirds in the breeding season** – Fulmar
53	West Westray SPA	UK9002101	578.0	**Breeding seabirds in the breeding season** – Fulmar
54	Fair Isle SPA	UK9002091	616.8	**Breeding seabirds in the breeding season** – Fulmar – Great skua
55	Sumburgh Head SPA	UK9002511	659.5	**Breeding seabirds in the breeding season** – Fulmar
56	Foula SPA	UK9002061	676.8	**Breeding seabirds in the breeding season** – Fulmar – Great skua
57	Noss SPA	UK9002081	694.0	**Breeding seabirds in the breeding season** – Fulmar – Great skua
58	Ronas Hill – North Roe and Tingon Ramsar	UK13054	730.0	**Breeding seabirds in the breeding season** – Fulmar – Great skua
59	Ronas Hill – North Roe and Tingon SPA	UK9002041	730.0	**Breeding seabirds in the breeding season** – Great skua

ID	European Site	Site Code	Approximate distance to Offshore Order Limits (km)	Relevant qualifying features
60	Fetlar SPA	UK9002031	740.6	**Breeding seabirds in the breeding season** – Fulmar – Great skua
61	Hermaness, Saxa Vord and Valla Field SPA	UK9002011	760.1	**Breeding seabirds in the breeding season** – Fulmar – Great skua
Breeding seabirds in the non-breeding season				
-	All UK SPAs	-	-	– Fulmar
-	All UK SPAs	-	-	– Gannet
-	All UK SPAs	-	-	– Lesser black-backed gull
-	All UK SPAs	-	-	– Herring gull
-	All UK SPAs	-	-	– Great black-backed gull
-	All UK SPAs	-	-	– Kittiwake
-	All UK SPAs	-	-	– Guillemot
-	All UK SPAs	-	-	– Razorbill
-	All UK SPAs	-	-	– Puffin

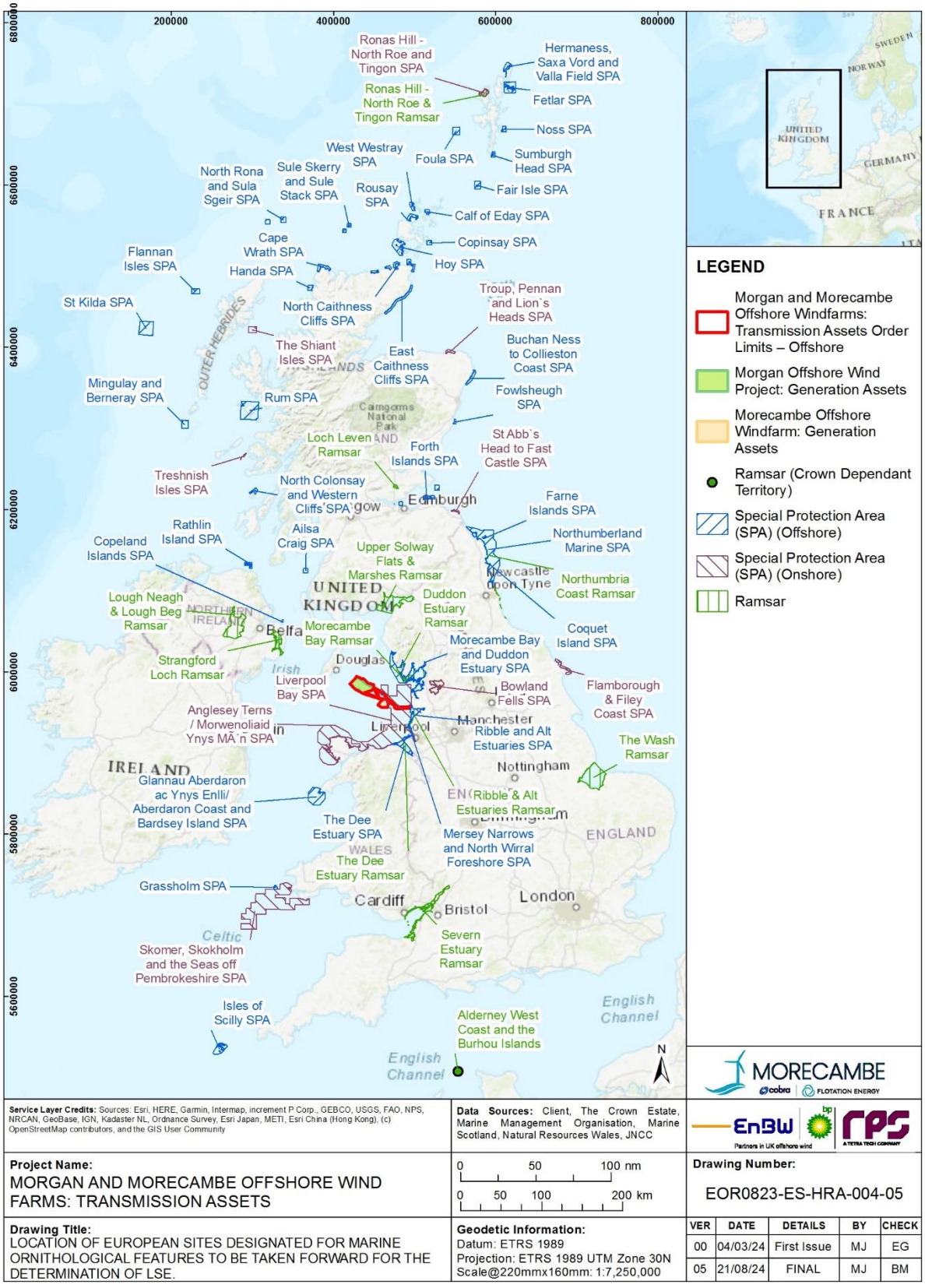

Figure 1.7: Location of European sites designated for marine ornithological features to be taken forward for the determination of LSE (not to scale)

Summary of initial screening of sites for offshore ornithology

1.4.7.10 The initial screening process has identified 61 European sites to be taken forward for determination of LSE in **section 1.5** of this report.

1.4.8 Sites considered for onshore and intertidal ornithology

Overview

1.4.8.1 The following section details the results of the stepwise process to identify the European sites with ornithological features impacted by the onshore and intertidal works (landward of MLWS), to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in **section 1.3.5** and **Table 1.2**.

1.4.8.2 The approach adopted for this HRA screening report focuses on the ornithology qualifying interest features for which there is considered to be a potential impact as a result of the onshore and intertidal activities associated with the Transmission Assets. Whilst pathways to individual features are identified, the consideration for the HRA Stage 1 Screening is acknowledged to be for the integrity of the European site as a whole.

Initial identification for onshore and intertidal ornithology

Criterion 1

1.4.8.3 Criterion 1 considers European or Ramsar sites which overlap with the Onshore Order Limits and the Intertidal Infrastructure Area.

1.4.8.4 From the low water to the high water mark, the Onshore Order Limits passes through the Ribble and Alt Estuaries SPA and Ramsar site.

1.4.8.5 On this basis two sites were identified:

- Ribble and Alt Estuaries SPA; and
- Ribble and Alt Estuaries Ramsar site.

Criterion 2

1.4.8.6 Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Onshore Order Limits and the Intertidal Infrastructure Area.

1.4.8.7 As birds move through SPAs during the passage period, they can also stop and feed in a range of locations outside SPAs. Coastal pastures and wet marshes outside the boundary of SPAs can also be used by waterbirds as alternative or complementary foraging areas (functionally linked land) throughout the winter.

1.4.8.8 SPAs and Ramsar sites with relevant ornithological qualifying features have been identified using expert knowledge and evidence from the literature on migratory routes and foraging ranges (see Volume 3 Chapter 4: Onshore and intertidal ornithology of the ES; document

reference F3.4). A precautionary approach has been adopted with all SPAs and Ramsar sites within 50 km of the Onshore Order Limits and the Intertidal Infrastructure Area being considered for preliminary screening.

1.4.8.9 On this basis, nine SPAs and four Ramsar sites within 50 km of the Onshore Order Limits and the Intertidal Infrastructure Area were identified:

- Liverpool Bay SPA;
- Morecambe Bay and Duddon Estuary SPA;
- Morecambe Bay Ramsar site;
- Martin Mere SPA;
- Bowland Fells SPA;
- Mersey Narrows and North Wirral Foreshore SPA;
- Duddon Estuary Ramsar site;
- The Dee Estuary SPA;
- The Dee Estuary Ramsar site;
- South Pennine Moors Phase 2 SPA;
- Mersey Estuary SPA;
- Mersey Estuary Ramsar site; and
- Leighton Moss SPA.

Criterion 3

1.4.8.10 Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Transmission Assets (e.g. habitat loss/disturbance). Given the large buffers associated with criterion 2 above, the ZOI for key impacts to onshore and intertidal ornithology are anticipated to be well within this range. No European sites are therefore screened in for further consideration on the basis of criterion 3.

Qualifying features

1.4.8.11 Qualifying species of the SPAs and Ramsar sites identified in Criterions 1 and 2 which are considered to be relevant within this onshore and intertidal ornithology section include:

- birds of prey (e.g. merlin *Falco columbarius* and hen harrier *Circus cyaneus*). The potential for connectivity between an SPA and/or Ramsar site and the Transmission Assets Onshore Order Limits and the Intertidal Infrastructure Area is based on NatureScot guidance (NatureScot, 2016);
- waterbirds (waders and wildfowl). The potential for connectivity between an SPA and/or Ramsar site and the Transmission Assets Onshore Order Limits and the Intertidal Infrastructure Area was

based on the Natural England Sites of Special Scientific Interest (SSSI) impact zone guidance (Natural England, 2023), functionally linked land around wintering waterfowl and wader species listed as a qualifying features of the European site is up to 2 km and therefore this buffer has been applied on a species specific basis;

- gulls such as lesser black-backed gull *Larus fuscus,* black-headed gull *Chroicocephalus ridibundus* and herring gull *Larus argentatus* which are known to use the terrestrial and intertidal environment for foraging and / or roosting;
- breeding tern species from SPAs/Ramsar sites which either overlap or are within foraging range of the Onshore Order Limits and the Intertidal Infrastructure Area due to the potential disturbance to their nesting habitats;
- pink-footed goose *Anser brachyrhynchus*, for the European sites located within a 20 km buffer to account for the potential connectivity between roosting and feeding sites (Natural England, 2021);
- golden plover *Pluvialis apricaria,* for the European sites located within a 10 km buffer based on the Natural England SSSI impact zone guidance (Natural England, 2023); and,
- curlew *Numenius arquata* for the European sites located within a 15 km buffer based upon Natural England mapping (Bowland Ecology, 2022).

1.4.8.12 Based on guidance for connectivity by NatureScot (NatureScot, 2016) and mapping of functionally linked land by Natural England (Bowland Ecology, 2021 and 2022), eight out of 15 sites that were identified, were screened out from determination of LSE based on lack of connectivity between qualifying features and Onshore Order Limits and the Intertidal Infrastructure Area. The sites and qualifying features which have been screened out are presented in **Table 1.8**, whereas the seven remaining sites where LSE cannot be ruled out are summarised in **Table 1.9.**

Table 1.8: European sites designated for onshore and intertidal ornithology features and screened out based on lack of connectivity

European Site	Site Code	Approximate distance to the Onshore Order Limits and the Intertidal Infrastructure Area	Ornithological qualifying features screened out	Rationale for screening decision
Mersey Narrows and North Wirral Foreshore SPA	UK9020287	29.8	• Common tern *Sterna hirundo* (Breeding) • Little gull *Hydrocoloeus minutus* (non-breeding) • Bar-tailed godwit *Limosa lapponica* (non-breeding) • Knot *Calidris canutus islandica* (non-breeding) • Waterbird assemblage (non-breeding); – Cormorant *Phalacrocorax carbo* – Oystercatcher *Haematopus ostralegus* – Grey Plover *Pluvialis squatarola* – Sanderling *Calidris alba* – Knot *Calidris canutus* – Dunlin *Calidris alpina alpina* – Bar-tailed Godwit – Redshank *Tringa totanus*	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site. Connectivity guidance from Natural England and NatureScot and the species foraging ranges were taken into consideration when assessing potential for impacts.
Duddon Estuary Ramsar site	UK11022	28.8	• Pintail *Anas acuta* (winter) • Knot (winter) • Redshank (winter)	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site. Connectivity guidance from Natural England and/ NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.

European Site	Site Code	Approximate distance to the Onshore Order Limits and the Intertidal Infrastructure Area	Ornithological qualifying features screened out	Rationale for screening decision
The Dee Estuary SPA	UK0030131	38.6	• Sandwich tern *Sterna sandvicensis* (non-breeding) • Common tern (breeding) • Little tern *Sternula albifrons* (breeding) • Shelduck *Tadorna tadorna* (non-breeding) • Teal *Anas crecca* (non-breeding) • Pintail (non-breeding) • Oystercatcher (non-breeding) • Grey plover (non-breeding) • Knot (non-breeding) • Dunlin (non-breeding) • Black-tailed godwit *Limosa limosa islandica* (non-breeding) • Bar-tailed godwit (non-breeding) • Curlew *Numenius arquata* (non-breeding) • Redshank (non-breeding) • Waterbird assemblage (in addition to above) (non-breeding): – Great crested grebe *Podiceps cristatus* – Cormorant – Wigeon *Anas penelope* – Lapwing *Vanellus vanellus* – Sanderling	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site. Connectivity guidance from Natural England and NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.
The Dee Estuary Ramsar Site	UK11082	38.6	• Redshank (spring/autumn) • Teal (winter) • Shelduck (winter) • Oystercatcher (winter)	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site.

European Site	Site Code	Approximate distance to the Onshore Order Limits and the Intertidal Infrastructure Area	Ornithological qualifying features screened out	Rationale for screening decision
			• Curlew (winter) • Pintail (winter) • Grey plover (winter) • Knot (winter) • Dunlin (winter) • Black-tailed godwit (winter) • Bar-tailed godwit (winter) • Redshank (winter)	Connectivity guidance from Natural England and NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.
South Pennine Moors Phase 2 SPA	UK9007022	38.5	• Merlin (breeding) • Golden plover (breeding) • Assemblage of characteristic moorland and moorland-fringe species (breeding): – Golden plover – Common sandpiper *Actitis hypoleucos* – Dunlin – Twite *Carduelis flavirostris* – Snipe *Gallinago gallinago* – Curlew – Wheatear *Oenanthe oenanthe* – Whinchat *Saxicola rubetra* – Redshank – Ring ouzel *Turdus torquatus* – Lapwing – Short-eared owl *Asio flammeus*	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site. Connectivity guidance from Natural England and NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.
Mersey Estuary SPA	UK9005131	41.5	• Shelduck (non-breeding) • Teal (non-breeding) • Pintail (non-breeding) • Golden plover (non-breeding) • Dunlin (non-breeding)	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site.

European Site	Site Code	Approximate distance to the Onshore Order Limits and the Intertidal Infrastructure Area	Ornithological qualifying features screened out	Rationale for screening decision
			• Black-tailed godwit (non-breeding) • Redshank (non-breeding) • Waterbird assemblage (in addition to above) (non-breeding): – Great crested grebe – Wigeon – Ringed plover *Charadrius hiaticula* – Grey plover – Lapwing – Curlew – Redshank	Connectivity guidance from Natural England and NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.
Mersey Estuary Ramsar site	UK11041	42.6	• Shelduck (spring/autumn) • Black-tailed godwit (spring/autumn) • Redshank (spring/autumn) • Teal (winter) • Pintail (winter) • Dunlin (winter)	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site. Connectivity guidance from Natural England and NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.
Leighton Moss SPA	UK9005091	42.5	• Bittern *Botaurus stellaris* (breeding)	Due to the distance between the Onshore Order Limits and the SPA, there is no potential for connectivity between the onshore and intertidal works and the qualifying features of the site. Connectivity guidance from Natural England and NatureScot and the species foraging ranges was taken into consideration when assessing potential for impacts.

Summary of initial screening of sites for onshore and intertidal ornithology

1.4.8.13 The remaining seven European sites with ornithological features which could potentially be impacted by the onshore and intertidal works and are to be taken forward for detailed determination of LSE in **section 1.5.6** of this report are listed **Table 1.9**. The seven screened in European sites are illustrated in **Figure 1.8**.

1.4.8.14 It should be noted, that in line with the Scoping Opinion (see **Table 1.1**), impacts on supporting habitats (functionally linked land) for relevant designated features of the SPAs and Ramsar sites are also considered (see **section 1.4.8**).

1.4.8.15 Whilst only specific qualifying features will be screened in for further consideration (see **Table 1.9**), it is acknowledged that the Competent Authority must undertake the HRA Stage 1 Screening, and any subsequent appropriate assessment, at the site level and not for individual qualifying interest features. Therefore, qualifying features that were considered but not taken forward to the consideration of LSE were also listed in **Table 1.9**.

Table 1.9: European sites designated for passage and wintering waterbird features with potential connectivity to the Onshore Order Limits and the Intertidal Infrastructure Area

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
1	Liverpool Bay SPA	UK9020294	0	• Red-throated diver *Gavia stellata* (non-breeding) • Common scoter *Melanitta nigra* (non-breeding) • Common tern (breeding)	• Little gull (non-breeding) • Little tern (breeding)	Red-throated diver, common scoter, red-breasted merganser and cormorant all have potential for LSE caused by works within the intertidal. Breeding common terns have potential connectivity with the onshore works as the Ribble and Alt colony is within the mean foraging range of 26.9 km as reported by Woodward, *et al*., (2019). Little tern however is screened out due to the nearest breeding colonies (within the Dee Estuary SPA) being over 35 km away and that their breeding season foraging range is 5 km (Woodward, *et al*., 2019). Therefore, there is no connectivity with the Onshore Order Limits and the Intertidal Infrastructure Area. Little gull is screened out as the population is mainly concentrated further offshore within the marine environment (Lawson, *et al*., 2017; HiDef aerial surveying, 2023).
2	Ribble and Alt Estuaries SPA	UK9005103	0	• Common tern (breeding) • Bewick's swan *Cygnus columbianus bewickii* (non-breeding)	None	There is direct spatial overlap between the Ribble and Alt Estuaries SPA and the onshore and intertidal works at the landfall (see **Figure 1.8**) and therefore all features are screened in.

