MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Habitats Regulations Assessment Stage 2 Information to Support an Appropriate Assessment
Part Three – Special Protection Areas (SPA) and Ramsar Site assessments

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Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Appropriate Assessment	A step-wise procedure undertaken in accordance with Article 6(3) of the Habitats Directive, to determine the implications of a plan or project on a European site in view of the site's conservation objectives, where the plan or project is not directly connected with or necessary to the management of a European site but likely to have a significant effect thereon, either individually or in-combination with other plans or projects.
Commitment	This term is used interchangeably with mitigation and enhancement measures. The purpose of commitments is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Primary and tertiary commitments are taken into account and embedded within the assessment set out in this Environmental Statement. Secondary commitments are incorporated to reduce effects to environmentally acceptable levels following initial assessment.
Competent Authority	The "competent authority" is the public body exercising its statutory functions in a manner that engages the Habitats Regulations
Conservation Objectives	In its most general sense, a conservation objective is the specification of the overall target for the species and/or habitat types for which a site is designated in order for it to contribute to maintaining or reaching favourable conservation status of the habitats and species concerned, at the national, the biogeographical or the European level.
Design envelope	A description of the range of possible elements and parameters that make up the Transmission Assets options under consideration, as set out in detail in Volume 1, Chapter 3: Project Description of the ES. This envelope is used to define the Transmission Assets for Environmental Impact Assessment purposes when the exact engineering parameters are not yet known. This is also referred to as the Maximum Design Scenario or Rochdale Envelope approach.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Duration (of impact)	The time over which an impact occurs. An impact may be described as short, medium or long-term and permanent or temporary.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
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.

Term	Meaning
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to, and information to support, the Environmental Impact Assessment and Habitats Regulations Assessment processes for certain topics.
Expert Working Group	A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan Process.
Export cable corridor	The specific corridor of seabed (seaward of Mean High Water Springs) and land (landward of Mean High Water Springs) from the Generation Assets to the National Grid Penwortham substation for cable installation and operation. .
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.
Habitat	The environment that a plant or animal lives in.
Habitats Directive	The Habitats Directive is the short name for European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. The Directive led to the establishing of European sites and setting out how they should be protected, it also extends to other topics such as European protected species.
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)
Habitats Regulations Assessment	A process required by the Habitats Regulations of identifying likely significant effects of a plan or project on a European site and (where likely significant effects are predicted or cannot be discounted) carrying out an Appropriate Assessment to ascertain whether the plan or project will adversely affect the integrity of the European site. If adverse effects on integrity cannot be ruled out, the latter stages of the process require consideration of the derogation provisions in the Habitats Regulations.
In-combination Effects	The combined effect of the Transmission Assets in-combination with the effects from a number of other projects on the same feature/receptor.
Intertidal Infrastructure Area	The temporary and permanent areas between MLWS and MHWS.
Intertidal area	The area between Mean High Water Springs and Mean Low Water Springs.
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).
Likely Significant Effect	Any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the European site was designated but excluding trivial or inconsequential effects. A likely effect is one that cannot be ruled out on the basis of objective information. A 'significant' effect is a test of whether a plan or project could undermine the site's conservation objectives.

Term	Meaning
Marine elements of the Transmission Assets	Works being undertaken seaward of Mean Low Water Springs.
Marine licence	The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities. Section 149A of the Planning Act 2008 allows an applicant for to apply for 'deemed marine licences' in English waters as part of the development consent process.
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
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.
Morecambe OWL	Morecambe Offshore Windfarm Limited is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra)and Flotation Energy Ltd.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy investments Ltd. and Energie Baden-Württemberg AG (EnBW).
Natura 2000 Network	A coherent European ecological network of Special Areas of Conservation and Special Protection Areas comprising sites located within European Union Member States.
Offshore export cables	The cables which would bring electricity from the Generation Assets to the landfall.
Offshore export cable corridor	The corridor within which the offshore export cables will be located.
Offshore Order Limits	See Transmission Assets Order Limits: Offshore (below).
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.

Term	Meaning
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables , and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.
Policy	A set of decisions by governments and other political actors to influence, change, or frame a problem or issue that has been recognized as in the political realm by policy makers and/or the wider public.
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 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.
Species	A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.
Statutory consultee	Organisations that are required to be consulted by an applicant pursuant to section 42 of the Planning Act 2008 in relation to an application for development consent. Not all consultees will be statutory consultees (see non-statutory consultee definition).
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.

Term	Meaning
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
BC	Blackpool Council
CAP	Conservation Advice Package
CTV	Crew Transfer Vessel
DAERA	Department of Agriculture, Environment and Rural Affairs
DCO	Development Consent Order
EA	Environment Agency
EC	European Commission
EIA	Environmental Impact Assessment
ES	Environmental Statement
EWG	Expert Working Group
FC	Fylde Council
FCA	Farmland Conservation Area
FLL	Functionally Linked Land
HRA	Habitats Regulations Assessment
HE	Historic England
IEMA	Institute for Environmental Management and Assessment
ISAA	Information to Support an Appropriate Assessment
JNCC	Joint Nature Conservation Committee
LCC	Lancashire County Council
LSE	Likely Significant Effect
MDS	Maximum Design Scenario

Acronym	Meaning
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
NRW	Natural Resources Wales
PCC	Preston City Council
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
RSPB	Royal Society for the Protection of Birds
SNCB	Statutory Nature Conservation Body
SoCC	Statement of Community Consultation
SOV	Service Operation Vessel
SPA	Special Protection Area
SRBC	South Ribble Borough Council
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UXO	Unexploded Ordnance
ZOI	Zone of Influence

Units

Unit	Description
%	Percentage
dB	Decibel
ha	Hectare
kg	Kilogram
km	Kilometre
km^2	Square kilometre
m	Metre
m^2	Square metre
m^3	Cubic metre
MW	Megawatt

1 Habitats Regulations Assessment Stage 2 Information to Support an Appropriate Assessment – Part Three: Special Protection Areas and Ramsar site assessments

1.1 Introduction

1.1.1 Purpose of the Habitats Regulations Assessment (HRA) Stage 2 Information to Support Appropriate Assessment (ISAA)

1.1.1.1 This document forms part of the Habitats Regulations Assessment (HRA) Stage 2 Information to Support Appropriate Assessment (ISAA) for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as the 'Transmission Assets').

1.1.1.2 This report has been prepared by RPS and NIRAS on behalf of the Applicants to support the HRA under Section 63 of the Conservation of Habitats and Species Regulations 2017 and Section 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 (The Habitats Regulations) for the Transmission Assets.

1.1.1.3 The HRA Stage 2 ISAA builds upon the Transmission Assets: HRA Stage 1 Screening Report (hereafter referred as 'HRA Stage 1 Screening Report'; document reference: E3) and considers whether the Transmission Assets could have an adverse effect, either alone or in-combination with other plans or projects, on the integrity of any European site. This report will provide the Competent Authority with the information required to undertake an HRA Stage 2 Appropriate Assessment (see HRA Stage 2 ISAA Part 1 – Introduction (document reference: E2.1) for more detail on the HRA process).

1.1.1.4 The scope of this document covers relevant Special Protection Areas (SPAs), Ramsar sites and relevant designated features where likely Significant Effects (LSEs) have been identified in the HRA Stage 1 Screening Report (document reference: E3), due to the potential impacts arising from the Transmission Assets. For the purposes of this HRA Stage 2 ISAA, ornithological features have been split into two subsections – 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 (MLWS)). 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 MLWS).

1.1.1.5 This means that in some cases, a feature may be assessed in both offshore ornithology and onshore and intertidal ornithology sections for different impacts. For example, terns are classified as seabirds but they nest on shores and onshore works may disturb nesting terns in the vicinity of the works. Therefore, nesting terns 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.

1.1.2 Structure of the HRA Stage 2 ISAA

1.1.2.1 For clarity and ease of navigation, the HRA Stage 2 ISAA is structured and reported in several 'Parts', as follows.

- Part One – Introduction (document reference: E2.1).
- Part Two –Special Areas of Conservation (SACs) Assessments (document reference: E2.2).
- Part Three (this document) –SPAs and Ramsar sites Assessments.

1.1.2.2 Each 'Part' of the HRA Stage 2 ISAA is supported by a series of topic specific appendices and relevant documentation including European site summaries.

1.1.3 Structure of this document

1.1.3.1 This document constitutes the HRA Stage 2 ISAA Part 3 – SPA and Ramsar site assessments and provides consideration of the implications of the Transmission Assets on SPAs and Ramsar sites.

1.1.3.2 This HRA Stage 2 ISAA – Part 3 SPA and Ramsar site assessments is structured as follows.

- **Section 1.1**: Introduction – this section describes the Transmission Assets and the Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets (hereafter collectively referred to as the Generation Assets) and establishes the need for, the purpose and structure of the HRA Stage 2 ISAA.
- **Section 1.2**: Consultation – this section provides a summary of the consultation undertaken to date of relevance to the qualifying features of SPA and Ramsar sites, responses provided and how these have been addressed within this Part of the HRA Stage 2 ISAA.
- **Section 1.3**: Summary of HRA Stage 1 Screening Report conclusions – this section presents the SPA and Ramsar sites potentially at risk of LSE and the features and pathways for which HRA Stage 2 Appropriate Assessment is required, both alone and in-combination.

1.1.3.3 Information to support the HRA Stage 2 ISAA – Part 3 SPA and Ramsar site assessments is provided in:

- **Section 1.4**: Information to support the Appropriate Assessment, including Maximum Design Scenarios (MDS), measures adopted as part of the Transmission Assets, an outline of the approach taken to baseline data, conservation objectives and the in-combination assessment;
- **Section 1.5:** Assessment of potential adverse effects on the integrity of SPA and Ramsar sites designated for offshore ornithological features, alone and in-combination;

- **Section 1.6:** Assessment of potential adverse effects on the integrity of SPA and Ramsar sites designated for onshore and intertidal ornithological features, alone and in-combination; and
- **Section 1.7**: Conclusions of the assessment and the overall findings of HRA Stage 2 ISAA – Part 3 SPA and Ramsar site assessments.

1.1.3.4 For the purposes of this HRA Stage 2 ISAA, 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 (MLWS)). 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 MLWS).

1.1.3.5 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.