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
				• Whooper swan *Cygnus Cygnus* (non-breeding) • Pink-footed goose (non-breeding) • Shelduck (non-breeding) • Wigeon (non-breeding) • Teal (non-breeding) • Pintail (non-breeding) • Oystercatcher (non-breeding) • Ringed plover (non-breeding and passage) • Golden plover (non-breeding) • Grey plover (non-breeding) • Knot (non-breeding) • Sanderling (non-breeding and passage) • Dunlin (non-breeding) • Ruff *Philomachus pugnax* (breeding) • Black-tailed godwit (non-breeding) • Bar-tailed godwit (non-breeding)		

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
				• Redshank (non-breeding and on passage) • Lesser black-backed gull (breeding) • Black-headed gull (breeding) • Non-breeding waterbird assemblage • Breeding waterbird assemblage		
3	Ribble and Alt Estuaries Ramsar site	UK11057	0	• Lesser black-backed gull (breeding and spring/autumn) • Ringed plover (spring/autumn) • Grey plover (spring/autumn) • Knot (spring/autumn) • Sanderling (spring/autumn) • Dunlin (spring/autumn) • Black-tailed godwit (spring/autumn) • Redshank (spring/autumn) • Bewick's swan (winter)	None	There is direct spatial overlap between the Ribble and Alt Estuaries Ramsar site and the onshore and intertidal works at the landfall works and therefore all onshore and intertidal qualifying features are screened in.

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
				• Whooper swan (winter) • Pink-footed goose (winter) • Shelduck (winter) • Wigeon (winter) • Teal (winter) • Pintail (winter) • Oystercatcher (winter) • Bar-tailed godwit (winter)		
4	Morecambe Bay and Duddon Estuary SPA	UK9020326	9.5	• Pink-footed goose (non-breeding) • Golden plover (non-breeding) • Curlew (non-breeding) • Lesser black-backed gull (breeding and non-breeding) • Herring gull (breeding) • Sandwich tern (breeding)	• Common tern (breeding) • Little tern (breeding) • Mediterranean gull *Larus melanocephalus* (non-breeding) • Little egret *Egretta garzetta* (non-breeding) • Whooper swan (non-breeding) • Shelduck (non-breeding) • Pintail (non-breeding) • Oystercatcher (non-breeding) • Ringed plover (non-breeding) • Grey plover (non-breeding)	Pink-footed goose can utilise a wide range of terrestrial habitats during the non-breeding period and have a core foraging range of 20 km (NatureScot, 2016), and therefore are screened in. Similarly golden plover can utilise functional linked terrestrial fields up to 10 km from the SPA, as stated by Natural England's guidance (Natural England, 2021), this includes much of the Onshore Order Limits north of the River Ribble. Curlew also have connectivity to the Onshore Order Limits as highlighted by mapping produced for Natural England (Bowland Ecology, 2022).

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
					• Knot (non-breeding) • Sanderling (non-breeding) • Dunlin (non-breeding) • Ruff (non-breeding) • Black-tailed godwit (non-breeding) • Bar-tailed godwit (non-breeding) • Redshank (non-breeding) • Turnstone *Arenaria interpres* (non-breeding)	Both herring and lesser black-backed gull forage in terrestrial environments and can travel up to 50 km on average during a foraging trip (Woodward, et al, 2019), and therefore are screened in for further assessment. Breeding sandwich tern within the Morecambe Bay and Duddon Estuary SPA have potential connectivity with the onshore and intertidal works (mean max foraging range of 46.5 km as reported by Woodward, *et al.*, (2019)). Breeding common terns within the Morecambe Bay and Duddon Estuary SPA have no potential connectivity with the onshore works (outwith mean max foraging range of 26.9 km as reported by Woodward, *et al.*, (2019)). The majority of waders are known to be site faithful (Van de Kam, 2004) and pintail, and whooper swan have foraging ranges of 2 km, 2 km and 4 km respectively (Bowland Ecology, 2022). Shelduck will travel to 8 km (Oelke, 1974) and little egret 2 km (Hafner & Britton, 1983). These have all therefore been screened out.

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
5	Morecambe Bay Ramsar site	UK11045	9.5	• Pink-footed goose (winter) • Golden plover (winter) • Curlew (non-breeding) • Lesser black-backed gull (breeding and non-breeding) • Herring gull (breeding) • Sandwich tern (breeding)	• Cormorant (spring/autumn) • Shelduck (spring/autumn) • Pintail (spring/autumn) • Eider *Somateria mollissima* (spring/autumn) • Oystercatcher (spring/autumn) • Ringed plover (passage) • Grey plover (spring/autumn) • Sanderling (spring/autumn) • Redshank (spring/autumn) • Turnstone (spring/autumn) • Lesser black-backed gull (spring/autumn) • Great crested grebe (winter) • Wigeon (winter)	Pink-footed goose can utilise a wide range of terrestrial habitats during the non-breeding period and have a core foraging range of 20 km (NatureScot, 2016), and therefore it is screened in. Similarly golden plover can utilise functional linked terrestrial fields up to 10 km from the SPA (Natural England, 2021). Curlew also have connectivity to the Onshore Order Limits as highlighted by mapping produced for Natural England (Bowland Ecology, 2022). Both herring and lesser black-backed gull forage in terrestrial environments and can travel up to 50 km on average during a foraging trip (Woodward, *et al*., 2019), and therefore are screened in for further assessment. Breeding sandwich tern within the Morecambe Bay and Duddon Estuary SPA have potential connectivity with the onshore and intertidal works (mean max foraging range of 46.5 km as reported by Woodward, *et al*., (2019)). The majority of waders are known to be site faithful (Van de Kam, 2004) and wigeon, pintail, and whooper swan have foraging ranges of 2 km, 2 km

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
					• Goldeneye *Bucephala clangula* (winter) • Red-breasted merganser (winter) • Lapwing (winter) • Knot (winter) • Dunlin (winter) • Bar-tailed godwit (winter)	and 4 km respectively (Bowland Ecology, 2022). These have therefore been screened out.
6	Martin Mere SPA	UK9005111	11.49	• Pink-footed goose (non-breeding)	• Bewick's Swan (non-breeding) • Whooper swan (non-breeding) • Teal (non-breeding) • Pintail (non-breeding) • Waterfowl assemblage (in addition to above) during the non-breeding period : – Pochard *Aythya ferina* – Mallard *Anas platyrhynchos* – Wigeon	Pink-footed goose can utilise a wide range of terrestrial habitats during the non-breeding period and have a core foraging range of 20 km (NatureScot, 2016). Whooper swans utilise a smaller wintering range (up to 5 km core foraging range as taken from NatureScot, 2016) and therefore have been screened out of further assessment. No data is available for Bewick's but they are assessed as the similar Whooper and therefore screened out. Pintail and wigeon have a foraging range of 2 km (Bowland Ecology, 2022) and teal will travel up to 8.4 km (Johnson, *et al*., 2014). These have therefore been screened out for further assessment.

ID	European Site	Site Code	Approximate distance to Onshore Order Limits and the Intertidal Infrastructure Area	Qualifying features screened in for onshore and intertidal ornithology	Qualifying features screened out for onshore and intertidal ornithology	Rationale for screening decision
7	Bowland Fells SPA	UK9005151	17.6	• Lesser black-backed gull *Larus fuscus* (breeding)	• Hen Harrier (breeding) • Merlin (breeding)	Breeding lesser black-backed gull can forage up to 50 km (on average) from their breeding location. Lesser black-backed gull often forage in terrestrial habitats and therefore there is potential connectivity between the onshore works and the Bowland Fells SPA. Breeding hen harrier and merlin, do not habitually forage beyond 2 to 5 km and therefore there is no potential connectivity for these species.

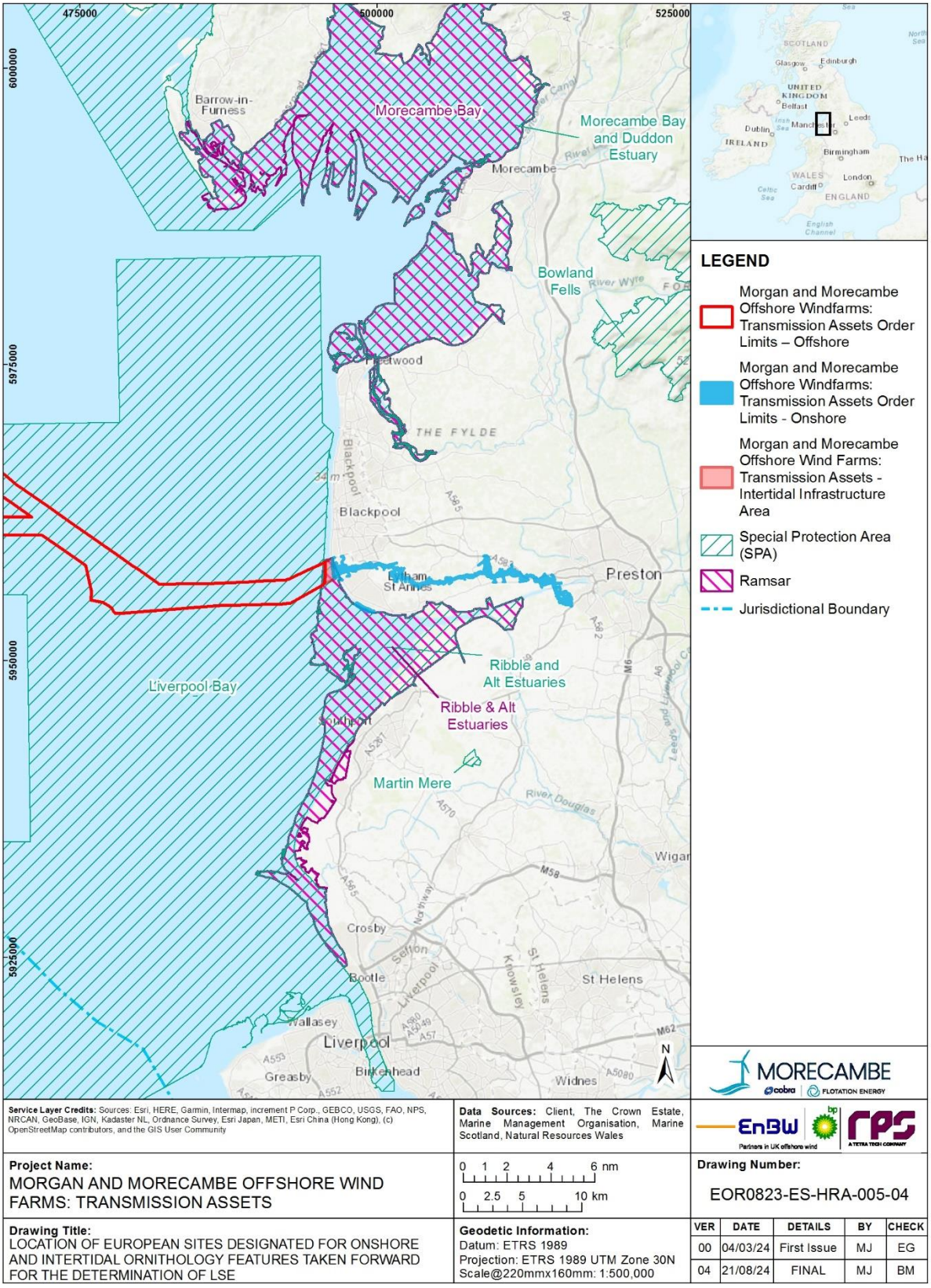

Figure 1.8: Location of European sites designated for onshore and intertidal ornithological features taken forward for the determination of LSE (not to scale)

1.5 Determination of likely significant effect

1.5.1 Approach

1.5.1.1 The assessment of LSE in the following sections is presented as a series of matrices setting out whether a conclusion of 'no LSE' can be reached for the relevant features of the European sites identified in **section 1.4**. The matrix approach used is considered to be a pragmatic approach and useful in defining the extent of impacts arising from the Transmission Assets on identified designated sites' qualifying interest features, in relation to the sites' conservation objectives. It also provides a clear audit trail for agreement with the statutory consultees on the scope of the HRA and the features and impacts to be taken forward into the appropriate assessment for each site.

1.5.1.2 The following matrix key is applicable to the matrices presented in the subsequent sections:

- ✓ - Potential for an LSE/LSE cannot be excluded;
- × - No potential for an LSE;
- C = Construction;
- O = Operation and maintenance; and
- D = Decommissioning.

1.5.1.3 With respect to the consideration of mitigation at the HRA Stage 1 LSE Screening stage in April 2018, the European Court of Justice issued a judgement, in the People Over Wind and Sweetman case (Case C323/17), clarifying the stage in a HRA process when mitigation measures can be taken into account when assessing impacts on a European site. The ruling stated that '…*in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site*.'

1.5.1.4 Therefore, measures intended to avoid or reduce the harmful effects of the plan or project have not been considered when determining the potential for LSE in **section 1.5.2** to **1.5.6** below.

1.5.2 Assessment of LSE for Annex I habitats (offshore and coastal)

1.5.2.1 One European site identified in the initial screening process (**section 1.4.2)** to be taken forward for determination of LSE for Annex I habitat features is outlined below in **Table 1.13.**

Table 1.10: European Site and relevant qualifying features to be taken forward for determination of LSE for Annex I habitats

European site	Relevant Annex I habitat features
Shell Flat and Lune Deep SAC	Sandbanks which are slightly covered by sea water all the time

Pathways for LSE: potential impacts on Annex I habitat features

1.5.2.2 This section provides a list of potential impacts and effects on Annex I habitats that may result from activities associated with the Transmission Assets. These are the impacts taken into account when determining the potential for LSE on the European sites and qualifying habitat features identified in **section 1.4.2**.

1.5.2.3 There is considerable knowledge from previous offshore wind farm projects and their associated transmission infrastructure on the potential impacts that the construction, operation and maintenance, and decommissioning of an offshore wind farm may have on benthic receptors. The list of potential impacts has also been informed by the benthic ecology chapter of the EIA Scoping Report for the Transmission Assets (Morgan OWL and Morecambe OWL, 2022) as well as the Scoping Opinion received in December 2022 (document reference: J25) and consultation responses received on the HRA Stage 1 Screening submitted alongside the PEIR (see **Table 1.1**). For consistency with the EIA process, the terminology adopted for describing the potential impacts for Annex I habitats (coastal and subtidal) is the same as that used in the EIA Scoping Report for the Transmission Assets (Morgan OWL and Morecambe OWL, 2022).

Table 1.11: Pathways for LSE: potential impacts on Annex I habitat features

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Increased SSC and associated deposition.	✓	✓	✓	**All phases** Sediment disturbance arising from activities across all phases (e.g. foundation and cable installation, cable reburial/replacement works/removal) may result in indirect impacts on benthic communities as a result of temporary increases in SSC and associated sediment deposition (i.e. smothering effects). The extent of this impact will be spatially restricted to within the Offshore Order Limits and the surrounding area. The Morgan Offshore Wind Project: Generation Assets ES modelling undertook a sample of sandwave clearance along the north east corner of the Morgan Offshore Wind Project: Generation Assets and, with relatively homogeneous tidal currents and sediments along much of the offshore cable corridors where sandwaves occur, these simulations may be used to quantify potential impacts for the Transmission Assets (see Volume 2, Chapter 1: Physical processes of the ES; document reference: F2.1). These simulations have therefore been used to determine the risk of LSE on SACs (see Volume 2, Chapter 1: Physical processes of the ES; document reference F2.1). The sediment plume associated with sandwave clearance would extend circa 5 km in a principally east/west orientation. Suspended sediment concentrations are at their greatest at the dredging site and where they have remobilisation following slack tide and may reach up to 1000 mg/l. However, average concentrations are typically one tenth of this value and near background levels at the edge of the plume's extent (see Volume 2, Chapter 1: Physical processes of the ES; document reference F2.1). It should also be noted that the MDS for sandwave clearance has been refined post-PEIR. These refinements have significantly reduced the requirements for sandwave clearance from 60% to 9% for the Morgan export cables and from 30% to 9% for the Morecambe export cables. The width of the sandwave clearance	Yes