1.2 Consultation

1.2.1 Scoping

1.2.1.1 On 28 October 2022, the Applicants submitted a Scoping Report to the Secretary of State, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any LSEs for the construction, operation and maintenance and decommissioning phases of the Transmission Assets. Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 8 December 2022. A Statement of Community Consultation (SoCC) was then prepared setting out the proposed approach to consultation, in consultation with local authorities. The SoCC was published in October 2023 and all consultation for the Transmission Assets has been undertaken in accordance with the approach set out in this document.

1.2.1.2 These scoping responses have been taken into account in the topic specific Environmental Statement (ES) chapters and have in turn been accounted for in the HRA Stage 1 Screening Report (document reference: E3) and HRA Stage 2 ISAA also (document references E2.1, E2.2, and this document). **Table 1.1** presents relevant Scoping Opinion responses which have been identified as being directly applicable to this HRA Stage 2 ISAA.

1.2.2 The Evidence Plan Process

1.2.2.1 Following scoping, consultation and engagement with interested parties specific to HRA and relevant chapter topics has continued. An Evidence Plan Process (EPP) has been developed for the Transmission Assets, seeking to ensure engagement with the relevant aspects of the Environmental Impact Assessment (EIA) and HRA processes throughout the pre-application phase. Evidence plans are formal mechanisms to agree what information the Applicants need to supply to the Planning Inspectorate as part of an application for development consent. This also helps to ensure compliance with the Habitats Regulations and helps ensure Applicants provide sufficient information as part of their Development Consent Order (DCO) application.

1.2.2.2 The development and monitoring of the Evidence Plan and its subsequent progress has been undertaken by the EPP Steering Group. The Steering Group comprises the Planning Inspectorate, the Applicants, the Marine Management Organisation, Natural England, Historic England (HE), the Environment Agency (EA) and the Local Planning Authorities as the key regulatory and bodies. These Steering Groups have met at key milestones throughout the Application process.

1.2.2.3 As part of the EPP, Expert Working Groups (EWGs) have been established to discuss topic specific matters with relevant statutory and non-statutory stakeholders. EWG meetings have been held at key stages in the EIA and HRA process or when new information became available for each topic, which provided the opportunity for stakeholders to provide feedback and advice at an early stage. EWGs have been established for offshore ornithology and onshore and intertidal ornithology and content which is relevant to the HRA process is outlined in **Table 1.1** below.

1.2.3 Section 42 responses

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

1.2.3.2 Further information regarding the consultation process can be found in the Consultation Report (document reference: E1) and in Volume 1, Chapter 5: Environmental assessment methodology of the ES (document reference: F1.5).

1.2.4 Summary of consultation responses received

1.2.4.1 A summary of the key matters raised during consultation activities undertaken to date specific to this Part of the HRA Stage 2 ISAA is presented in **Table 1.1**, together with how these have been considered in the production of this document.

1.2.4.2 EWG meetings were also considered in this section and are included in **Table 1.1**, specifically advice provided by the stakeholders relevant to the

Table 1.1: Summary of key consultation comments raised during consultation activities undertaken for the Transmission Assets in relation to offshore, onshore and intertidal ornithology HRA matters

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
Scoping Opinion				
8 December 2022	The Planning Inspectorate	Scoping Opinion	• Advice has been provided on impacts to be scoped in and out from the PEIR. • The inspectorate provided agreement that: – The impact of habitat loss on protected habitats and species during operation could be scoped out. – The impact of pollution from accidental spills/contaminant release on protected habitats and species during operation could be scoped out.	Given that this advice has been considered in the relevant chapters of the ES, the HRA Stage 1 Screening Report (document reference: E3) and the HRA Stage 2 ISAA – Part 3 SPA and Ramsar site assessments (this document) have been aligned with the following. • Volume 2, Chapter 5: Offshore ornithology of the ES (document reference F2.5); and • Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference F3.4). As such, please refer to the reports listed above for more details.
8 December 2022	The Planning Inspectorate	Scoping Opinion	• 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 alongside the ornithology receptors in **section 1.5** and HRA Stage 1 Screening report (document reference: E3).
8 December 2022	Natural Resources Wales (NRW)	Scoping Opinion	• Cross-border designations are taken into consideration in relation to the EIA and HRA.	Where relevant, cross-border designations (e.g. Liverpool Bay SPA which spans both English and Welsh waters) are considered assessments are provided in **section 1.5**.
8 December 2022	South Ribble Borough Council (SRBC)	Scoping Opinion	• HRA will be required for potential impacts of the development on European designated	Potential impacts on designated sites (including the Ribble and Alt Estuaries SPA and Ramsar site) are included

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
			sites, including the Ribble and Alt Estuaries SPA and Ramsar site. An important element of the HRA should be consideration of functionally linked land.	in **section 1.5** and HRA Stage 1 Screening report (document reference: E3). Consideration is also given to the functionally linked land where birds are likely to use land within their foraging ranges.
Steering Group				
11 May 2023	Planning Inspectorate, MMO, HE, SRC, Natural England	Steering Group Meeting 2	• Meeting to introduce the cable route selection process.	N/A
16 July 2023	Planning Inspectorate, MMO, HE, SRC, Natural England, FC, EA	Steering Group Meeting 3	• Meeting to describe: – the route planning and site selection refinements post PEIR. – mitigation, biodiversity and enhancement areas. – provide an update on surveys (this did not include onshore and intertidal ornithology surveys). – the commitment register. – the Evidence Plan Process as a whole.	A detailed description of those commitments, mitigation measures and enhancement opportunities specifically relevant to onshore and intertidal ornithology is provided within Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference F3.4).
Expert Working Groups				
Offshore ornithology				
1 June 2023	Royal Society for the Protection of Birds, MMO, Natural England	EWG Meeting 1	• Meeting to introduce the Transmission Assets and to establish the EWG. • Outline of the approach to the HRA Stage 1 Screening report.	**Section 1.5.3** and **1.5.4** of the ISAA follow the approach as set out in the EWG.
17 August 2023	MMO Natural England The Wildlife Trust	EWG Meeting 2	• Outline of the key impacts considered during the HRA Stage 1 Screening and Stage 2 ISAA. • Outline of ISAA methodology. • Outline of preliminary ISAA findings. • Natural England raised the use of Lawson et al.	**Section 1.5.3** and **1.5.4** of the ISAA follow the approach as set out in the EWG. Natural England have provided the Applicants with the data associated with HiDef Aerial Surveying Limited (2023) and these data have been used to inform relevant

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
			(2016) and suggested the use of a more recent Hidef report	assessments (**section 1.5.3** and **1.5.4**).
6 February 2024	MMO Natural England	EWG meeting 3	• Applicants provided updates on the project design including the removal of offshore substation platforms and booster stations.	Offshore Substation Platforms and booster stations are no longer included in the project design
6 February 2024	MMO Natural England	EWG meeting 3	• Potential impacts restricted to temporary disturbance and displacement during construction only. Focus in the in-combination assessment will be qualitative.	Assessments are provided in **section 1.5.**
Onshore ecology, onshore and intertidal ornithology				
23 March 2023	Natural England, RSPB, EA, LCC, Local Planning Authorities	EWG Meeting 1	• Meeting to introduce the Transmission Assets and to establish the EWG. • Outline of onshore route planning and site selection. • Summary of impacts to be scoped in and impacts to be scoped out. • Overview of onshore designated sites, phase I surveys and phase II surveys to be carried out in 2023. • Overview of onshore and intertidal ornithology surveys out to date.	The ornithological survey methodology was disseminated to consultees in August 2023, including Natural England, and is presented in full within Volume 3, Annex 4.4: Ornithological survey methodologies of the ES (document reference: F3.4.4) and within the specific technical reports accompanying this chapter: Volume 3 Annex 4.1 Onshore and intertidal ornithology - breeding birds technical report of the ES (document reference: F3.4.1); Volume 3, Annex 4.2 Onshore and intertidal ornithology - wintering and migratory birds technical report of the ES (document reference: F3.4.2); Volume 3, Annex 4.3: Onshore and intertidal ornithology – intertidal birds technical report of the ES (document reference F3.4.3).
13 September 2023	Natural England, Lancashire County Council, Preston City Council and	EWG Meeting 2	• The data presented and survey approach to date was considered to be extensive. • No points of concern were raised in relation to	N/A

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
	Environment Agency.		the content for the PEIR assessment.	
18 December 2023	Environment Agency and Natural England	EWG Meeting 3	• The main focus of the meeting was to provide an update on the Projects approach to Biodiversity Net Gain. However the potential for impacts on ornithological features was highlighted. The EWG was informed on ongoing consultation in relation to crop choice in order to support SPA feature pink-footed goose. • The opportunities for potential collaboration with ongoing and planned enhancement and mitigation schemes were outlined. This included the Queensway Farmland Conservation Area, RSPB Hesketh Out Marsh and the proposed RSPB Megafence scheme. Attendees were invited to send further suggestions.	The Transmission Assets aim to mitigate impacts on habitats arising as a result of the project and, additionally, to deliver biodiversity net gain, where practicable as an enhancement under a separate commitment. Areas identified through the iterative EIA process to date as potentially suitable for mitigation and/or net gain are shown on Figure 3.7 (see Volume 1, Figures). More detail is set out in Volume 3, Chapter 3: Onshore ecology and nature conservation of the ES (document reference F3.3). Measures adopted as part of the Transmission Assets ('Commitments') will be secured through the Commitments Register (document reference: F1.5.3). Commitments relevant to onshore and intertidal ornithology are listed in **section 1.6.**
26th January 2024	Natural England, Lancashire County Council, Preston City Council and Environment Agency.	EWG Meeting 4	• Presentation of S42 consultation key comments and approach to addressing comments in ES. • Update on baseline surveys undertaken to date and baseline data proposed to be included in the ES.	The results of these surveys are presented within Volume 3, Annex 4.1 Onshore and intertidal ornithology - breeding birds technical report of the ES (document reference: F3.4.1); Volume 3, Annex 4.2 Onshore and intertidal ornithology - wintering and migratory birds technical report of the ES (document reference: F3.4.2); Volume 3, Annex 4.3: onshore and intertidal ornithology - intertidal birds technical report of the ES (document reference: F3.4.3). All desktop data sources used to add to the characterisation of the baseline are described within **section 1.6.2.**