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				corridor has also reduced from 104 m to 60 m for the Morgan cables and 48 m for the Morecambe cables. This has contributed to a decrease in the area affected by sandwave clearance material deposition associated with export cables from 16,326,400 m^2 at PEIR to 2,853,600 m^2 at ES (see Volume 2, Chapter 1: Physical processes of the ES and Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES; document reference F2.1, F2.2). As with the sandwave clearance, it is expected that cable installation activities will create a suspended sediment plume extending up to 5 km of the trenching operation. In the direct vicinity of the trenching, SSC was found to be typically 500 mg/l whilst at the extents of the plume SSC levels dropped to 0.5 mg/l which is in the order of background level variation. Sedimentation levels beyond the immediate vicinity of the trench were circa 50 mm and reducing to <0.5 mm within 2 km. The Shell Flat and Lune Deep SAC is located approximately 5.7 km to the north of the Offshore Order Limits (i.e. perpendicular to the main orientation of the plume), on the basis of the information provided above it is considered that the Shell Flat and Lune Deep SAC is located outside of the ZOI for changes in physical processes. However, concerns were raised by Natural England as part of S42 Consultation (see **Table 1.1**) regarding the volume of sand wave clearance required and the subsequent effects on the SAC, therefore on a precautionary basis there is considered to be potential for LSE on Annex I habitats of this site. This impact is therefore screened in for further consideration in the HRA Stage 2 ISAA Part 2 (document reference E2.2) for Annex I habitat features of the European site identified in **section 1.4.2**.	
Temporary habitat loss/disturbance.	✓	✓	✓	**All phases** Temporary habitat disturbance may occur from activities across all phases (e.g. Unexploded Ordnance (UXO) detonation, pre-cabling seabed clearance and anchor placements, cable repair/reburial etc.). This impact will be spatially restricted to within the footprint of the	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				Offshore Order Limits. Therefore, there is no potential for LSE on Annex I habitats of the Shell Flat and Lune Deep SAC as a result of temporary habitat loss/disturbance across all phases due to lack of spatial overlap. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	
Long term habitat loss.	✓[1]	✓	✓[2]	**All phases** There is the potential for long term habitat loss to occur directly under any cable protection required along the offshore export cables. As offshore export cables are installed throughout the construction phase this impact is also relevant to the construction phase although this impact will largely occur within the operation and maintenance phase. This impact will be spatially restricted to within the footprint of the Offshore Order Limits. Therefore, there is no potential for LSE on Annex I habitats of the Shell Flat and Lune Deep SAC as a result of loss term habitat loss across all phases due to lack of spatial overlap. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	No
Increased risk of introduction and spread of invasive non-native species (INNS).	✓	✓	✓	**All phases** The environmental risk associated with invasive species is considered to be relative to the capacity for a new species to enter a new environment and spread. The greatest risk exists where new opportunities are provided for novel invasive species. Although there may be some new infrastructure (e.g. cable protection, noting that offshore export cables will be buried where possible) as a result of the Transmission Assets, there is not considered to be a new route to impact due to the presence of other local offshore wind farms and major shipping lanes within the Irish Sea. It is therefore anticipated that the addition of hard substratum in the Offshore Order Limits would not	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				create any new connectivity routes or 'stepping-stones' that were previously absent. In addition, there is no physical overlap with the SAC and it is approximately 5.7 km from the Offshore Order Limits and in the nearshore region (the area of the export cable that is closest to the SAC) only 10% of all cables will need cable protection and in the nearshore area of overlap with the Fylde Marine Conservation Zone this will be even less with only 3% of cables potentially needing cable protection. As such, there is no additional risk posed to the conservation objectives of the relevant Annex I qualifying features. It should be noted that the risk of such events occurring will be managed by the implementation of measures such as an Offshore Environmental Management Plan (CoT65) which will include a marine biosecurity plan detailing measures to minimise the potential spread of INNS. These plans have not however, been considered in the determination of LSE, but they will nevertheless reduce the likelihood of introduction and spread of INNS. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	
Colonisation of hard substrate.	✓[1]	✓	×	**Construction and operation and maintenance phases** Artificial structures placed on the seabed (i.e. cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and changes in community composition. This impact will be spatially restricted to within the footprint of the Offshore Order Limits . Therefore, there is no potential for LSE on Annex I habitats of the Shell Flat and Lune Deep SAC as a result of colonisation of hard substrate across all phases due to lack of spatial overlap. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Changes in physical processes.	×	✓	×	**Operation and maintenance phase and decommissioning phase** The presence of d cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology. The extent of this impact will be spatially restricted to within the Offshore Order Limits and the surrounding area. Volume 2, Chapter 1: Physical processes of the ES (document reference F2.1) states that for wave climate where the cable protection height was less than circa 15% of the water depth there would be no change in wave climate; whilst in shallower water the change was 0.5 to 1% of background levels at the site of cable protection, reducing rapidly with distance and indistinguishable from background levels within 1 km of the site. For tidal currents, where cables were perpendicular to tidal currents and continuous length of cable protection was provided there would be a highly localised increase in current speed of circa 1% as flow is accelerated over and around the structure due to the depth reduction. The area influenced extended circa 500 m from the cable protection however the influence diminished rapidly within this zone. The Shell Flat and Lune Deep SAC is located approximately 5.7 km from the Offshore Order Limits; on the basis of the information provided above, it is considered that the Shell Flat and Lune Deep SAC is located outside of the ZOI for changes in physical processes. Therefore, there is considered to be no potential for LSE on Annex I habitats of this site. This impact is therefore screened out for further consideration in the ISAA Part 2 (document reference E2.2) for Annex I habitat features of the European site identified in **section 1.4.2**.	No
Removal of hard substrates.	×	×	✓	**Decommissioning Phase** The removal of cables during decommissioning has the potential to lead to loss of species/habitats colonising these structures. This impact	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				will be spatially restricted to within the footprint of the Offshore Order Limits. Therefore, there is no potential for LSE on Annex I habitats of the Shell Flat and Lune Deep SAC as a result of removal of hard substrates during decommissioning phase due to lack of spatial overlap. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	**All phases** Seabed disturbance associated with activities across all phases of the development (e.g. cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. The detailed results of the sediment chemistry analysis for the Transmission Assets are presented in Volume 2, chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2). Levels of contamination were generally low throughout the survey area, with levels of most contaminants below the Cefas Action level (AL)1 and the Canadian TEL. No contaminants were present at levels exceeding the Cefas AL2 or the Canadian PEL. For metals, the only exceptions were nickel, arsenic and mercury. Concentrations of nickel exceeded the Cefas AL1 at one station (but was well below the Cefas AL2). Concentrations of mercury at seven sites largely in the central and nearshore parts of the Offshore Order Limits (i.e., to the east and south east of the Morecambe Offshore Windfarm: Generation Assets), nearshore area exceeded the Canadian TEL (but were below the Cefas AL1). Concentrations of arsenic exceeded the Canadian TEL at 17 stations (but were below the Cefas AL1) throughout the survey area west of the Morgan Offshore Wind Project: Generation Assets and in the centre and east of the survey area (i.e. to the east and south east of the Morecambe Offshore Windfarm: Generation Assets and approaching near to the landfall).	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				Given overall low contaminant concentrations and the standard level of activity and disturbance associated with other activities in the area (e.g. construction and maintenance of oil and gas/offshore wind structures, vessel movements and associated anchoring), it is highly unlikely that activities associated with the construction, operation and maintenance, or decommissioning phases will cause any significant resuspension of contaminants. Additionally, there is no spatial overlap with the Shell Flat and Lune Deep SAC and as such there is no risk posed to the conservation objectives of the relevant Annex I qualifying features as a result of this impact. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	
Impacts to benthic invertebrates due to Electromagnetic Fields (EMF).	×	✓	×	**Operation and maintenance phase** EMF generated through the subsea electrical cabling may affect benthic subtidal and intertidal ecology by inhibiting/interfering with behaviours of the relevant benthic receptors. Research has demonstrated that even when buried, emission of EMF can impact the behaviour of invertebrates (Hutchison *et al*., 2020). Any impacts associated with EMF will be spatially restricted to within the footprint of the Offshore Order Limits. Therefore, there is no potential for LSE on Annex I habitats of the Shell Flat and Lune Deep SAC as a result of impacts of benthic invertebrates due to EMFs during operation and maintenance phase due to lack of spatial overlap. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	No
Heat from subsea electrical cables.	×	✓	×	**Operation and maintenance phase** The presence and operation of export cables within the Offshore Order Limits may lead to localised heating of seabed affecting benthic subtidal and intertidal receptors. This impact will be spatially restricted	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				to within the footprint of the Offshore Order Limits. Therefore, there is no potential for LSE on Annex I habitats of the Shell Flat and Lune Deep SAC as a result of heat from subsea electrical cables during operation and maintenance phase due to lack of spatial overlap. On this basis there is considered to be no potential for LSE on any Annex I habitats of the European site identified in **section 1.4.2** and this impact is screened out.	

[1] Combined assessment for construction and operation and maintenance phases

[2] Permanent loss from infrastructure left *in situ*

Determination of LSE for Annex I habitat features

1.5.2.4 **Table 1.12** presents the results of the LSE determination assessment as a result of the Transmission Assets on relevant Annex I habitats of the European Site identified in **section 1.4.2.** These assessments are made in the absence of mitigation measures. The text below the tables provides a brief assessment to support the screening in or out of each of the LSEs on the relevant Annex I habitats.

LSE in-combination

1.5.2.5 The LSE test requires consideration of the Transmission Assets alone and in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment stage, in the HRA Stage 2 ISAA Part 2 (document reference E2.2). The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for an LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

1.5.2.6 Given the highly precautionary method for site selection applied during this HRA Stage 1 Screening Report, it is considered that the consolidation of information regarding external plans and projects would not be likely to result in additional European sites or new effect pathways being identified for the screening assessment.

1.5.2.7 For Annex I habitats, the potential for LSE alone is identified for the increased SSC and associated deposition impact resulting from the Transmission Assets acting alone (see **Table 1.11**):

1.5.2.8 Therefore, the impacts outlined above will also be considered for the Transmission Assets acting in-combination with other plans/projects at the Appropriate Assessment stage.

Table 1.12: LSE matrix for European sites with Annex I habitat features

European site and relevant qualifying features	SSCs and associated sediment deposition			Temporary habitat loss/ disturbance			Long term habitat loss			Increased risk of introduction and spread of INNS				Colonisation of hard structures			Changes in physical processes			Removal of hard substrates			Disturbance/remobilisation of sediment-bound contaminants			Impacts to benthic invertebrates due to EMF			Heat from subsea cables		
	C	O	D	C	O	D	C	O	D	C	O	D	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Shell Flat and Lune Deep SAC																															
Sandbanks which are slightly covered by sea water all the time	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×			×				×	×	×	×	×	×			×	

Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

1.5.2.9 The points below explain the conclusion of whether LSE can be ruled out for a given impact presented in **Table 1.12**.

- **Increases in SSC and sediment deposition –** As detailed in **Table 1.11**, the Shell Flat and Lune Deep SAC is located approximately 5.7 km from the Offshore Order Limits. On the basis of the information provided above it is considered that the Shell Flat and Lune Deep SAC is located outside of the ZOI (beyond 5 km as defined in **Table 1.11**) for changes in physical processes. However, comments were raised from Natural England as part of Section 42 consultation regarding the volume of sand wave clearance required and the subsequent effects on the Shell Flat and Lune Deep SAC (see **Table 1.1**), therefore on a precautionary basis there is considered to be potential for LSE on Annex I habitats of this site. Therefore, there is potential for LSE on the Annex I habitat features of this site from increases in SSC and associated deposition during all phases.
- **Temporary habitat loss/disturbance –** As detailed in **Table 1.11**, the effects of this impact will be localised within the Offshore Order Limits. The Shell Flat and Lune Deep SAC is located outside of the Offshore Order Limits and it can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of this site from temporary habitat loss/disturbance across all phases.
- **Long term habitat loss –** As detailed in **Table 1.11**, the effects of this impact will be localised within the Offshore Order Limits. The Shell Flat and Lune Deep SAC is located outside of the Offshore Order Limits and it can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of this site from long term habitat loss across all phases.
- **Increased risk of introduction and spread of INNS** - As detailed in **Table 1.11**, although there may be some new infrastructure (e.g. cable protection, noting that offshore export cables will be buried where possible) introduced as a result of the Transmission Assets and that could facilitate the spread of INNS, this will not result in a new impact pathway. This is due to the presence of other local offshore wind farms and major shipping lanes within the Irish Sea region. Therefore, there is no potential for LSE on the Annex I habitats of the Shell Flat and Lune Deep SAC from increased risk of introduction and spread of INNS during all phases.
- **Colonisation of hard structures -** As detailed in **Table 1.11**, the effects of this impact will be localised within the Offshore Order Limits. The Shell Flat and Lune Deep SAC is located outside of the Offshore Order Limits and it can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of this site from colonisation of hard structures during construction and operation and maintenance phases.
- **Changes in physical processes -** As outlined in **Table 1.11**, given that the effects of this impact will be spatially restricted to within 1 km of the Offshore Order Limits; the Shell Flat and Lune Deep

SAC, located approximately 5.7 km away, is out with the ZOI for this impact. Therefore, there is no potential for LSE on the Annex I habitat features of this site from changes in physical processes during operation and maintenance phase.

- **Removal of hard substrate –** As detailed in **Table 1.11**, the effects of this impact will be localised within the Offshore Order Limits. The Shell Flat and Lune Deep SAC is located outside of the Offshore Order Limits and it can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of this site from removal of hard substrate during decommissioning phase.
- **Disturbance/remobilisation of sediment-bound contaminants -** As detailed in **Table 1.11**, the results of the sediment chemistry analysis levels of transitional elements showed overall low contaminant concentrations. Given the standard level of activity and disturbance associated with other activities in the area, it is highly unlikely that activities associated with the construction, operation and maintenance, or decommissioning phases will cause any significant resuspension of contaminants. As such, there is no potential for LSE on any Annex I habitat features of this site from disturbance/remobilisation of sediment-bound contaminants across all phases.
- **Impacts to benthic invertebrates due to EMF -** As detailed **Table 1.11**, the effects of this impact will be localised within the Offshore Order Limits. The Shell Flat and Lune Deep SAC is located outside of the Offshore Order Limits and it can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of this site from impacts to benthic invertebrates due to EMF during operation and maintenance phase.
- **Heat from the subsea cables -** As outlined in **Table 1.11**, the effects of this impact will be localised within the Offshore Order Limits. The Shell Flat and Lune Deep SAC is located outside of the Offshore Order Limits and it can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of this site from heat from the subsea cables during operation and maintenance phase.

1.5.3 Assessment of LSE for Annex II diadromous fish

1.5.3.1 The European sites identified in the initial screening process (**section 1.4.3**) to be taken forward for determination of LSE for Annex II diadromous fish features and freshwater pearl mussel are outlined below in **Table 1.13**.

Table 1.13: SACs and relevant qualifying features to be taken forward for determination of LSE for Annex II diadromous fish and freshwater pearl mussel

European site	Relevant Annex II diadromous fish features
Dee Estuary/Aber Dyfrdwy SAC	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC	Sea lamprey Petromyzon marinus Atlantic salmon *Salmo salar* River lamprey *Lampetra fluviatilis*
River Kent SAC	Freshwater pearl mussel *Margaritifera margaritifera*
River Ehen SAC	Atlantic salmon *Salmo salar* Freshwater pearl mussel *Margaritifera margaritifera*
River Derwent and Bassenthwaite Lake SAC	Sea lamprey *Petromyzon marinus* Atlantic salmon *Salmo salar* River lamprey *Lampetra fluviatilis*
Afon Gwyrfai a Llyn Cwellyn SAC	Atlantic salmon *Salmo salar*
Solway Firth SAC	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*
River Bladnoch SAC	Atlantic salmon *Salmo salar*
River Eden SAC	Sea lamprey *Petromyzon marinus* Atlantic salmon *Salmo salar* River lamprey *Lampetra fluviatilis*

Pathways for LSE: potential impacts on Annex II diadromous fish features

1.5.3.2 This section provides a list of potential impacts on Annex II diadromous fish species and freshwater pearl mussel that may result from activities associated with the Transmission Assets. These are the impacts taken into account when determining the potential for LSE on the European sites and qualifying Annex II diadromous fish species and freshwater pearl mussel identified in **section 1.4.3**.