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
19 June 2024	Environment Agency, Natural England, RSPB, Preston City Council, Greater Manchester Ecology Unit	EWG Meeting 6A	• A site selection update was provided. • Details were provided in relation to intertidal works and measures to be taken to reduce the potential for impacts on ornithological constraints. • An update was provided on ornithological surveys completed to date and post PEIR. • A summary of the proposed mitigation strategy for the Project in relation to birds was provided.	The results of these surveys are presented within Volume 3, Annex 4.1 Onshore and intertidal ornithology - breeding birds technical report of the ES (document reference: F3.4.1); Volume 3, Annex 4.2 Onshore and intertidal ornithology - wintering and migratory birds technical report of the ES (document reference: F3.4.2); Volume 3, Annex 4.3: onshore and intertidal ornithology - intertidal birds technical report of the ES (document reference: F3.4.3). Measures adopted as part of the Transmission Assets ('Commitments') will be secured through the Commitments Register (document reference: F1.5.3). Commitments relevant to onshore and intertidal ornithology are listed in **section 1.6.** Further detail is provided within Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference F3.4).
	Natural England	Ongoing engagement	• Continual engagement to discuss areas of concern highlighted by S42 response and Natural England's response to EWG6A, including impacts, vulnerable receptors, number of birds affected and in which areas. • Discussions are focussed on the mitigation hierarchy and how the principles of avoidance and minimisation have been applied to onshore and intertidal ornithology receptors where possible. • Details provided on the locations of proposed mitigation and what measures are being proposed within these areas.	Mitigations, as relevant to impacts and receptors, are summarised in **Table 1.71**, **Table 1.78** and **Table 1.94**.

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
			• Evidence to support the rationale behind the mitigation. • The locations for which baseline data has been collected.	
S42 Responses				
Offshore ornithology				
November 2023	Natural England	S42 consultation	• Further consideration should be given to the temporal and spatial overlap between the Transmission Assets and other projects considered in-combination in relation to impacts on red-throated diver and common scoter.	The in-combination assessment for red-throated diver and common scoter as features of the Liverpool Bay SPA is provided in **section 1.5.4.**
November 2023	Natural England and Natural Resources Wales	S42 consultation	• Minimise and mitigate disturbance to the receptor species of Liverpool Bay SPA through the implementation of a Vessel Management Plan.	Measures adopted as part of the project are discussed in **section 1.4.2** (see also Volume 1, Annex 5.3: Commitments register of the ES). with any mitigation measures required discussed in the relevant assessment sections (**sections 1.5.3** and **1.5.4**). Commitments regarding minimising vessel disturbance are addressed in **Table 1.6** (CoT65 and CoT111 - which addresses Liverpool Bay/Bae Lerpwl SPA, specifically). See also the Outline Vessel Traffic Management Plan (document reference: J21) which has been developed to detail the plans to minimise vessel related disturbance.
November 2023	Natural England	S42 consultation	• PEIR assessments for red-throated diver and common scoter utilised data from Lawson *et al.* (2016). Data from HiDef Aerial Surveying Limited (2023) should be used.	Natural England have provided the Applicants with the data associated with HiDef Aerial Surveying Limited (2023) and these data have been used to inform relevant assessments **in section 1.5.**
Onshore ecology, onshore and intertidal ornithology				
23 November 2023	Natural England	S42 Response	• Request to identify the breeding, non-breeding and assemblage features	Features of internationally and nationally designated sites are considered with the potential

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
			of SPAs and Ramsar sites (Morecambe and Duddon Estuary SPA, Morecambe Bay Ramsar Site and Martin Mere SPA and Ramsar). • Request for a 'whole project alone' assessment of potential impacts on the Ribble and Alt Estuaries SPA and its' functionally linked land. • Request to include an assessment of the impact of visual and noise disturbance on ornithological receptors. • Request for details pertaining to activities expected to occur during the lifetime of the cables. • Request for the ES and HRA to be brought in line with each other and to make sure that impacts are assessed simultaneously.	for impacts from the Transmission Assets in **section 1.6.**. An assessment of the potential impact on qualifying features of the SPAs (e.g. Ribble and Alt Estuaries SPA) is addressed within **section 1.6.3**. This assessment includes the potential impact to areas of Functionally Linked Land (FLL) identified. The assessment of the effects due to disturbance and displacement from construction, decommissioning, and operation and maintenance activities is presented within **section 1.6.3**. The assessment is conducted against the MDS as set out within **section 1.6.3**. The impacts assessed within the ES and the HRA have been aligned to ensure synchronisation.
23 November 2023	Lancashire County Council	S42 Response	• Request to consult Lancashire Environmental Records Network for all statutory designated sites. • Request that relevant legislation is adhered to and mitigation/compensation proposals are included. • Request that all surveys are conducted in line with recognised guidelines and at an appropriate time of year. • Request that all potential impacts are fully assessed.	All legislation, policy and guidance relevant to ornithology and the assessment carried out within this chapter is set out in **section 1.1**. All measures adopted by the project relevant to onshore and intertidal ornithology are set out in **section 1.6** and further detail is provided within Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference: F3.4). The desktop data (including LERN designated sites data) used to inform the assessment of baseline conditions and potential impacts on birds is presented in full within Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference: F3.4). Survey methodologies are set out in the in Volume 3, Annex

Date	Consultee	Type of Consultation	Summary of Consultation	Where addressed
				4.1: Onshore ornithology breeding birds technical report (document reference: F3.4.1), Volume 3, Annex 4.2: Onshore ornithology wintering and migratory birds technical report (document reference: F3.4.2) and Volume 3, Annex 4.3: Onshore ornithology intertidal ornithology technical report of the ES (document reference: F3.4.3). An assessment of the potential impact on qualifying features of the SPAs and Ramsars is presented within **section 1.6.3**. This assessment includes the potential impact at areas of FLL.
23 November 2023	Northwest Wildlife Trust	S42 Response	• Concerns raised regarding the potential impact on wintering birds on the foreshore, Lytham Moss, the Ribble Estuary, Newton Marsh SSSI and the functionally linked land.	An assessment of the potential impact on key qualifying features of the SPAs and Ramsars is presented within **section 1.6.3**.