1.5.3.3 The list of potential impacts has been compiled using the experience and knowledge gained from previous offshore wind farm projects and relevant stakeholder advice documents (NRW (2010), Countryside Council For Wales (2008a), Countryside Council For Wales (2008b), Natural England (2019a), Natural England (2019b), Natural England (2019c), NatureScot (2022a) and NatureScot (2022b)) for individual features of sites. The list of potential impacts has also been informed by the fish and shellfish chapter of the EIA Scoping Report for the Transmission Assets (Morgan OWL and Morecambe OWL, 2022) as well as the Scoping Opinion received in December 2022 (document reference J25) and section 42 responses received on the HRA Stage 1 Screening Report submitted alongside the PEIR (see **Table 1.1**). Consideration of the potential impacts identified for Annex II

diadromous fish is presented in **Table 1.14** to inform the determination of LSE in **section 1.4.**

Table 1.14: Pathways for LSE: potential impacts on Annex II diadromous fish and freshwater pearl mussel features

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Temporary habitat loss/disturbance.	✓	✓	✓	**All phases** There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of cable installation activities, placement of spud-can legs from jack-up operations, cable repair/reburial, and removal of the export cables during decommissioning phase. This impact will be spatially restricted to within the footprint of the Offshore Order Limits. No European sites with Annex II diadromous fish species and freshwater pearl mussel physically overlap with the Offshore Order Limits (see **Figure 1.5**) and so there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species/freshwater pearl mussel within any site. There is the potential for migratory fish to be present in the waters in and around the Offshore Order Limits and to be affected by temporary habitat loss/disturbance (e.g. effects on feeding grounds). However, similar habitats are widespread within the wider Irish Sea region and it is considered that there would be no barrier effects to migratory fish reaching the designated sites as a result of this impact. Furthermore, any impacts to supporting habitats such as foraging grounds outside the designated sites would be temporary, localised and would not be expected to result in any long term effects on the availability of food in the area, particularly given the extensive ranges of these species. On this basis there is considered to be no potential for LSE on any Annex II fish species and freshwater pearl mussel of any of the European sites screened in as a result of temporary habitat loss/disturbance. This impact is screened out for all sites.	No
Underwater sound from UXO impacting fish and shellfish receptors.	✓	x	x	**Construction phase** There is potential for mortality, injury and/or disturbance to migratory fish as a result of construction activities including clearance of UXOs. It is acknowledged that there will be stages when fish do not move much at all, for example salmon are likely to aggregate in the open sea near river mouths, prior to the upriver migration (e.g. Matz, 2014). The nearest European site to the Offshore Order Limits with Annex II diadromous fish and/or freshwater pearl mussel qualifying interest features is the Dee Estuary/Aber Dyfrdwy SAC which is located 32.81 km from the Offshore Order Limits (see **Figure 1.5**), but there is potential for migratory species to be present	Yes

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				within, or transiting through, the Offshore Order Limits and potential ZOI for underwater sound resulting from UXO (985 m as outlined in Volume 2, Chapter 3: Fish and shellfish ecology of the ES; document reference F2.3). The ZOI has been determined as part of the EIA process and indicates that effects will be spatially limited (985 m), and any behavioural effects (e.g. disruption to migration) will be short term and temporary. However, to ensure a precautionary assessment is presented, the potential for LSE on any Annex II features of European sites as a result of underwater sound arising from construction activities cannot be excluded. On this basis, this impact is screened in for further consideration in the HRA Stage 2 ISAA Part 2 (document reference E2.2) for Annex II diadromous fish and freshwater pearl mussel features associated with SACs outlined in **section 1.4.3** for construction phase. The HRA Stage 2 ISAA Part 2 (document reference E2.2) will include consideration of site-specific underwater sound assessments.	
Underwater sound from other activities during all phases.	✓	✓	✓	**All phases** There is potential for mortality, injury and/or disturbance to migratory fish as a result of underwater sound from vessel movement, cable repairs, removal of infrastructure and other activities during all phases. The nearest European site to the Offshore Order Limits with Annex II diadromous fish and/or freshwater pearl mussel qualifying interest features is the Dee Estuary/Aber Dyfrdwy SAC which is located 32.81 km from the Offshore Order Limits (see **Figure 1.5**), but there is potential for migratory species to be present within, or transiting through, the Offshore Order Limits and potential ZOI. Sound levels associated with these activities will be substantially lower compared to UXO operations. Although it is noted that the duration of sound emission will be significantly longer, which could result in a localised effect. At greater distances, however, sound levels will be reduced due to transmission loss, therefore an LSE pathway is unlikely. Therefore it is concluded that there is no potential for LSE on Annex II diadromous fish and freshwater pearl mussel qualifying interest features of the sites as a result of underwater sound from other activities during all phases.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				On this basis, there is no potential for LSE on any Annex II diadromous fish and freshwater pearl mussel qualifying interest features of European sites as a result of underwater sound from other activities and this impact is screened out from further consideration. This impact is screened out for all sites.	
Increased SSCs and associated sediment deposition.	✓	✓	✓	**All phases** Temporary increases in SSC and associated sediment deposition may arise during activities across all phases (e.g. cable reburial or replacement works). The extent of the impact will be spatially restricted to within the Offshore Order Limits and the surrounding area. The ZOI for increases in SSC and associated sediment deposition is 5 km, as defined by physical processes modelling of the sediment plume associated with sandwave clearance (outlined in **Table 1.11**). Given that there are no European sites designated for Annex II diadromous fish and/or freshwater pearl mussel within this buffer there is considered to be no potential for LSE as a result of increased SSCs and associated sediment deposition. This impact is screened out for all sites.	No
Long term habitat loss.	✓	✓	✓	**All phases** There is the potential for long term habitat loss to occur directly under any cable protection required along the export cables. This impact will be spatially restricted to within the footprint of the Offshore Order Limits and there is no physical overlap between the Offshore Order Limits and any European sites (see **Figure 1.5**). As such, there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species and freshwater pearl mussel within any site. There is the potential for migratory fish to be present in the waters in and around the Offshore Order Limits, and to be affected by long term habitat loss (e.g. loss of feeding grounds). However, similar habitats are widespread within this region of the Irish Sea and the areas of seabed impacted by long term loss will be discreet and small in the content of the habitats present in the wider area and the extensive ranges of these species. Furthermore, it is considered that there would be no barrier effects to migratory fish reaching the designated sites as a result of this impact. Any impacts to supporting habitats such as foraging grounds outside the designated sites would be localised and would not be expected to result in any long term effects on the availability of food in the area.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				On this basis, there is no potential for LSE on any Annex II diadromous fish and freshwater pearl mussel qualifying interest features of European sites as a result of long term habitat loss, and this impact is screened out from further consideration. This impact is screened out for all sites.	
EMF from subsea electrical cabling.	x	✓	x	**Operation and maintenance phase** The presence of subsea electrical cabling has the potential to emit a localised EMF which may interfere with the navigation of migratory fish, particularly in shallow nearshore waters (Gill and Bartlett, 2010). At this stage, the potential for LSE on Annex II features of European sites as a result of EMF from subsea cabling cannot be excluded. This impact is therefore screened in for further consideration in the HRA Stage 2 ISAA Part 2 (document reference E2.2) for Annex II diadromous fish and freshwater pearl mussel features of sites outlined in **section 1.4.3**.	Yes
Introduction of hard substrata.	✓	✓	✓	**All phases** Artificial structures placed on the seabed (i.e. cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. These structures may also facilitate the spread of INNS (see **Table 1.11** for more information on the potential for introduction and spread of INNS). Further, the introduction of hard substrate into the marine environment could increase the time fish spend in the vicinity of the structures (known as the fish aggregation (or reef) effect). It is anticipated that the risk of bio-invasion and the spread of marine INNS is low (as set out in the discussion of the risk to Annex I habitats, see **Table 1.11**) and that introduction of hard substrata will lead to limited effects on Annex II fish features of the SACs screened into the assessment. On this basis, there is no potential for LSE on any Annex II diadromous fish and freshwater pearl mussel qualifying interest features of European sites as a result of introduction of hard substrata, and this impact is screened out from further consideration. This impact is screened out for all sites.	No
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	**All phases** Seabed disturbance associated with all phases (e.g cable installation, repairs and decommissioning) could lead to the remobilisation of sediment-bound contaminants that may	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				result in harmful and adverse effects on fish and shellfish communities. The detailed results of the sediment chemistry analysis for the Transmission Assets are presented in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2). Levels of contamination were generally low throughout the survey area, with levels of most contaminants below the Cefas AL1 and the Canadian TEL. No contaminants were present at levels exceeding the Cefas AL2 or the Canadian PEL. For metals, the only exceptions were nickel, arsenic and mercury. Concentrations of nickel exceeded the Cefas AL1 at one station (but was well below the Cefas AL2). Concentrations of mercury at seven sites largely in the central and nearshore parts of the Offshore Order Limits (i.e. to the east and south east of the Morecambe Offshore Windfarm: Generation Assets), nearshore area exceeded the Canadian TEL (but were below the Cefas AL1). Concentrations of arsenic exceeded the Canadian TEL at 17 stations (but were below the Cefas AL1) throughout the survey area west of the Morgan Offshore Wind Project: Generation Assets and in the centre and east of the survey area (i.e. to the east and south east of the Morecambe Offshore Windfarm: Generation Assets and approaching near to the landfall). Given overall low contaminant concentrations and the standard level of activity and disturbance associated with other activities in the area (e.g. construction and maintenance of oil and gas/offshore wind structures, vessel movements and associated anchoring), it is highly unlikely that activities associated with the construction, operation and maintenance, or decommissioning phases will cause any significant resuspension of contaminants. Therefore, there is no additional risk posed to the conservation objectives of the relevant Annex II qualifying features as a result of this impact. On this basis, there is no potential for LSE on any Annex II diadromous fish and freshwater pearl mussel qualifying interest features of European sites as a result of disturbance/remobilisation of sediment-bound contaminants, and this impact is screened out from further consideration. This impact is screened out for all sites.	

Determination of LSE for Annex II diadromous fish features

1.5.3.4 **Table 1.15** presents the results of the LSE determination assessment as a result of the Transmission Assets on relevant Annex II diadromous fish and freshwater pearl mussel qualifying features of the SACs identified in **Table 1.14**. These assessments are made in the absence of mitigation measures. The text below the tables provides a brief assessment to support the screening in or out of each of the LSEs on the relevant Annex II diadromous fish and freshwater pearl mussel features.

LSE in-combination

1.5.3.5 The LSE test requires consideration of the Transmission Assets alone and in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment stage. The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for an LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

1.5.3.6 Given the highly precautionary method for site selection applied during this HRA Stage 1 Screening Report, it is considered that the consolidation of information regarding external plans and projects would not likely result in additional European sites or new effect pathways being identified for the Screening assessment.

1.5.3.7 For Annex II diadromous fish species, the potential for LSE alone is identified for the following impacts arising from the Transmission Assets acting alone (see **Table 1.14**).

- Underwater sound from UXO impacting fish and shellfish receptors.
- EMF from subsea electrical cabling.

1.5.3.8 Therefore, the impacts outlined above will also be considered for the Transmission Assets acting in-combination with other plans/projects at the Appropriate Assessment stage.

Table 1.15: LSE matrix for SACs with Annex II diadromous fish features

European site and relevant qualifying features	Temporary habitat loss/disturbance			Underwater sound from UXO impacting fish and shellfish receptors			Underwater sound from other activities			SSCs and associated sediment deposition.			Long term habitat loss			EMFs from subsea electrical cabling			Introduction of hard substrata			Disturbance/remobilisation of sediment-bound contaminants		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Dee Estuary/Aber Dyfrdwy SAC																									
Sea lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC																									
Sea lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
Atlantic salmon	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River Kent SAC																									
Freshwater pearl mussel	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River Ehen SAC																									
Atlantic salmon	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
Freshwater pearl mussel	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River Derwent and Bassenthwaite Lake SAC																									
Sea lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×

European site and relevant qualifying features	Temporary habitat loss/disturbance			Underwater sound from UXO impacting fish and shellfish receptors			Underwater sound from other activities			SSCs and associated sediment deposition.			Long term habitat loss			EMFs from subsea electrical cabling			Introduction of hard substrata			Disturbance/remobilisation of sediment-bound contaminants		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
River lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
Atlantic salmon	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
Afon Gwyrfai a Llyn Cwellyn SAC																								
Atlantic salmon	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
Solway Firth SAC																								
Sea lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River Bladnoch SAC																								
Atlantic salmon	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River Eden SAC																								
Sea lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
River lamprey	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×
Atlantic salmon	×	×	×	✓			×	×	×	×	×	×	×	×	×		✓		×	×	×	×	×	×

Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

1.5.3.9 The points below explain the conclusion of whether LSE can be ruled out for a given impact presented in **Table 1.15**.

- **Temporary habitat loss/disturbance –** As detailed in **Table 1.14**, this impact is screened out for all sites as there is no spatial overlap between the Offshore Order Limits and any SACs with Annex II diadromous fish and/or freshwater pearl mussel features. There is no potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from temporary habitat loss/disturbance during all phases.
- **Underwater sound impact from UXO affecting fish and shellfish receptors -** As detailed in **Table 1.14**, there is potential for migratory species to be present within or transiting through the Offshore Order Limits and potential ZOI area for underwater sound resulting from UXO (985 m as outlined in Volume 2, Chapter 3: Fish and shellfish ecology of the ES; document reference F2.3). There is considered to be the potential for LSE on Annex II diadromous fish and/or freshwater pearl mussel features of the sites during the construction phase.
- **Underwater sound from other activities -** As detailed in **Table 1.14**, there is potential for migratory species to be present within or transiting through the Offshore Order Limits and ZOI area (injury and behavioural) from underwater sound during construction, operation and maintenance and decommissioning phases as a result of various sound-producing activities (e.g. trenching, dredging, vessel traffic). Sound levels will be substantially lower when compared to activities such as UXO clearance, although it is noted, that the duration of sound emission will be significantly longer, which could result in a localised effect. At greater distances, however, sound levels will be reduced due to transmission loss, therefore an LSE pathway is unlikely. As such there is no potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from underwater sound from other (non-piling) activities during all phases.
- **Increases in SSC and sediment deposition –** As detailed in **Table 1.14**, given that the effects of this impact will be localised within and in the near vicinity of the Offshore Order Limits this impact is screened out as all SACs are located outside the ZOI for increases in SSCs and associated sediment deposition (5 km). There is no potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from increases in SSC and sediment deposition during all phases.
- **Long term habitat loss -** As detailed in **Table 1.14**, given that the effects of this impact will be localised within the Offshore Order Limits, this impact is screened out for all sites as there is no spatial overlap between the Offshore Order Limits and any SACs with Annex II diadromous fish features. There is no potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from long term habitat loss during all phases.

- **EMF from subsea electrical cabling -** As detailed in **Table 1.14**, there is potential for migratory species to be present within or transiting through the Offshore Order Limits and the ZOI for EMF from subsea electrical cabling. Therefore, there is potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs with Annex II diadromous fish features and/or freshwater pearl mussel from EMF during the operation and maintenance phase.
- **Introduction of hard substrata -** As detailed in **Table 1.14**, given that the effects of this impact will be localised within the Offshore Order Limits, this impact is screened out for all sites as there is no spatial overlap between the Offshore Order Limits and any SACs with Annex II diadromous fish features and/or freshwater pearl mussel. There is no potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from Introduction of hard substrata during all phases.
- **Disturbance/remobilisation of sediment-bound contaminants -** As detailed in **Table 1.14**, given that the effects of this impact will be localised within and in the near vicinity of the Offshore Order Limits, this impact is screened out as all SACs are located outside the ZOI for disturbance/remobilisation of sediment-bound contaminants (5 km). Furthermore, results of the sediment chemistry analysis for the Transmission Assets are presented in Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES (document reference F2.2) reported levels of contamination were generally low throughout the survey area, with levels of most contaminants below the Cefas AL1 and the Canadian TEL. There is no potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from disturbance/remobilisation of sediment-bound contaminants during all phases.

1.5.4 Assessment of LSE for Annex II marine mammals

1.5.4.1 33 European sites were identified in the initial screening process (**section 1.4.4**) to be taken forward for determination of LSE for Annex II marine mammals. These sites and their relevant qualifying interest features are listed according to country in **Table 1.16**.

Table 1.16: The SACs and Ramsar sites taken forward for determination of LSE, with details of associated marine mammal qualifying features

ID	European Site	Relevant Annex II features
UK		
1	North Anglesey Marine/Gogledd Môn Forol SAC	Harbour porpoise *Phocoena phocoena*
2	North Channel SAC	Harbour porpoise *Phocoena phocoena*
3	Strangford Lough SAC	Harbour seal *Phoca vitulina*
4	Murlough SAC	Harbour seal *Phoca vitulina*

ID	European Site	Relevant Annex II features
5	Cardigan Bay/Bae Ceredigion SAC	Bottlenose dolphin *Tursiops truncatus* Grey seal *Halichoerus grypus*
6	Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC	Bottlenose dolphin *Tursiops truncatus* Grey seal *Halichoerus grypus*
7	West Wales Marine/Gorllewin Cymru Forol SAC	Harbour porpoise *Phocoena phocoena*
8	The Maidens SAC	Grey seal *Halichoerus grypus*
9	Pembrokeshire Marine/Sir Benfro Forol SAC	Grey seal *Halichoerus grypus*
10	Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC	Harbour porpoise *Phocoena phocoena*
11	Lambay Island SAC	Grey seal *Halichoerus grypus*
12	Isles of Scilly Complex SAC	Grey seal *Halichoerus grypus*
Republic of Ireland		
13	Rockabill to Dalkey Island SAC	Harbour porpoise *Phocoena phocoena*
14	Saltee Islands SAC	Grey seal *Halichoerus grypus*
15	Roaringwater Bay and Islands SAC	Harbour porpoise *Phocoena phocoena*
16	Blasket Islands SAC	Harbour porpoise *Phocoena phocoena*
France		
17	Mers Celtiques - Talus du golfe de Gascogne SCI	Harbour porpoise *Phocoena phocoena*
18	Abers - Côte des légendes SCI	Harbour porpoise *Phocoena phocoena*
19	Ouessant-Molène SCI	Harbour porpoise *Phocoena phocoena*
20	Côte de Granit rose-Sept-Iles SCI	Harbour porpoise *Phocoena phocoena*
21	Anse de Goulven, dunes de Keremma SCI	Harbour porpoise *Phocoena phocoena*
22	Tregor Goëlo SCI	Harbour porpoise *Phocoena phocoena*
23	Côtes de Crozon SCI	Harbour porpoise *Phocoena phocoena*
24	Chaussée de Sein SCI	Harbour porpoise *Phocoena phocoena*

ID	European Site	Relevant Annex II features
25	Cap Sizun SCI	Harbour porpoise *Phocoena phocoena*
26	Récifs du talus du golfe de Gascogne SCI	Harbour porpoise *Phocoena phocoena*
27	Anse de Vauville SCI	Harbour porpoise *Phocoena phocoena*
28	Cap d'Erquy-Cap Fréhel SCI	Harbour porpoise *Phocoena phocoena*
29	Baie de Saint-Brieuc - Est SCI	Harbour porpoise *Phocoena phocoena*
30	Banc et récifs de Surtainville SCI	Harbour porpoise *Phocoena phocoena*
31	Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SCI	Harbour porpoise *Phocoena phocoena*
32	Estuaire de la Rance SCI	Harbour porpoise *Phocoena phocoena*
33	Baie du Mont Saint-Michel SCI	Harbour porpoise *Phocoena phocoena*

Pathways for LSE: potential impacts on Annex II marine mammals

1.5.4.2 This section provides a list of potential impacts on Annex II marine mammal species that may result from activities associated with the Transmission Assets. These are the impacts taken into account when determining the potential for LSE on the European sites and qualifying Annex II marine mammal species identified in **section 1.4.4**.