1.3 Summary of HRA Stage 1 Screening Report conclusions

1.3.1.1 This section summarises all pathways identified for potential LSE (arising alone and/or in-combination) and defines the scope of the assessments within the HRA Stage 2 ISAA – Part 3 SPA and Ramsar Site assessments.

1.3.2 Screening outcomes for the Transmission Assets alone

1.3.2.1 The potential for LSE as a result of the Transmission Assets alone has been identified in the HRA Stage 1 Screening Report (document reference: E3).

Offshore ornithological features

1.3.2.2 As detailed in the HRA Stage 1 Screening Report (document reference: E3), the potential for LSE has been identified for three SPAs and two Ramsar sites designated for offshore ornithological features and five SPA sites and two overlapping Ramsar sites designated for onshore and intertidal ornithological features (**Table 1.2**).

Table 1.2: SPA and Ramsar sites and relevant offshore ornithological features and onshore and intertidal ornithological features for which the potential for LSE could not be ruled out and therefore considered in the HRA Stage 2 ISAA

European site	Offshore ornithological features
Offshore ornithology	
Liverpool Bay/Bae Lerpwl SPA	• Red-throated diver • Cormorant • Common scoter • Red-breasted merganser
Ribble and Alt Estuaries Ramsar site	• Red-throated diver • Cormorant • Common scoter
Ribble and Alt Estuaries SPA	• Common scoter • Cormorant • Scaup
Morecambe Bay and Duddon Estuary SPA	• Cormorant • Eider • Red-breasted merganser
Morecambe Bay Ramsar site	• Cormorant • Eider • Red-breasted merganser
Onshore and intertidal ornithology	
Liverpool Bay/Bae Lerpwl SPA	• Common scoter *Melanitta nigra* (non-breeding) • Red-throated diver *Gavia stellata* (non-breeding) • Common tern *Sterna hirundo* (breeding)
Ribble and Alt Estuaries SPA	• Pink-footed goose *Anser brachyrhynchus* (wintering) • Whooper swan *Cygnus cygnus* (wintering) • Shelduck *Tadorna tadorna* (wintering) • Wigeon *Anas penelope* (wintering) • Teal *Anas crecca* (wintering) • Oystercatcher *Haematopus ostralegus* (wintering) • Ringed plover *Charadrius hiaticula* (passage) • Golden plover *Pluvialis apricaria* (wintering) • Grey plover *Pluvialis squatarola* (wintering) • Bar-tailed godwit *Limosa lapponica* (wintering) • Black-tailed godwit *Limosa limosa* (wintering) • Ruff *Calidris pugnax* (breeding) • Dunlin *Calidris alpina* (wintering)

European site	Offshore ornithological features
	• Sanderling *Calidris alba* (wintering and passage) • Knot *Calidris canutus* (wintering and passage) • Redshank *Tringa totanus* (non-breeding) • Lesser black-backed gull *Larus fuscus* (breeding) • Common tern (breeding) • Non-breeding waterbird assemblage • Breeding waterbird assemblage
Ribble and Alt Estuaries Ramsar site	• Pink-footed goose (wintering) • Whooper swan (wintering) • Wigeon (wintering) • Teal (wintering) • Oystercatcher (wintering) • Ringed plover (passage) • Golden plover (wintering) • Grey plover (wintering) • Bar-tailed godwit (wintering) • Black-tailed godwit (passage) • Knot (wintering) • Dunlin (passage) • Sanderling (passage) • Redshank (passage) • Common tern (breeding)
Martin Mere SPA	• Pink-footed goose (wintering)
Martin Mere Ramsar site	• Pink-footed goose (wintering)
Morecambe Bay and Duddon Estuary SPA	• Pink-footed goose (wintering) • Golden plover (wintering) • Curlew (wintering) • Herring gull *Larus argentatus* (breeding) • Lesser black-backed gull (breeding and non-breeding) • Sandwich tern *Thalasseus sandvicensis* (breeding)
Morecambe Bay Ramsar site	• Pink-footed goose (wintering) • Golden plover (wintering) • Curlew (wintering) • Herring gull (breeding) • Lesser black-backed gull (breeding) • Sandwich tern (breeding)
Bowland Fells SPA	• Lesser black-backed gull (breeding)

1.3.3 LSE in-combination

1.3.3.1 When undertaking an in-combination assessment, projects, plans or activities with which the Transmission Assets may interact to produce an in-combination effect must be identified in the HRA Stage 1 Screening Report (document reference: E3). These interactions may arise within the construction, operation and maintenance, or decommissioning phases. The process of identifying those projects, plans or activities for which there is the potential for an interaction to occur is referred to as 'screening'.

1.3.3.2 A specialised process has been developed in order to methodically and transparently screen the large number of projects, plans and activities that may be considered in-combination with the Transmission Assets. This involves a staged process that considers the level of detail available for projects, plans and activities, as well as the potential for interactions on a conceptual, physical and temporal basis.

LSE in-combination for ornithological features

1.3.3.3 Projects and plans with the potential to directly affect the SPAs and Ramsars and/or their features for which an LSE has been identified for the Transmission Assets alone have been screened in for the in-combination assessment.

1.3.3.4 For offshore ornithological features, the potential for LSE alone has been identified for the following impacts from the Transmission Assets acting alone.

- 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 Suspended Sediment Concentrations (SSC).

1.3.3.5 For onshore and intertidal ornithology features, the potential for LSE alone has been identified for the following impacts from the Transmission Assets acting alone:

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

1.3.3.6 For potential impacts discounted for LSE alone, there was either no pathway to effect, or the Transmission Assets would result in only negligible or inconsequential effects that would not contribute (even collectively with other projects or plans) in a material way to in-combination effects. Therefore, where a potential impact has been screened out for LSE alone, it has also been screened out for in-combination effects.

1.3.4 Summary table of HRA Stage 1 Screening Report outcomes

1.3.4.1 **Table 1.3** presents a summary of the SPAs and Ramsar sites and relevant qualifying features for which LSE could not be ruled out and therefore an Appropriate Assessment is required to be undertaken.

Table 1.3: A summary of all SPA and Ramsar sites for which the potential for LSE could not be discounted in the HRA Stage 1 Screening Report and for which an Appropriate Assessment is required

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
Offshore ornithological features				
Liverpool Bay/Bae Lerpwl SPA	0.00	Red-throated diver Cormorant Common scoter Red-breasted merganser	Construction/decommissioning	• 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 SSC. • In-combination effects.
			Operation and maintenance	• Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • Temporary habitat. loss/disturbance and increased SSC. • In-combination effects.
Ribble and Alt Estuaries Ramsar site	0.00	Red-throated diver Cormorant Common scoter	Construction/decommissioning	• 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 SSC. • In-combination effects.

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
			Operation and maintenance	• Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • Temporary habitat loss/disturbance and increased SSC. • In-combination effects.
Ribble and Alt Estuaries SPA	0.00	Common scoter Cormorant Scaup	Construction/decommissioning	• 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 SSC. • In-combination effects.
			Operation and maintenance	• Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • Temporary habitat loss/disturbance and increased SSC. • In-combination effects.
Morecambe Bay and Duddon Estuary SPA	15.8	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • Indirect impacts from underwater sound affecting prey species.

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
				• Temporary habitat loss/disturbance and increased SSC. • In-combination effects.
			Operation and maintenance	• Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • Temporary habitat loss/disturbance and increased SSC. • In-combination effects.
Morecambe Bay Ramsar site	15.8	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• 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 SSC. • In-combination effects.
			Operation and maintenance	• Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • Temporary habitat loss/disturbance and increased SSC. In-combination effects.

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
Onshore and intertidal ornithology				
Liverpool Bay/Bae Lerpwl SPA	0.00	Common scoter (non-breeding) Red-throated diver (non-breeding) Common tern (breeding)	Construction/decommissioning	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
			Operation and maintenance	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
Ribble and Alt Estuaries SPA	0.00	Pink-footed goose (non-breeding) Whooper swan (non-breeding) Shelduck (non-breeding) 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)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
			Operation and maintenance	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
		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		• In-combination effects
Ribble and Alt Estuaries Ramsar site	0.00	Pink-footed goose (non-breeding) Whooper swan (non-breeding) Wigeon (non-breeding) 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)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
			Operation and maintenance	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
		Redshank (non-breeding) Common tern (breeding)		
Martin Mere SPA	11.49	Pink-footed goose (non-breeding)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
Martin Mere Ramsar site	11.49	Pink-footed goose (non-breeding)	Construction/decommissioning	• Permanent loss of supporting habitats. • Temporary loss of supporting habitats and/or resource availability. • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects.
Morecambe Bay and Duddon Estuary SPA	9.5	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Herring gull (breeding) Lesser black-backed gull (breeding and non-breeding) Sandwich tern (breeding)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
			Operation and maintenance The following features: – Golden plover (non-breeding) – Curlew (non-breeding) – Pink-footed goose (non-breeding)	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
Morecambe Bay Ramsar site	9.5	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Herring gull (breeding) Lesser black-backed gull (breeding) Sandwich tern (breeding)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
			Operation and maintenance The following features: – Golden plover (non-breeding) – Pink-footed goose (non-breeding) – Curlew (non-breeding) – Lesser black-backed gull (breeding)	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects

SPA and Ramsar sites	At sea distance to Transmission Assets Order Limits: Offshore (km)	Relevant qualifying features	Project phase	Impact
Bowland Fells SPA	17.6	Lesser black-backed gull (breeding)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects
			Operation and maintenance	• Temporary loss of supporting habitats and/or resource availability. • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities. • In-combination effects.

1.4 Information to support the Appropriate Assessment

1.4.1 Maximum Design Scenarios

1.4.1.1 For all SPA and Ramsar sites considered in this HRA Stage 2 ISAA – Part 3 SPA and Ramsar site assessments, the assessments have been based on a realistic MDS. The MDS have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. Each MDS has been derived from the Project Design Envelope (PDE) for the Transmission Assets. Volume 1, Chapter 3: Project description of the ES (document reference: F1.3) describes the Transmission Assets design and identifies the range of potential parameters for all relevant components.