1.5.4.3 The list of potential impacts on marine mammals has been compiled using the experience and knowledge gained from previous offshore wind farm projects and the Natural England and NRW 'Advice on Operations' for individual features of sites (JNCC, 2019; NRW, 2018). The list of potential impacts has also been informed by the marine mammal chapter of the EIA Scoping Report for the Transmission Assets (Morgan OWL and Morecambe OWL, 2022) as well as the Scoping Opinion received in December 2022 and section 42 responses received on the HRA Stage 1 Screening submitted alongside the PEIR (see **Table 1.1**). Three impacts: accidental pollution during all phases; increased SSC and associated sediment deposition during all phases and impact of EMF (from cables present on the seabed or buried cables) during the operation and maintenance phase, were scoped out of the EIA at Scoping stage and therefore these impacts have not been considered further in this HRA Stage 1 Screening Report. Consideration of the potential impacts identified for Annex II marine mammal features is presented in **Table 1.17** to inform the determination of LSE in **section 1.4**.

Table 1.17: Pathways for LSE: potential impacts on Annex II marine mammal features

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Injury and disturbance from underwater sound generation from UXO clearance.	✓	×	×	**Construction phase** There may be a requirement for the clearance of UXOs within the Offshore Order Limits. The clearance has the potential to result in auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals. The underwater sound modelling presented in Volume 1, Annex 5.2: Underwater sound technical report of the ES (document reference F1.5.2), presents injury to a maximum range of ~15 km for Permanent Threshold Shift (PTS) and ~28 km for Temporary Threshold Shift (TTS) for harbour porpoise. The underwater sound modelling demonstrates that PTS (unmitigated) could impact hundreds of individuals; however, this is based on a highly precautionary scenario and realistically the numbers of animals impacted is considered to be much lower. For TTS (unmitigated), the maximum range of 28 km could result in >800 individuals being impacted; however, again this is a highly precautionary scenario and realistically animals impacted is anticipated to be closer to <400 m. Considering the results of the underwater noise modelling presented in Volume 1, Annex 5.2: Underwater sound technical report of the ES (document reference F1.5.2), and the distances to the SACs with potential connectivity to the Transmission Assets, this impact is therefore screened in for further consideration in the HRA Stage 2 ISAA Part 2 (document reference E2.2) for harbour porpoise features of the following European sites (as agreed with stakeholders in the EWG, see **Table 1.1**). • North Anglesey Marine/Gogledd Môn Forol SAC. • North Channel SAC. • Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC. • West Wales Marine/Gorllewin Cymru Forol SAC. • Rockabill to Dalkey Island SAC. The underwater sound modelling presented in Volume 1, Annex 5.2: Underwater sound technical report of the ES (document reference F1.5.2), presents injury to a maximum range for grey seal of ~3 km for PTS and ~6.4 km for TTS for grey seal. The underwater sound modelling demonstrates that PTS (unmitigated) could impact 14 individuals; however, this is based on a highly precautionary	Yes

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				scenario and realistically the numbers of animals impacted is considered to be much lower. For TTS (unmitigated), the maximum range of 6.4 km could result in 15 individuals being impacted; however, again this is a highly precautionary scenario and realistically animals impacted is anticipated to be closer to one. Considering the results of the underwater noise modelling presented in Volume 1, Annex 5.2: Underwater sound technical report of the ES (document reference F1.5.2), and the distances to the SACs with potential connectivity to the Transmission Assets, this impact is therefore screened in for further consideration in the HRA Stage 2 ISAA Part 2 (document reference E2.2) for grey seal features of the following European sites. • Pen Llŷn a`r Sarnau/Llŷn Peninsula and the Sarnau SAC. • Lambay Island SAC. • Cardigan Bay/Bae Ceredigion SAC. • Pembrokeshire Marine/Sir Benfro Forol SAC. • Saltee Island SAC. All other SACs identified are located >300 km from the Offshore Order Limits. While there may be a potential for Annex II marine mammal features linked with SACs further away than those outlined above occurring in the vicinity of the Offshore Order Limits, the likelihood of a LSE on these SACs is significantly lower and it's considered highly unlikely that any potential clearance of UXOs would lead to significant effects in terms of the conservation objectives of the European sites. For harbour seal, for all UXO weights, no more than one animal is predicted to experience PTS, equating to a maximum of 0.0004% of the reference population (Wales, NW England and Northern Ireland SMUs). With reference to wider populations, this equated to very small proportions of the relevant MUs (0.0008% for bottlenose dolphin). Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4) concluded that conservatively, during high order detonation of any size of UXO the maximum number of individuals that could potentially be injured for any of these species (based on densities presented in Volume 2, Chapter 4: Marine mammals off the ES; document reference F2.4) was estimated as no more than one. Noting, this conservative scenario does not include for any mitigation to avoid/minimise risk of injury effects. Considering the very small numbers	

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				of harbour seal and bottlenose dolphin potentially affected, in the most conservative scenario with no mitigation these species are screened out and no potential for LSE is concluded. On this basis it is concluded there is potential for LSE from underwater sound resulting from UXO clearance on the following SACs: North Anglesey Marine/Gogledd Môn Forol SAC, North Channel SAC, Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC, West Wales Marine/Gorllewin Cymru Forol SAC, Rockabill and Dalkey SAC, Pen Llŷn a`r Sarnau/Llŷn Peninsula and the Sarnau SAC, Lambay Island SAC, The Maidens SAC, Cardigan Bay/Bae Ceredigion SAC, Pembrokeshire Marine/Sir Benfro Forol SAC (as agreed with the EWG, see **Table 1.1)**.	
Disturbance to marine mammals from pre-construction surveys.	✓	×	×	**Construction phase** The impact of pre-construction related activities, and in particular geophysical surveys, may result in behavioural disturbance/displacement of marine mammals. A precautionary approach has been adopted to the identification of European sites for the LSE assessment which assumes that there is the potential for connectivity with Annex II marine mammal features of all sites located within the relevant MU for each species, as well as OSPAR Region III for seals. However, there will be no spatial overlap between the pre-construction surveys and any SAC with Annex II marine mammals features (the closest site being the North Anglesey Marine/Gogledd Môn Forol SAC which is located approximately 28.5 km from the Offshore Order Limits). Furthermore, considering the injury ranges presented in Volume 2, Chapter 4: Marine mammals of the ES (document reference F2.4), Permanent Threshold Shift (PTS) could occur out to a maximum of 254 m, with a maximum of one animal affected. Most of the predicted ranges for potential disturbance are within hundreds of meters of the source, however the largest distance over which the disturbance could occur is out to approximately 17.3 km for Sub-Bottom Profiler. Pre-construction site investigation surveys will not be undertaken nearby or within any of the SACs identified and potential disturbance impact zones will not overlap with the SAC. Annex II marine mammal features are likely to recover quickly after the surveys have ceased and therefore behavioural disturbance is unlikely to be significant. Only a small area will be affected when compared to available foraging habitat in the Irish Sea and it will not affect important areas for foraging and reproduction within the SACs considered.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				On this basis it is concluded that there is no potential for LSE from underwater sound resulting from pre-construction site surveys on any of the SACs with Annex II marine mammal features.	
Disturbance to marine mammals from vessel use and other sound-producing activities.	✓	✓	✓	**All phases** Disturbance of marine mammals may also arise during the construction, operation and maintenance and decommissioning phases from vessel use and other sound-producing activities. The extent of this potential disturbance will be spatially restricted to within the Offshore Order Limits and along vessel routes to ports used in support of the Transmission Assets during construction, operation and maintenance, and decommissioning phases. Beyond this, the movements of vessels using already established vessel routes will be dispersed and will become part of the background vessel traffic. Following the submission of the HRA Screening Report submitted alongside the PEIR, the Transmission Assets Project Description has been refined (e.g. removal of OSPs from the PDE and subsequent removal of piling impact) and the numbers of vessels associated with the construction, operation and maintenance, and decommissioning phase have been reduced. During the construction phase there may be a maximum of 29 construction vessels on site at any given time and up to 284 return trips across the 4 year construction phase. During the operation and maintenance phase there may be a maximum of 14 vessels on site at any one time, and a maximum of 77 return trips per year. The sound modelling results demonstrate the threshold for PTS was not exceeded for any species for all vessels and all cable burial activities. Therefore, there is no risk of PTS occurring to marine mammals as a result of elevated underwater sound due to vessel use or cable burial activities. Acoustic modelling was conducted for TTS for completeness (see Volume 1, Annex 5.2: Underwater sound technical report of the ES; document reference F1.5.2), however ranges indicated are likely to be overestimates. The greatest modelled disturbance range (TTS) (as presented in Volume 1, Annex 5.2: Underwater sound technical report of the ES; document reference: F1.5.2) was for survey and support vessels, crew transfer vessels, scour/offshore export cables protection and seabed preparation/installation vessels, at 4.02 km, for all marine mammal species. Cable trenching resulted in disturbance ranges of 3.43 km, whilst sandwave clearance, construction and installation, rock placement and cable installation vessels, had disturbance ranges out to 2.34 km. Offshore export cable laying also had disturbance ranges of 2.34 km, and tug/anchor handlers had a disturbance range of 1.44 km. In comparison, boulder clearance has the potential to result in a disturbance range of 0.37 km; jack-up rigs had a disturbance range of less than 10 m.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				Vessel use associated with the Transmission Assets will not be undertaken nearby or within any of the SACs identified and potential disturbance impact zones will not overlap with the SAC, (the closest site being the North Anglesey Marine/Gogledd Môn Forol SAC which is located approximately 28.5 km from the Offshore Order Limits). Activities and vessel movements will be restricted to the vicinity of the Offshore Order Limits, and large vessels, producing low frequency sound, will likely follow existing shipping routes. Therefore, a slight increase from the existing levels of traffic in the vicinity of the Offshore Order Limits will not result in high levels of disturbance and thus, behavioural disturbance is unlikely to result in adverse impacts on Annex II marine mammal features of the SACs considered. Only a small area will be affected when compared to available foraging habitat in the Irish Sea and it will not affect important areas for foraging and reproduction within the SACs. On this basis, it is concluded that there is no potential for LSE from underwater sound resulting from vessels and other sound sources on Annex II marine mammals features.	
Injury to marine mammals due to collision with vessels.	✓	✓	✓	**All phases** An increase in vessel activity, compared to baseline levels, during the construction, operation and maintenance, and decommissioning phases, may result in increased vessel collisions with marine mammals. The extent of this potential disturbance will be spatially restricted to within the Offshore Order Limits and along routes to local ports. Beyond this, the movements of vessels using already established vessel routes will be dispersed and will become part of the background vessel traffic. As only a small increase in vessels (see vessel numbers outlined for relevant phases in the row above) against a baseline of high shipping activity is anticipated, the likelihood of collisions occurring between vessels and marine mammals is considered to be low, with marine mammals likely to maintain their distance. Therefore, there is considered to be little potential for the increased vessel activity during all phases to result in a significant effect to Annex II marine mammal features in terms of collision risk with vessels. As such, no LSEs are anticipated to occur to Annex II marine mammal features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for all European sites.	No
Effects on marine	✓	✓	✓	**All phases**	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
mammals due to changes in prey availability.				There is the potential for changes in marine mammal prey (e.g. fish species) abundance and distribution to arise as a result of construction, operation and maintenance, and decommissioning activities which physically disturb the seabed, result in increased SSC or which generate underwater sound. Potential impacts to prey species may result in changes in the ability/success of marine mammals to forage in the area of the Offshore Order Limits and surrounding area. The risk of effects on prey species is expected to be greatest during the construction phase (e.g. due to seabed disturbance and/or underwater sound during construction) with effects during operation and maintenance and decommissioning phases expected to be much reduced. Impacts on prey species of Annex II marine mammal features will be limited in scale, temporary and reversible, and will not result in significant effects on fish and shellfish species (see Volume 2, Chapter 3: Fish and shellfish ecology of the ES; document reference F2.3). Marine mammals exploit a range of different prey items and can forage widely and change prey sources, sometimes covering extensive distances (Volume 2, Chapter 4: Marine mammals of the ES; document reference F2.4). Given that the potential impacts of construction to prey resources will be localised and largely restricted to the boundaries of the Transmission Assets (except for increases in SSC and associated sediment deposition which may extend out to 5 km), only a small area will be affected when compared to available foraging habitat in the Irish and Celtic Seas. The fish and shellfish communities found around Offshore Order Limits are characteristic of the fish and shellfish assemblages in the wider Irish Sea and it is therefore reasonable to assume that, due to the highly mobile nature of marine mammals, there will be similar prey resources available in the wider area (Volume 2, Chapter 4: Marine mammals of the ES; document reference F2.4). There may be an energetic cost associated with increased travelling and two species, harbour porpoise and harbour seal, may be particularly vulnerable to this effect. Despite this, if animals do have to travel further to alternative foraging grounds, the potential impacts are expected to be short term in nature and reversible. It is expected that all Annex II marine mammals would be able to tolerate the effect without any potential impact on reproduction and survival rates and would be able to return to previous activities once the potential impact had ceased. On this basis, it is concluded that there is no potential for LSE from effects on marine mammals due to changes in prey availability, the impact is therefore screened out of further consideration for all European sites.	

Determination of LSE for marine mammal features

1.5.4.4 **Table 1.18** and **Table 1.19** present the results of the LSE determination assessment for the designated sites located within the UK and Irish waters as well as French waters, respectively, as a result of the Transmission Assets on relevant Annex II marine mammal qualifying features identified in **Table 1.18**. These assessments are made in the absence of mitigation measures. The text below the tables provides a brief assessment to support the screening in or out of each of the LSEs on the relevant Annex II marine mammal features.

LSE in-combination

1.5.4.5 The LSE test requires consideration of the Transmission Assets alone and in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment stage. The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for a LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

1.5.4.6 Given the highly precautionary method for site selection used in this HRA Stage 1 Screening Report, it is considered that the consolidation of other plans and projects would not likely result in additional European sites or new effect pathways being identified for the screening of LSE.

- For Annex II marine mammals, the potential for LSE alone is identified for the injury and disturbance from underwater sound generation from UXO clearance impact resulting from the Transmission Assets acting alone (see **Table 1.18**).

1.5.4.7 Therefore, the impacts outlined above will also be considered for the Transmission Assets acting in-combination with other plans/projects at the Appropriate Assessment stage.

Table 1.18: LSE matrix for SACs in UK and Irish waters with Annex II marine mammal features

Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

European site and relevant qualifying features	Injury and disturbance from underwater sound generation from UXO detonation			Disturbance to marine mammals from pre-construction surveys			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities			Injury to marine mammals due to collision with vessels			Effects on marine mammals due to changes in prey availability		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
North Anglesey Marine/Gogledd Môn Forol SAC															
Harbour porpoise	✓			×			×	×	×	×	×	×	×	×	×
North Channel SAC															
Harbour porpoise	✓			×			×	×	×	×	×	×	×	×	×
Strangford Lough SAC															
Harbour seal *Phoca vitulina*	×			×			×	×	×	×	×	×	×	×	×
Murlough SAC															
Harbour seal *Phoca vitulina*	×			×			×	×	×	×	×	×	×	×	×
Cardigan Bay/Bae Ceredigion SAC															
Bottlenose dolphin *Tursiops truncatus*	×			×			×	×	×	×	×	×	×	×	×
Grey seal *Halichoerus grypus*	✓			×			×	×	×	×	×	×	×	×	×

European site and relevant qualifying features	Injury and disturbance from underwater sound generation from UXO detonation			Disturbance to marine mammals from pre-construction surveys			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities			Injury to marine mammals due to collision with vessels			Effects on marine mammals due to changes in prey availability		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC															
Bottlenose dolphin *Tursiops truncatus*	×			×			×	×	×	×	×	×	×	×	×
Grey seal *Halichoerus grypus*	✓			×			×	×	×	×	×	×	×	×	×
West Wales Marine/Gorllewin Cymru Forol SAC															
Harbour porpoise *Phocoena phocoena*	✓			×			×	×	×	×	×	×	×	×	×
The Maidens SAC															
Grey seal *Halichoerus grypus*	×			×			×	×	×	×	×	×	×	×	×
Pembrokeshire Marine/Sir Benfro Forol SAC															
Grey seal *Halichoerus grypus*	✓			×			×	×	×	×	×	×	×	×	×
Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC															
Harbour porpoise *Phocoena phocoena*	✓			×			×	×	×	×	×	×	×	×	×

European site and relevant qualifying features	Injury and disturbance from underwater sound generation from UXO detonation			Disturbance to marine mammals from pre-construction surveys			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities			Injury to marine mammals due to collision with vessels			Effects on marine mammals due to changes in prey availability		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Lambay Island SAC															
Grey seal *Halichoerus grypus*	×			×			×	×	×	×	×	×	×	×	×
Isles of Scilly Complex SAC															
Grey seal *Halichoerus grypus*	×			×			×	×	×	×	×	×	×	×	×
Rockabill to Dalkey Island SAC															
Harbour porpoise *Phocoena phocoena*	✓			×			×	×	×	×	×	×	×	×	×
Saltee Islands SAC															
Grey seal *Halichoerus grypus*	✓			×			×	×	×	×	×	×	×	×	×
Roaringwater Bay and Islands SAC															
Harbour porpoise *Phocoena phocoena*	×			×			×	×	×	×	×	×	×	×	×
Blasket Islands SAC															
Harbour porpoise *Phocoena phocoena*	×			×			×	×	×	×	×	×	×	×	×

1.5.4.8 The points below explain the conclusion of whether LSE can be ruled out for a given impact presented in **Table 1.18**.

- **Injury and disturbance from underwater sound generation from UXO clearance** - results of the underwater sound modelling in **Table 1.18** present the potential injury and disturbance ranges associated with UXO clearance. Overall, it is concluded that there is potential for LSE on the following SACs: North Anglesey Marine/Gogledd Môn Forol SAC, North Channel SAC, Bristol Channel Approaches/ Dynesfeydd Môr Hafren SAC, West Wales Marine/Gorllewin Cymru Forol SAC, Rockabill to Dalkey Island SAC, Pen Llŷn a`r Sarnau/Llŷn Peninsula and the Sarnau SAC (grey seal only), Lambay Island SAC, Cardigan Bay/Bae Ceredigion SAC (grey seal only) and Pembrokeshire Marine/Sir Benfro Forol SAC and Saltee Islands SAC and associated qualifying features due to this impact during the construction phase.
- **Disturbance to marine mammals from pre-construction surveys -** As detailed in **Table 1.18**, Pre-construction site investigation surveys will not be undertaken nearby or within any of the SACs identified and potential disturbance impact zones will not overlap with any SACs identified within **Table 1.5**. Annex II marine mammal features are likely to recover quickly after the surveys have ceased and therefore behavioural disturbance is unlikely to be significant. Only a small area will be affected when compared to available foraging habitat in the Irish Sea, and it will not affect important areas for foraging and reproduction within the SACs considered. Overall, it is concluded that there is no potential for LSE on all relevant qualifying features of their respective SACs due to this impact during the construction phase.
- **Disturbance to marine mammals from vessel use and other sound-producing activities -** As detailed in **Table 1.18**, Vessel use associated with the Transmission Assets will not be undertaken nearby or within any of the SACs identified and potential disturbance impact zones will not overlap with the SAC, (the closest site being the North Anglesey Marine/Gogledd Môn Forol SAC which is located 28.5 km from the Offshore Order Limits). Activities and vessel movements will be restricted to the vicinity of the Transmission Assets, and large vessels, producing low frequency sound, will likely follow existing shipping routes. Therefore, a slight increase from the existing levels of traffic in the vicinity of the Transmission Assets will not result in high levels of disturbance and thus, behavioural disturbance is unlikely to result in adverse impacts on Annex II marine mammal features of the SACs considered. Only a small area will be affected when compared to available foraging habitat in the Irish Sea and it will not affect important areas for foraging and reproduction within the SACs. Overall, it is concluded that there is no potential for LSE on all relevant qualifying features of their respective SACs due to this impact across all phases.

- **Injury to marine mammals due to collision with vessels -** As detailed in **Table 1.18**, the increase in vessel traffic and activity associated with all phases of the Transmission Assets would be low in comparison to baseline levels. The likelihood of this impact occurring is low and there is considered to be little potential of increased vessel traffic resulting in an adverse impact to Annex II marine mammals in terms of collision risk. Overall, it is concluded that there is no potential for LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Transmission Assets.
- **Effects on marine mammals due to changes in prey availability -** As detailed in **Table 1.18**, marine mammals exploit a range of different prey items and can forage widely and change prey sources, sometimes covering extensive distances. Given that the potential impacts of construction to prey resources will be localised and largely restricted to the boundaries of the Transmission Assets (except for increases in SSC and associated sediment deposition which may extend out to 5 km), only a small area will be affected when compared to available foraging habitat in the Irish and Celtic Seas. Overall, it is concluded that there is no potential for LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Transmission Assets.

Table 1.19: LSE matrix for SCIs in French waters with Annex II marine mammal features

European site and relevant qualifying features	Injury and disturbance from underwater sound generation from UXO detonation			Disturbance to marine mammals from pre-construction surveys			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities			Injury to marine mammals due to collision with vessels			Effects on marine mammals due to changes in prey availability		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
All European sites within French waters are listed in Table 1.16.															
Harbour porpoise	×			×			×	×	×	×	×	×	×	×	×

Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

1.5.4.9 The points below explain the conclusion of whether LSE can be ruled out for a given impact presented in **Table 1.19**.

- **Injury and disturbance from underwater sound generation from UXO clearance -** the nearest transboundary European site, Mers Celtiques - Talus du golfe de Gascogne SCI is located 559 km from the Offshore Order Limits. Given this significant distance, it is unlikely that the area in the vicinity of the Transmission Assets constitutes important foraging grounds for harbour porpoise features of this site and the other European sites which are located at a greater distance. Overall, it is concluded that there is no potential for LSE on Annex II marine mammal features of any European site due to this impact across the construction phase of the Transmission Assets.
- **Disturbance to marine mammals from pre-construction surveys -** the nearest transboundary European site, Mers Celtiques - Talus du golfe de Gascogne SCI is located 559 km from the Offshore Order Limits. Given this significant distance, it is unlikely that the area in the vicinity of the Transmission Assets constitutes important foraging grounds for harbour porpoise features of this site and the other European sites which are located at a greater distance. Overall, it is concluded that there is no potential for LSE on Annex II marine mammal features of any European site due to this impact across the construction phase of the Transmission Assets.
- **Disturbance to marine mammals from vessel use and other sound-producing activities -** the increase in underwater sound from vessel traffic will be small in comparison to existing background levels and activities within the Transmission Assets. Activities such as trenching and/or rock placement will also be intermittent and short term. Overall, it is concluded that there is no potential for LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Transmission Assets.
- **Injury to marine mammals due to collision with vessels -** As detailed in **Table 1.17**, the increase in vessel traffic across all phases of the Transmission Assets is considered to be low compared the baseline levels. Furthermore, the likelihood of collisions between marine mammals and vessels is considered to be low as the nearest transboundary European site, Mers Celtiques - Talus du golfe de Gascogne SCI is located 559 km from the Offshore Order Limits. Overall, it is concluded that there is no potential for LSE to the harbour porpoise feature of any transboundary European site from collision risk with vessels for all phases of the Transmission Assets.
- **Effects on marine mammals due to changes in prey availability -** changes in prey availability are unlikely to result in significant effects on Annex II marine mammal features given that the majority of impacts on prey species will be spatially limited to the Offshore Order Limits (for habitat disturbance) and immediate vicinity (e.g. for indirect effects such as underwater sound and increases in SSCs), particularly in the context of the extensive foraging ranges exhibited by marine mammals and their

highly mobile nature. Effects on marine mammals due to changes in prey availability are considered particularly unlikely given the significant distance between the Offshore Order Limits and the nearest transboundary European site (Mers Celtiques - Talus du golfe de Gascogne SCI, 559 km). Overall, there is no potential for LSE on Annex II marine mammal features due to changes in prey availability across all phases of the Transmission Assets.

1.5.5 Assessment of LSE for offshore ornithological features

Pathways for LSE: potential impacts on marine ornithology features

1.5.5.1 This section provides a list of potential impacts and effects on offshore ornithological features that may result from activities associated with the Transmission Assets. These are the impacts taken into account when determining the potential for LSE on the European sites and qualifying marine ornithological features identified in **section 1.4.7**.

1.5.5.2 The list of potential impacts (**Table 1.20**) has been compiled using the experience and knowledge gained from previous offshore wind farm projects and Natural England's 'advice on operations' (such as Natural England, 2022). Consideration of the potential impacts identified for offshore ornithological features is presented in the following sections to inform the determination of LSE in **section 1.5.**

Table 1.20: Pathways for LSE: potential impacts on marine ornithology receptors

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure	✓	✓	✓	Airborne sound and underwater sound generated during construction activities (such as cable laying), and the presence of vessels, may temporarily disturb/displace birds from foraging areas. Occasional presence of vessels during operation and maintenance checks may disturb birds and displace them from their foraging or resting areas. The presence of vessels during the decommissioning phase may temporarily disturb birds from foraging areas. There is potential for disturbance due to underwater sound resulting from cable removal during decommissioning.	Yes
Indirect impacts from underwater sound affecting prey species.	✓	×	✓	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities. Similar impacts may arise during the decommissioning. This may cause reduced energy intake affecting the productivity or survival of birds. This does not apply to the operation and maintenance phase when effects on fish and shellfish are expected to be considerably reduced compared with construction.	Yes
Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓	There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of construction and operation and maintenance activities during all phases (e.g., seabed preparation, UXO detonation, cable installation and repair/reburial and removal of infrastructure) (see Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES; document reference F2.2). This has potential to affect the foraging efficiency of diving birds as well as indirect effects from impacts on fish and shellfish prey.	Yes
Accidental pollution	✓	✓	✓	Pollution events are considered unlikely, and given the volumes associated with offshore wind farm development, should an event occur, effects will be temporary, reversible and limited in spatial extent (e.g. due to the expected low volumes of pollutants associated with offshore wind developments). Any indirect effects on offshore ornithology qualifying interests from the accidental release of pollutants would therefore be unlikely and should they occur, these would be unlikely to lead to a significant effect on the conservation objectives of the site. It should be noted that the risk of such events occurring will be minimised and managed by the implementation of a marine pollution contingency plan (appended to the Offshore Environmental Management Plan; CoT65), which addresses the risks, methods and procedures to deal with any spills during construction and operation of the authorised scheme for activities carried out below MHWS. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. They will also set out industry good practice	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				and OSPAR (Oslo-Paris), International Maritime Organization and the International Convention for the Prevention of Pollution from Ships guidelines for preventing pollution at sea. These plans have not however, been considered in the determination of LSE, but they will nevertheless reduce the likelihood of an accidental pollution event occurring. Consequently, seabirds and shorebirds are extremely unlikely to be significantly affected by any such pollution impacts. As such, no significant effects would occur and it is proposed that this is screened out of the HRA process.	

Determination of LSE for offshore ornithology

1.5.5.3 The initial screening exercise (**section 1.4.7**) for offshore ornithology, which identified 61 European sites, used the HRA screening tool as a precautionary filter to identify connectivity between SPAs and Ramsar sites and the Transmission Assets using foraging ranges and ZOIs associated with each impact.

1.5.5.4 The method used for the determination of LSE builds on this initial screening but takes into consideration the following factors which are described in detail in the bullets preceding **Table 1.21**.

- The vulnerability of each species to impacts associated with the Transmission Assets.
- The limitations of the screening tool as applied in the breeding season including the application of foraging ranges to SPAs designated to protect foraging areas and the application of foraging ranges over land.
- Site-specific foraging range data.
- The likely magnitude of impacts associated with the Transmission Assets.

1.5.5.5 The process has been informed by published guidance and literature on species sensitivities (i.e. Wade *et al.,* 2016; Bradbury *et al.,* 2014) and behaviour (i.e. Wilson *et al.,* 2014; Parsons *et al.,* 2015).

1.5.5.6 **Table 1.21** presents the LSE screening matrix for SPAs with offshore ornithological features, which presented the results of the screening assessment for the potential impacts associated with the Transmission Assets on relevant qualifying interest features of the SPAs identified in **Table 1.7**. The consideration of whether or not an LSE will occur is made in the absence of mitigation measures. The footnotes to the following tables provide a brief explanation to support the screening in or out of each of the likely significant effects on the identified SPA features.

1.5.5.7 Based on the likely magnitude of impacts associated with the Transmission Assets and the distance between the Offshore Order Limits and any non-UK designated sites, no LSE has been concluded for all designated sites outside of UK waters.

1.5.5.8 For breeding seabird features in the breeding season where potential LSE has been identified in **Table 1.21**, consideration will be given to impacts occurring across the entire annual cycle in the ISAA Part 3 (document reference E2.3). Outside of the breeding season, seabirds disperse or migrate to sea areas that are often different to those that they utilise in the breeding season. At this time of year breeding seabirds are not constrained to specific sea areas due to the necessity to provision young and are therefore able to exploit much larger areas; however, the availability of prey may be reduced. The area affected by the Transmission Assets would represent a negligible proportion of the area available to seabirds in the non-breeding season with many species migrating to areas outside of the Irish Sea. It is considered highly unlikely that the Offshore Order Limits will provide a material contribution to any existing impact in the non-breeding season and

therefore LSE is discounted for any SPA for which potential connectivity has been identified in the non-breeding seasons only (as relevant to each species).

LSE in-combination

1.5.5.9 The LSE test requires consideration of the Transmission Assets alone and/or in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment. The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for a LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

1.5.5.10 Given the highly precautionary method for site selection applied during this HRA Stage 1 Screening Report, it is considered that the consolidation of information regarding external plans and projects would not likely result in additional European sites or new effect pathways being identified for the HRA Stage 1 Screening Report.

Table 1.21: LSE matrix for SPAs with offshore ornithological features

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Liverpool Bay SPA												
Red-throated diver	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Cormorant	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Common scoter	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Red-breasted merganser	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Little gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Common tern	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Little tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
Ribble and Alt Estuaries Ramsar												
Red-throated diver	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Cormorant	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Common scoter	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Black-headed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Common tern	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Ribble and Alt Estuaries SPA												
Common scoter	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Cormorant	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Scaup	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Black-headed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Common tern	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Morecambe Bay and Duddon Estuary SPA												
Cormorant	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Eider	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Red-breasted merganser	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Mediterranean gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Black-headed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Common gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Herring gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Sandwich tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
Common tern	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Little tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
Morecambe Bay Ramsar												
Cormorant	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Eider	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Red-breasted merganser	✓	✓	✓	✓	N/A	✓	✓	✓	✓	×	×	×
Black-headed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Herring gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Sandwich tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
Bowland Fells SPA												
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Mersey Narrows and North Wirral Foreshore SPA												
Common tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
Duddon Estuary Ramsar												
Sandwich tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
The Dee Estuary Ramsar												
Common tern	× (c)	(c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
The Dee Estuary SPA												
Common tern	× (c)	× (c)	× (c)	× (c)	N/A	× (c)	× (c)	× (c)	× (c)	×	×	×
Anglesey Terns/Morwenoliaid Ynys Môn SPA												
Sandwich tern	× (c, e)	× (c, e)	× (c, e)	× (c, e)	N/A	× (c, e)	× (c)	× (c)	× (c)	×	×	×
Arctic tern	× (e)	× (e)	× (e)	× (e)	N/A	× (e)	× (e)	× (e)	× (e)	×	×	×
Upper Solway Flats & Marshes Ramsar												
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Herring gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Strangford Lough Ramsar												
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Copeland Islands SPA												
Manx shearwater	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Glannau Aberdaron ac Ynys Enlli/FebAberdaron Coast and Bardsey Island SPA												
Manx shearwater	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Ailsa Craig SPA												
Gannet	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Kittiwake	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Guillemot	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Lough Neagh & Lough Beg Ramsar												
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Northumbria Coast Ramsar												
Kittiwake	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Northumberland Marine SPA												
Fulmar	× (a, b, d, e)	× (a, b, d, e)	× (a, b, d, e)	× (a, b, d, e)	N/A	× (a, b, d, e)	× (a, b, d, e)	× (a, b, d, e)	× (a, b, d, e)	×	×	×
Lesser black-backed gull	× (a, b, e)	× (a, b, e)	× (a, b, e)	× (a, b, e)	N/A	× (a, b, e)	× (a, b, e)	× (a, b, e)	× (a, b, e)	×	×	×
Rathlin Island SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Kittiwake	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Puffin	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Flamborough and Filey Coast SPA												
Gannet	× (a,b, d)	× (a,b, d)	× (a,b, d)	× (a,b, d)	N/A	× (a,b, d)	× (a,b, d)	× (a,b, d)	× (a,b, d)	×	×	×
Kittiwake	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Puffin	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Coquet Island SPA												
Fulmar	× (a, b, d)	× (a, b, d)	× (a, b, d)	× (a, b, d)	N/A	× (a, b, d)	× (a, b, d)	× (a, b, d)	× (a, b, d)	×	×	×
Lesser black-backed gull	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Kittiwake	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Puffin	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Forth Islands SPA												
Gannet	× (a, b, d)	× (a, b, d)	× (a, b, d)	× (a, b, d)	N/A	× (a, b, d)	× (a, b, d)	× (a, b, d)	× (a, b, d)	×	×	×
Lesser black-backed gull	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Kittiwake	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Puffin	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Severn Estuary Ramsar												
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
The Wash Ramsar												
Lesser black-backed gull	× (a, b)	× (a, b)	× (a, b)	× (a, b)	N/A	× (a, b)	× (a, b)	× (a, b)	× (a, b)	×	×	×
Farne Islands SPA												
Kittiwake	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Puffin	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Loch Leven Ramsar												
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
St Abb's to Fast Castle SPA												
Kittiwake	× (a,b)	× (a,b)	× (a,b)	× (a,b)	N/A	× (a,b)	× (a,b)	× (a,b)	× (a,b)	×	×	×
Skomer, Skokholm and the Seas off Pembrokeshire SPA												
Manx shearwater	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Storm petrel	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Lesser black-backed gull	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Kittiwake	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Puffin	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Grassholm SPA												
Gannet	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
North Colonsay and Western Cliffs SPA												
Kittiwake	× (b)	× (b)	× (b)	× (b)	N/A	× (b)	× (b)	× (b)	× (b)	×	×	×
Treshnish Isles SPA												
Storm petrel	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Fowlsheugh SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Rum SPA												
Manx shearwater	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Mingulay and Berneray SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Buchan Ness to Collieston Coast SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Troup, Pennan and Lion`s Heads SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
The Shiant Isles SPA												

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
East Caithness Cliffs SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Alderney West Coast & the Burhou Islands Ramsar												
Gannet	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Isles of Scilly SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Manx shearwater	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Handa SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
St Kilda SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Manx shearwater	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Leach's petrel	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Gannet	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
North Caithness Cliffs SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Cape Wrath SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Flannan Isles SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Leach's petrel	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Hoy SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Copinsay SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Sule Skerry and Sule Stack SPA												
Leach's petrel	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Rousay SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
North Rona and Sula Sgeir SPA												

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Leach's petrel	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Calf of Eday SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
West Westray SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Fair Isle SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Sumburgh Head SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Foula SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Noss SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×

European site and relevant qualifying features	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure			Indirect impacts from underwater sound affecting prey species			Temporary habitat loss/disturbance and increased SSCs			Accidental pollution		
	C	O	D	C	O	D	C	O	D	C	O	D
Ronas Hill – North Roe and Tingon Ramsar												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Ronas Hill – North Roe and Tingon SPA												
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Fetlar SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Hermaness, Saxa Vord and Valla Field SPA												
Fulmar	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×
Great skua	× (b, d)	× (b, d)	× (b, d)	× (b, d)	N/A	× (b, d)	× (b, d)	× (b, d)	× (b, d)	×	×	×

The text below explains the conclusion of whether LSE can be ruled out for a given impact for each SPA feature. Within Table 1.21, where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they contain N/A.

a. Foraging distances applied over land: The screening tool does not discriminate between land and sea and there are occasions where the foraging range of a feature appears to intersect with the Transmission Assets but this has only occurred because the tool has projected this range across an intervening land mass. It is highly unlikely that seabirds will traverse significant distances over land in order to forage. In these cases a judgement is made as to whether connectivity would still be indicated if foraging was restricted only to sea areas. For example this affects gannet and lesser black-backed gull as features of the Forth Islands SPA.

b. Vulnerability of species to impacts associated with offshore wind farms: The screening exercise has been conducted assuming that all impacts are applicable to all features. This is, however, not realistic with some species having no vulnerability to certain impacts.

Table 1.22 identifies the vulnerability for each species (Wade *et al.,* 2016) for which potential connectivity between the Transmission Assets and an SPA or Ramsar at which they are a feature has been identified. Assessments for all impacts will only be conducted where a species has a vulnerability to 'displacement associated with vessels/helicopters' of High or Very High and/or a Low habitat flexibility.

c. Site-specific foraging range data: The screening exercise uses generic foraging ranges from Woodward *et al.* (2019). In some cases site-specific foraging range data are available and these have been used, where necessary, to inform the determination of LSE. Site-specific foraging ranges have been sourced from Wilson *et al.* (2014) and Parsons *et al.* (2015) for relevant species and where referenced indicate no connectivity between the Transmission Assets and birds from the relevant SPA and therefore no LSE is concluded.

d. Large foraging ranges, limited magnitude of impacts: Fulmar, gannet, great skua, Leach's petrel and storm petrel all have significant foraging ranges (Woodward *et al.,* 2019) meaning that the screening exercise has identified connectivity between the Transmission Assets and all UK SPAs at which these species are qualifying features. The large foraging ranges of these species means that the area impacted by the Transmission Assets will represent a negligible proportion of the foraging area available for these species to exploit and therefore no LSE is concluded.

e. Foraging ranges applied to foraging areas: The boundaries designated for certain SPAs incorporate foraging areas utilised by birds from colonies that either form part of the same SPA or are designated as part of another SPA. In these cases it is incorrect to apply an additional foraging to the SPA boundary as this would over-estimate the foraging area utilised by relevant features. Where this has occurred, a manual check of the distance between the SPA and Transmission Assets has been undertaken and a conclusion of no LSE reached if there is no overlap.

Table 1.22: Vulnerability of all features for which connectivity was identified to the impacts for which pathways exist used to inform the determination of LSE (green shading indicates where a species is not considered vulnerable to the extent that would result in LSE)

Feature	Vulnerability to disturbance from vessels and helicopters (Wade *et al.*, 2016 unless otherwise stated)	Habitat flexibility (Wade *et al.*, 2016 unless otherwise stated)
Scaup	High	Low
Eider	Moderate	Low
Common scoter	Very High	Low
Red-breasted merganser[2]	Moderate	Low
Kittiwake	Low	Moderate
Black-headed gull	Low	Moderate
Little gull[3]	Very low	Moderate
Mediterranean gull[3]	Low	Moderate
Common gull	Low	Moderate
Herring gull	Very low	High
Lesser black-backed gull	Very low	High
Sandwich tern	Low	Moderate
Little tern	Low	Low
Common tern	Low	Moderate
Arctic tern	Low	Moderate
Great skua	Very low	Moderate
Guillemot	Moderate	Moderate
Puffin	Moderate	Moderate
Red-throated diver	Very High	Low
Storm petrel	Very low	High
Leach's petrel	Very low	High
Fulmar	Very low	High
Manx shearwater	Very low	High
Gannet	Very low	High
Cormorant	High	Moderate

[2] Bradbury *et al.* (2014)

1.5.6 Assessment of LSE for onshore and intertidal ornithology

1.5.6.1 The five European sites and two Ramsar sites identified in the initial screening process (**section 1.4.8**) to be taken forward for determination of LSE for the ornithological features, for which there is considered to be a potential for impact as a result of the onshore and intertidal works associated with the Transmission Assets, are outlined below in **Table 1.23**.

Table 1.23: European sites and Ramsar sites and relevant qualifying features to be taken forward for determination of LSE for onshore and intertidal ornithological features

ID	European site	Relevant onshore and intertidal ornithological features
1	Liverpool Bay SPA	Red-throated diver (non-breeding) Common scoter (non-breeding Common tern (breeding)
2	Ribble and Alt Estuaries SPA	Common tern (breeding) Bewick's swan (non-breeding) Whooper Swan (non-breeding) Pink-footed goose (non-breeding) Shelduck (non-breeding) Wigeon (non-breeding) Teal (non-breeding) Pintail (non-breeding) Oystercatcher (non-breeding) Ringed plover (non-breeding and passage) Golden plover (non-breeding) Grey plover (non-breeding) Knot (non-breeding) Sanderling (non-breeding and passage) Dunlin (non-breeding) Ruff (breeding) Black-tailed godwit (non-breeding) Bar-tailed godwit (non-breeding) Redshank (non-breeding and passage) Lesser black-backed gull (breeding) Non-breeding waterbird assemblage Breeding waterbird assemblage
3	Ribble and Alt Estuaries Ramsar site	Lesser black-backed gull (breeding spring and passage ring) Ringed plover (spring/autumn) Grey plover (spring/autumn) Knot (spring/autumn) Sanderling (spring/autumn) Dunlin (spring/autumn) Black-tailed godwit (spring/autumn) Redshank (spring/autumn) Bewick's swan (winter) Whooper swan (winter) Pink-footed goose (winter) Shelduck (winter) Wigeon (winter) Teal (winter) Pintail (winter) Oystercatcher (winter) Bar-tailed godwit (winter)

ID	European site	Relevant onshore and intertidal ornithological features
4	Morecambe Bay and Duddon Estuary SPA	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Lesser black-backed gull (breeding and non-breeding) Herring gull (breeding) Sandwich tern (breeding)
5	Morecambe Bay Ramsar site	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Lesser black-backed gull (breeding) Herring gull (breeding) Sandwich tern (breeding)
6	Martin Mere SPA	Pink-footed goose (non-breeding)
7	Bowland Fells SPA	Lesser black-backed gull (breeding)

Pathways for LSE: potential impacts on onshore and intertidal ornithology

1.5.6.2 Potential impacts on the onshore and intertidal ornithological features may occur during the construction, operation and maintenance as well as decommissioning phases of the Transmission Assets. The impacts taken into account when determining the potential for LSE on the designated sites and waterbird features identified are presented in **Table 1.24.** The list of potential impacts on onshore and intertidal ornithology has been compiled using the experience and knowledge gained from previous onshore elements of offshore wind farm projects, as well as published literature alongside the project description and the MDS. A comprehensive suite of surveys have been carried out over the Onshore Order Limits and two full years' worth of data has been used to inform the baseline.

1.5.6.1 Surveys carried out to inform this report include two years of intertidal surveys at the landfall, two winters of estuarine surveys at the Ribble crossing, two years of breeding bird surveys along the onshore cable route and two winters of winter bird surveys along the onshore cable route. See Volume 3, Annex 4.1: Breeding birds technical report; Volume 3, Annex 4.2: Wintering and migratory birds technical report; and Volume 3, Annex 4.3 Intertidal birds technical report for full details (document reference F3.4.1, F3.4.2, F3.4.3).

1.5.6.2 Consideration of the potential impacts identified for the onshore and intertidal ornithological features is presented in the following sections to inform the determination of LSE. Many of the European sites screened in include an assemblage qualifying feature, with the named components of each of these assemblage features also being identified in **Table 1.24**. For the purposes of considering the potential impact pathways, these named components are treated as qualifying features (with the potential impact pathways also considered for the overall assemblage feature).

Table 1.24: Pathways for LSE: potential impacts on onshore and intertidal ornithology receptors

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Permanent loss of supporting habitats.	✓	×	×	Permanent habitat loss will occur during the construction of the onshore substations and the associated infrastructure (e.g., transition joint bays). This impact has the potential to affect SPA or Ramsar sites supporting habitats through loss of key foraging and roosting habitats for waterbirds. The effects of this impact will be localised within and in the near vicinity of the Onshore Order Limits. However, the area affected by permanent habitat loss represents foraging grounds for ornithological features. Therefore, it may result in indirect impacts on prey availability as birds will not be able to forage within affected areas. As such, this impact may affect qualifying features of European sites, whose foraging ranges overlap with the Onshore Order Limits. This impact is screened in for further consideration in the HRA Stage 2 ISAA Part 3 (document reference E2.3) for the relevant ornithology features of the Ribble and Alt Estuaries SPA, Ribble and Alt Estuaries Ramsar site, Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Martin Mere SPA and Bowland Fells SPA during the construction and decommissioning phases. This impact is not screened in for further consideration in the HRA Stage 2 ISAA Part 3 (document reference E2.3) for the ornithology features of the Liverpool Bay/Bae Lerpwl SPA, as all features are intertidal and/or coastal specialists. Since permanent habitat loss will be limited to terrestrial habitats this impact only has the potential to impact features that rely upon these habitats. There will be no additional permanent loss of supporting habitats during the operation and maintenance phase.	Yes
Temporary loss of supporting habitats and/or resource availability.	✓	✓	✓	**All phases** Temporary habitat loss arising from activities associated with the onshore export cable has the potential to impact SPA or Ramsar sites supporting habitats and functionally linked land and may occur during the construction and decommissioning phases of the Transmission Assets. The impact will be temporary and the effects of this impact will be localised within and in the near vicinity of the Onshore Order Limits and the Intertidal Infrastructure Area. The area affected by temporary loss of habitats and resource availability may represent foraging grounds for ornithological features from all of the screened in SPAs and Ramsar sites. One of the key impacts on birds from temporary habitat loss/disturbance is	Yes

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				a reduction in prey availability, indirectly increasing the energy expenditure of SPA and Ramsar site features, and potentially leading to impacts on survival. During the operation and maintenance phase cables in the Intertidal Infrastructure Area may need to be repaired and / or reburied at a rate of up to three cables (equalling 3.4 km of cable) every 10 years. As such, it is concluded that there is potential for LSE on onshore and intertidal ornithology features of the sites during the operation and maintenance phase, although this is limited to the intertidal area only. This impact is screened in for further consideration in the ISAA Part 3 (document reference E2.3) for the relevant ornithology features of the Liverpool Bay SPA, Ribble and Alt Estuaries SPA, Ribble and Alt Estuaries Ramsar site, Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Martin Mere SPA and Bowland Fells SPA during the construction, operation and maintenance, and decommissioning phases.	
Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓	For the purposes of determining LSE, disturbance and displacement from construction, decommissioning, and operation and maintenance activities are considered together although these effects will be treated as separate pathways in the assessment for adverse effects on integrity. The presence of vehicles/heavy machinery and works associated with construction and decommissioning may disturb waterbirds from the onshore and intertidal habitats in the short term, as waterbirds predominantly forage and roost in these habitats over the tidal cycle. This may cause change in behaviour (e.g. reduce feeding intake rate) or displace the birds from the affected area. The temporary disturbance/displacement may lead to a reduction in foraging opportunities or increased energy expenditure with the potential to affect fitness (e.g. body condition), which can have a detrimental impact on bird survival and productivity. Although the Intertidal Infrastructure Area may be used by waterbirds from SPAs and Ramsar sites located in the vicinity as an alternative or complementary foraging areas, these species will be mostly relying on the feeding and roosting sites within their respective SPAs and/or Ramsar sites. The effects of this impact will be localised within and in the near vicinity of the Onshore Order Limits and the Intertidal Infrastructure Area. Features of the screened in European sites have potential to forage/utilise the impacted area within the Onshore Order Limits and the Intertidal Infrastructure Area	Yes

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
				and, therefore, there is considered to be potential for LSE on onshore and intertidal ornithology features of these sites. The extent of disturbance and displacement from the presence of vehicles/heavy machinery will be substantially smaller during the operation and maintenance phase when compared to the construction and decommissioning phases. However, due to the cable repair and / or reburial within the intertidal it is concluded that there is also potential for LSE on onshore and intertidal ornithology features of these sites during the operation and maintenance phase, although this is limited to the intertidal area only. However, due to greater number of vehicles and heavy machinery being involved in the construction and decommissioning phases, this impact is screened in for further consideration in the HRA Stage 2 ISAA Part 3 (document reference E2.3) for the relevant ornithology features of the Liverpool Bay SPA, Ribble and Alt Estuaries SPA, Ribble and Alt Estuaries Ramsar site, Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Martin Mere SPA and Bowland Fells SPA, during the construction, operation and maintenance, and decommissioning phases.	
Pollution caused by accidental spills and/or contaminant release	x	x	x	Activities required for the construction and decommissioning of the Transmission Assets may result in accidental spills/contaminant release which could adversely affect IEFs fitness. All species of bird utilising the environment in the vicinity of a pollution incident may be vulnerable to either direct mortality from oil/contaminant coverage preventing flight, for example, or indirectly via a reduction in ability to forage due to damage to foraging habitats. The likely significant impacts during the operation and maintenance phase are considered similar but of a reduced scale compared to those during the construction and decommissioning phases. The risk of such events occurring will be minimised and manged by the implementation of measures set out in standard post consent plans (e.g., an Outline Pollution Prevention Plan, which forms part of the Outline Code of Construction Practice, which includes details of emergency spill procedures; CoT04) employed as part of the Transmission Assets and secured as a requirement of the DCO. Consequently, ornithological receptors are extremely unlikely to be significantly affected by any such pollution impacts. These contingencies are based on legislative requirements and are therefore standard practice. As such, no significant effects would occur, and it is proposed that this is screened out of the HRA process.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Spreading INNS	x	x	x	There is a risk that the project could increase the spread of INNS through the movement of earth, materials and personnel. This could adversely affect the status of native habitats and species that bird species rely on. The likely significant impacts during the operation and maintenance phase are considered similar but of a reduced scale compared to those during the construction and decommissioning phases. It should be noted that the risk of such events occurring will be minimised and managed by the implementation of measures set out in post consent plans (e.g. an Outline Code of Construction Practice (CoCP), which will include measures to maintain and address ecology and nature conservation (including protected species and invasive species); CoT35) employed as part of the Transmission Assets and secured as a requirement of the DCO. Consequently, ornithological receptors are extremely unlikely to be significantly affected by any such impacts. These plans are considered an integral part of the Transmission Assets and would therefore be required regardless of HRA matters; it is therefore proposed that this potential impact is screened out of the HRA process.	No

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes/No)
	C	O	D		
Habitat fragmentation and species isolation	x	x	x	The construction, operation and maintenance and decommissioning phases of the Transmission Assets have the potential to result in habitat fragmentation and species isolation through creating changes to habitat configuration at a landscape scale. Changes which cause existing habitat to become broken up or fragmented can lead to the isolation of individual species and reduce the individual patch size in which they forage and are ecologically dependent upon. This vulnerability is increased if a species is relatively immobile, occupies small territories and is unable to move increased distances created between individual patch sizes or territories. The Onshore Order Limits overlap with SPA and Ramsar sites at the landfall and contains functionally linked land at Newton Marsh and Lytham Moss; however, as no permanent above ground infrastructure will be present within these areas, there is no potential for habitat fragmentation and species isolation to occur. Throughout the Onshore Order Limits, cables will be situated underground thus removing the potential for the isolation of species to be caused or fragmentation of habitats to occur on a permanent basis. Of the IEFs identified, none of the species are highly specialist and therefore considered to be highly vulnerable to this potential impact during the construction and decommissioning phases. As bird species can move a considerable distance between nesting areas or roosting areas, the probability of fragmentation leading to an observable impact is low. Non-breeding birds are not tied to territories and, with the exception of mostly sedentary species, can move freely between fragmented patches of habitat. It is therefore proposed that this potential impact of habitat fragmentation and species isolation is screened out of the HRA process.	No

Determination of LSE for onshore and intertidal ornithology

1.5.6.3 **Table 1.25** presents the conclusions of the LSE determination assessment as a result of the Transmission Assets on relevant qualifying features of sites listed in **Table 1.23**. These assessments are made in the absence of mitigation measures. The text below the tables provides a brief assessment to support the screening in or out of each of the LSEs on the identified SPA and Ramsar sites.

1.5.6.4 All features were screened in unless they were completely absent within the Onshore Order Limits during the comprehensive two years' of bird surveys. See Volume 3, Annex 4.1: Breeding birds Technical Report; Volume 3, Annex 4.2: Wintering and migratory birds Technical Report; and Volume 3, Annex 4.3 Intertidal birds Technical Report for full details (document reference F3.4.1, F3.4.2, F3.4.3).

1.5.6.5 Features that do not rely upon intertidal habitats have been screened out of LSE during the operation and maintenance phase for temporary loss of supporting habitat and / or resource availability and disturbance and displacement as these impacts are not predicted affect areas outside of the intertidal during this phase.

LSE in-combination

1.5.6.6 The LSE test requires consideration of the Transmission Assets alone and in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment stage (Habitats Regulations Assessment Stage 2 Information to Support an Appropriate Assessment: Part 3 – SPA and Ramsar Assessment; document reference E2.3). The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for a LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

1.5.6.7 Given the highly precautionary method for site selection applied during this Screening assessment, it is considered that the consolidation of information regarding external plans and projects would not likely result in additional European sites or new effect pathways being identified for the Screening assessment.

1.5.6.8 For onshore and intertidal ornithology features, the potential for LSE alone is identified for the following impacts arising from the Transmission Assets acting alone (see **Table 1.24**).

- Temporary loss of supporting habitats and/or resource availability.
- Permanent loss of supporting habitats.
- Disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

1.5.6.9 Therefore, the impacts outlined above will also be considered for the Transmission Assets acting in-combination with other plans/projects at the Appropriate Assessment stage.

Table 1.25: LSE matrix for European sites for onshore and intertidal ornithology features

European site and relevant qualifying features	Temporary loss of supporting habitats and/or resource availability			Permanent loss of supporting habitats			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities		
	C	O	D	C	O	D	C	O	D
Liverpool Bay SPA									
Common scoter	✓	✓	✓				✓	✓	✓
Red-throated diver	✓	✓	✓				✓	✓	✓
Common tern	✓	✓	✓				✓	✓	✓
Ribble and Alt Estuaries SPA									
Common tern	✓	✓	✓	✓		✓	✓	✓	✓
Bewick's swan	×	×	×	×		×	×	×	×
Whooper swan	✓	✓	✓	✓		✓	✓	✓	✓
Pink-footed goose	✓	✓	✓	✓		✓	✓	✓	✓
Shelduck	✓	✓	✓	✓		✓	✓	✓	✓
Wigeon	✓	✓	✓	✓		✓	✓	✓	✓
Teal	✓	✓	✓	✓		✓	✓	✓	✓
Pintail	×	×	×	×		×	×	×	×
Oystercatcher	✓	✓	✓	✓		✓	✓	✓	✓
Ringed plover	✓	✓	✓	✓		✓	✓	✓	✓
Golden plover	✓	✓	✓	✓		✓	✓	✓	✓
Grey plover	✓	✓	✓	✓		✓	✓	✓	✓
Knot	✓	✓	✓	✓		✓	✓	✓	✓
Sanderling	✓	✓	✓	✓		✓	✓	✓	✓
Dunlin	✓	✓	✓	✓		✓	✓	✓	✓
Ruff	✓	✓	✓	✓		✓	✓	✓	✓
Black-tailed godwit	✓	✓	✓	✓		✓	✓	✓	✓
Bar-tailed godwit	✓	✓	✓	✓		✓	✓	✓	✓
Redshank	✓	✓	✓	✓		✓	✓	✓	✓
Lesser black-backed gull	✓	✓	✓	✓		✓	✓	✓	✓
Non-breeding waterbird assemblage	✓	✓	✓	✓		✓	✓	✓	✓

European site and relevant qualifying features	Temporary loss of supporting habitats and/or resource availability			Permanent loss of supporting habitats			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities		
	C	O	D	C	O	D	C	O	D
Breeding waterbird assemblage	✓	✓	✓	✓		✓	✓	✓	✓
Ribble and Alt Estuaries Ramsar site									
Ringed plover	✓	✓	✓	✓		✓	✓	✓	✓
Grey plover	✓	✓	✓	✓		✓	✓	✓	✓
Golden plover	✓	✓	✓	✓		✓	✓	✓	✓
Knot	✓	✓	✓	✓		✓	✓	✓	✓
Sanderling	✓	✓	✓	✓		✓	✓	✓	✓
Dunlin	✓	✓	✓	✓		✓	✓	✓	✓
Black-tailed godwit	✓	✓	✓	✓		✓	✓	✓	✓
Redshank	✓	✓	✓	✓		✓	✓	✓	✓
Common tern	✓	✓	✓	✓		✓	✓	✓	✓
Bewick's swan	×	×	×	×		×	×	×	×
Whooper swan	✓	✓	✓	✓		✓	✓	✓	✓
Pink-footed goose	✓	✓	✓	✓		✓	✓	✓	✓
Wigeon	✓	✓	✓	✓		✓	✓	✓	✓
Teal	✓	✓	✓	✓		✓	✓	✓	✓
Pintail	×	×	×	×		×	×	×	×
Oystercatcher	✓	✓	✓	✓		✓	✓	✓	✓
Bar-tailed godwit	✓	✓	✓	✓		✓	✓	✓	✓
Morecambe Bay and Duddon Estuary SPA									
Pink-footed goose	✓	✓	✓	✓		✓	✓	✓	✓
Golden plover	✓	✓	✓	✓		✓	✓	✓	✓
Curlew	✓	✓	✓	✓		✓	✓	✓	✓
Lesser black-backed gull	✓	×	✓	✓		✓	✓	×	✓
Herring gull	✓	×	✓	✓		✓	✓	×	✓
Sandwich tern	✓	×	✓	✓		✓	✓	×	✓
Morecambe Bay Ramsar site									

European site and relevant qualifying features	Temporary loss of supporting habitats and/or resource availability			Permanent loss of supporting habitats			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities		
	C	O	D	C	O	D	C	O	D
Pink-footed goose	✓	✓	✓	✓		✓	✓	✓	✓
Golden plover	✓	✓	✓	✓		✓	✓	✓	✓
Curlew	✓	✓	✓	✓		✓	✓	✓	✓
Lesser black-backed gull	✓	✓	✓	✓		✓	✓	✓	✓
Herring gull	✓	×	✓	✓		✓	✓	×	✓
Sandwich tern	✓	×	✓	✓		✓	✓	×	✓
Martin Mere SPA									
Pink-footed goose	✓	×	✓	✓		✓	✓	×	✓
Martin Mere Ramsar									
Pink-footed goose	✓	×	✓	✓		✓	✓	×	✓
Bowland Fells SPA									
Lesser black-backed gull	✓	✓	✓	✓		✓	✓	✓	✓

Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out due to the species not being present during surveys a × symbol is included and highlighted green. Where the impact is not applicable grey shading has been used.

1.5.6.10 The points below explain the conclusion of whether LSE can be ruled out for a given impact presented in **Table 1.25**.

- **Temporary loss of supporting habitats and/or resource availability** – As detailed in **Table 1.24**, the effects of this impact will be localised within the Onshore Order Limits during construction, operation and maintenance, and decommissioning phases. It may also result in indirect impacts on resource availability as birds will temporarily not be able to forage within affected areas. It is concluded there is potential for LSE on the relevant features of the Liverpool Bay SPA, Ribble and Alt Estuaries SPA, Ribble and Alt Estuaries Ramsar site, Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Martin Mere SPA and Bowland Fells SPA due to this impact during the construction, operation and maintenance, and decommissioning phases.
- **Permanent loss of supporting habitats –** As detailed in **Table 1.24**, the effects of this impact will be localised to within the Onshore Order Limits. It may also result in indirect impacts on resource availability as birds will not be able to forage within affected areas permanently. As such, it is concluded there is potential for LSE on the relevant features of the Ribble and Alt Estuaries SPA, Ribble and Alt Estuaries Ramsar site, Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Martin Mere SPA and Bowland Fells SPA due to this impact during the construction and decommissioning phases.
- **Disturbance and displacement from construction, decommissioning, and operation and maintenance activities –** As detailed in **Table 1.24**, the effects of this impact will be localised within and in close proximity to the Onshore Order Limits. Due to the potential for individuals from all screened in SPAs to be present within the vicinity of the Onshore Order Limits during construction, operation and maintenance, and decommissioning phases it is concluded there is potential for LSE on the relevant ornithology features of the Liverpool Bay SPA, Ribble and Alt Estuary SPA, Ribble and Alt Estuary Ramsar site, Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Martin Mere SPA and Bowland Fells SPA.

1.6 Approach to the in-combination effects assessment

1.6.1.1 The Habitats Regulations require the consideration of the likely effects of a project on European sites both alone and in-combination with other plans or projects.

1.6.1.2 The in-combination assessment presented in the HRA Stage 2 ISAA Part 2 and Part 3 (document reference E2.2 and E2.3) will draw from information presented and plans and projects assessed within the CEA conducted for the relevant receptors (Annex I habitats. Annex II fish, Annex II marine mammals and birds) in their associated ES chapters. A detailed approach to the CEA is present in Volume 1, Chapter 5: Environmental assessment methodology of the ES (document reference F1.5).

1.6.1.3 For the Transmission Assets in-combination assessment a tiered approach (in accordance with the guidance set out in the Planning Inspectorate's Advice Note 17 (Planning Inspectorate, 2019)) will be adopted, whereby the cumulative assessment will be provided for three tiers of projects, as follows:

Table 1.26: Assigning uncertainty to projects, plans or activities for in-combination assessment

Tier	Examples
Tier 1	• Under construction. • Permitted application(s), whether under the Planning Act 2008 or other regimes, but not yet implemented. • Submitted application(s) whether under the Planning Act 2008 or other regimes but not yet determined.
Tier 2	• Projects on the Planning Inspectorate's Programme of Projects where a scoping report has been submitted and is in the public domain.
Tier 3	• Projects on the Planning Inspectorate's Programme of Projects where a scoping report has not been submitted and is not in the public domain. • Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals. • Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

1.7 Summary of LSE

1.7.1.1 **Table 1.27** provides a summary of the European sites, qualifying interest features and potential impacts for which a potential LSE has been identified as a result of the Transmission Assets alone and/or in-combination with other plans or projects. The table excludes all features which have been screened out as no potential for LSE has been identified. These sites and features will be taken forward for consideration in the HRA Stage 2 ISAA (document references: E2.1, E2.2 and E2.3).

1.7.1.2 In total, 25 European sites and three Ramsar sites are being taken forward for consideration in the HRA Stage 2 ISAA (document references: E2.1, E2.2 and E2.3).

- One European site was considered for LSE in relation to Annex I habitats (offshore and coastal) in **section 1.5.2**. The only impact taken forward for consideration in the HRA Stage 2 ISAA Part 2 (document reference E2.2) is increases in SSCs and associated sediment deposition.

1.7.1.3 Nine SACs were considered for Annex II diadromous fish species and freshwater pearl mussel in **section 1.5.3.2**. All nine of these sites were progressed to the HRA Stage 2 ISAA Part 2 (document reference E2.2) with respect to the following impacts.

- Underwater sound from UXO impacting fish and shellfish receptors.
- EMFs from subsea electrical cabling.

1.7.1.4 With respect to marine mammals, the assessment of LSE undertaken in **section 1.5.4**, identified 10 European sites to be taken forward to the HRA Stage 2 ISAA Part 2 (document reference E2.2). The only impact taken forward for consideration in the HRA Stage 2 ISAA is 'injury and disturbance from underwater sound generation from UXO clearance'.

1.7.1.5 The assessment of LSE undertaken in **section 1.5.5** has identified the potential for LSE for three SPAs and two Ramsar sites for offshore ornithology features. The impacts taken forward to consideration in ISAA Part 3 (document reference E2.3) include:

- disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure;
- indirect impacts from underwater sound affecting prey species; and
- temporary habitat loss/disturbance and increased SSCs.

1.7.1.6 Five SPAs and three Ramsar sites were considered for LSE with relevant onshore and intertidal ornithology features in **section 1.5.6**. The impacts taken forward to consideration in ISAA Part 3 (document reference E2.3) include:

- temporary loss of supporting habitats and / or resource availability;
- permanent loss of supporting habitats; and
- disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

Table 1.27: Summary of the European sites and relevant qualifying features for which potential LSEs have been identified and further assessment in the HRA Stage 2 ISAA (document reference E2.1, E2.2, E2.3) is required (C = construction, O = operation and maintenance, D = decommissioning)

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
Sites relevant to Annex I habitats (offshore and coastal)						
Shell Flat and Lune Deep SAC	5.7	Sandbanks which are slightly covered by sea water all the time	SSCs and associated sediment deposition	✓	✓	✓
Sites relevant to Annex II diadromous fish						
River Ehen SAC	62.5	Atlantic salmon Freshwater pearl mussel	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
Dee Estuary/Aber Dyfrdwy SAC	32.8	Sea lamprey River lamprey	Underwater sound UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
River Derwent and Bassenthwaite Lake SAC	72.3	Sea lamprey River lamprey Atlantic salmon	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
River Kent SAC	65.2	Freshwater pearl mussel	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
Solway Firth SAC	85.7	Sea lamprey	Underwater sound from UXO impacting fish and shellfish receptors	✓		

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
		River lamprey	EMF from subsea electrical cabling		✓	
River Bladnoch SAC	89.5	Atlantic salmon	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC	59.1	Atlantic salmon Sea lamprey River lamprey	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
Afon Gwyrfai a Llyn Cwellyn SAC	87.3	Atlantic salmon	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
River Eden SAC	127.7	Sea lamprey River lamprey	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
		Atlantic salmon	Underwater sound from UXO impacting fish and shellfish receptors	✓		
			EMF from subsea electrical cabling		✓	
Sites relevant to Annex II marine mammals						
North Anglesey Marine/Gogledd Môn Forol SAC	28.5	Harbour porpoise	Injury and disturbance from underwater sound generation from UXO clearance	✓		
North Channel SAC	62.7	Harbour porpoise	Injury and disturbance from underwater sound generation from UXO clearance	✓		

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
Bristol Channel Approaches/ Dynesfeydd Môr Hafren SAC	296.9	Harbour porpoise	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC	111.2	Grey seal	Injury and disturbance from underwater sound generation from UXO clearance	✓		
West Wales Marine/Gorllewin Cymru Forol SAC	111.4	Harbour porpoise	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Cardigan Bay/Bae Ceredigion SAC	183.4	Grey seal	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Lambay Island SAC	130.4	Grey seal	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Pembrokeshire Marine/Sir Benfro Forol SAC	233.7	Grey seal	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC	296.9	Harbour porpoise	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Rockabill to Dalkey Island SAC	123.6	Harbour porpoise	Injury and disturbance from underwater sound generation from UXO clearance	✓		

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
Saltee Islands SAC	259.3	Grey seal	Injury and disturbance from underwater sound generation from UXO clearance	✓		
Sites relevant to offshore ornithology						
Liverpool Bay SPA	0.0	Red-throated diver Cormorant Common scoter Red-breasted merganser	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure	✓	✓	✓
			Indirect impacts from underwater sound affecting prey species.	✓		✓
			Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓
Ribble and Alt Estuaries Ramsar	0.0	Red-throated diver Cormorant Common scoter	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure	✓	✓	✓
			Indirect impacts from underwater sound affecting prey species.	✓		✓
			Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓
Ribble and Alt Estuaries SPA	0.0	Common Scoter Cormorant Scaup	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure	✓	✓	✓
			Indirect impacts from underwater sound affecting prey species.	✓		✓
			Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
Morecambe Bay and Duddon Estuary SPA	15.8	Cormorant Eider Red-breasted merganser	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure	✓	✓	✓
			Indirect impacts from underwater sound affecting prey species.	✓		✓
			Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓
Morecambe Bay Ramsar	15.8	Cormorant Eider Red-breasted merganser	Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure	✓	✓	✓
			Indirect impacts from underwater sound affecting prey species.	✓		✓
			Temporary habitat loss/disturbance and increased SSCs.	✓	✓	✓
Sites relevant to onshore and intertidal ornithology						
Liverpool Bay SPA	0.0	Common scoter (non-breeding) Red-throated diver (non-breeding) Common tern (breeding)	Temporary loss of supporting habitats and/or resource availability	✓	✓	✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓
Ribble and Alt Estuaries SPA	0.0	Pink-footed goose (non-breeding) Whooper swan (non-breeding) Shelduck (non-breeding)	Temporary loss of supporting habitats and/or resource availability	✓	✓	✓

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
		Wigeon (non-breeding) Teal Anas crecca (non-breeding) Oystercatcher (non-breeding) Ringed plover (non-breeding) Golden plover (non-breeding) Grey plover (non-breeding) Bar-tailed godwit (non-breeding) Black-tailed godwit (non-breeding) Ruff (breeding) Dunlin (non-breeding) Sanderling (non-breeding) Knot (non-breeding) Redshank (non-breeding) Lesser black-backed gull (breeding) Common tern (breeding) Non-breeding waterbird assemblage Breeding waterbird assemblage	Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓
Ribble and Alt Estuaries Ramsar site	0.0	Pink-footed goose (non-breeding) Whooper swan (non-breeding) Wigeon (non-breeding)	Temporary loss of supporting habitats and/or resource availability	✓	✓	✓

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
		Teal (non-breeding) Oystercatcher (non-breeding) Ringed plover (non-breeding) Golden plover (non-breeding) Grey plover (non-breeding) Bar-tailed godwit (non-breeding) Black-tailed godwit (non-breeding) Dunlin (non-breeding) Sanderling (non-breeding) Knot (non-breeding) Redshank (non-breeding) Common tern (breeding)	Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓
Martin Mere SPA	11.49	Pink-footed goose (non-breeding)	Temporary loss of supporting habitats and/or resource availability	✓	×	✓
			Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	×	✓
Martin Mere Ramsar site	11.49	Pink-footed goose (non-breeding)	Temporary loss of supporting habitats and/or resource availability	✓	×	✓
			Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	×	✓

European site	Distance to Transmission Assets Order Limits (km)	Relevant qualifying features	Potential impact	Project phase		
				C	O	D
Morecambe Bay and Duddon Estuary SPA	15.8	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Lesser black-backed gull (breeding and non-breeding) Herring gull (breeding) Sandwich tern (breeding)	Temporary loss of supporting habitats and/or resource availability	✓	✓	✓
			Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓
Morecambe Bay Ramsar site	15.8	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Herring gull (breeding) Lesser black-backed gull (breeding) Sandwich tern (breeding)	Temporary loss of supporting habitats and/or resource availability	✓	✓	✓
			Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓
Bowland Fells SPA	17.4	Lesser black-backed gull (breeding)	Temporary loss of supporting habitats and/or resource availability	✓	✓	✓
			Permanent loss of supporting habitats	✓		✓
			Disturbance and displacement from construction, decommissioning, and operation and maintenance activities	✓	✓	✓

Within the table where there is potential for LSE for a given impact during Transmission Assets phase a ✓ symbol is included and the box is highlighted in blue, where there is no potential for LSE during Transmission Assets phase a × symbol is included and highlighted green. Where effects are not applicable to a particular feature/phase they are greyed out.

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