1.4.1.2 The PDE approach defines a design envelope and parameters within which the final design will sit. This allows flexibility for elements that may change such as a different infrastructure layout, whilst ensuring the MDS is assessed. The MDS for each of the potential impacts for each receptor group are tabulated separately in each of the receptor sections of this HRA Stage 2 ISAA (document reference: E2.2) according to the effect-pathway under consideration. The assessment scenarios are consistent with those used for assessment in relevant chapters of the ES.

1.4.1.3 The MDS for each of the potential impacts for each receptor, or receptor group, are tabulated separately in each of the receptor sections of the HRA Stage 2 ISAA – Part 3 SPA and Ramsar Site Assessments (see **section 1.5** and **1.6**) according to the effect-pathway under consideration. The assessment scenarios are consistent with those used for assessment within Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference: F3.4) and Volume 2, Chapter 5: Offshore ornithology of ES (document reference: F2.5).

1.4.2 Measures adopted as part of the Transmission Assets

1.4.2.1 For the purposes of this HRA Stage 2 ISAA, the term ‘measures adopted as part of the Transmission Assets’ is used to include the following two types of mitigation measures (adapted from the Institute for Environmental Management and Assessment (IEMA), 2016) These measures are set out in Volume 1, Annex 5.3: Commitments register of the ES (document reference: F1.5.3).

- Embedded mitigation. This includes the following.
  - Primary (inherent) mitigation: measures included as part of the project design. IEMA describes these as ‘modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken’. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and/or deemed marine licences. For example, a reduction in footprint or height.

  - Tertiary (inexorable) mitigation: IEMA describes these as 'actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects'. Such measures can be secured through a Code of Construction Practice or similar.

- Secondary (foreseeable) mitigation: IEMA describes these as '*actions that will require further activity in order to achieve the anticipated outcome'*. These include measures required to reduce the significance of environmental effects (such as lighting limits) and can be implemented through the various plans and documents secured via the requirements in the DCO and conditions in the deemed marine licences, such as an offshore environmental management plan or similar.

1.4.2.2 In addition, where relevant, measures have been identified that may result in enhancement of environmental conditions. Such measures are clearly identified within Volume 1, Annex 5.3: Commitments register of the ES (document reference: F1.5.3).

1.4.2.3 Embedded measures that will form part of the final design (and/or are established legislative requirements/good practice) have been taken into account as part of the assessment presented in the relevant assessment sections below (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures to which the Applicants are committed are considered in the assessment of effects.

1.4.2.4 The measures adopted are tabulated separately in each of the sections addressing the potential effect-pathways for which they have been designed. These measures are presented within each relevant part of **section 1.5.3** (offshore ornithology) and **section 1.6.3** (onshore and intertidal ornithology) of the HRA Stage 2 ISAA – Part 3 SPA and Ramsar Site Assessments.

1.4.3 Baseline information

1.4.3.1 Baseline information on the SPA and Ramsar sites identified for further assessment within HRA Stage 2 ISAA (document references: E2.1, E2.2 and this document) has been gathered through a comprehensive desktop study of existing studies and datasets. The key data sources are summarised in each of the receptor group sections below and presented in detail within topic chapters in the ES. Any additional sources of information used in the HRA Stage 2 ISAA are also summarised. The key baseline data sources, for each receptor, are outlined below.

- Offshore ornithology – Volume 2, Chapter 5: Offshore Ornithology of the ES (document reference: F2.5) was referred to for baseline information, which included data from 24 months of survey of the Morgan Offshore Wind Project: Generation Assets (between April 2021 and March 2023) and 24 months of survey of the Morecambe Offshore Windfarm: Generation Assets (between March 2021 and February 2023).

- Onshore and intertidal ornithology.
  - Volume 3, Annex 4.1: Onshore and intertidal ornithology - breeding birds technical report of the ES (document reference: F3.4.1).
  - Volume 3, Annex 4.2: Onshore and intertidal ornithology - wintering and migratory birds technical report of the ES (document reference: F3.4.2).
  - Volume 3, Annex 4.3: Onshore and intertidal ornithology – intertidal birds technical report of the ES (document reference: F3.4.3).
  - Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference: F3.4).

1.4.3.2 For brevity, information on the SPA and Ramsar sites is summarised within the main body of this HRA Stage 2 ISAA (document references: E2.1, E2.2 and this document).

1.4.4 Conservation objectives and advice

1.4.4.1 The SNCBs have produced conservation advice for SPAs under their statutory remit. This conservation advice provides supplementary information on sites and features and although the content provided is similar, the format of the advice provided varies between the different SNCBs.

1.4.4.2 Conservation objectives set the framework for establishing appropriate conservation measures for each feature of the site and provide a benchmark against which plans or projects can be assessed. The conservation objectives set out the essential elements needed to ensure that a qualifying habitat or species is maintained or restored at a site. If all the conservation objectives are met, then the integrity of the site will be maintained and deterioration or significant disturbance of the qualifying features avoided.

1.4.4.3 In this HRA Stage 2 ISAA, the Applicants have referenced the most up-to-date conservation objectives and conservation advice available. It is recognised that in the conservation advice documents, if any feature of the SPA is in unfavourable condition, the integrity of the site is deemed to be compromised and the overarching objective is therefore to restore site integrity.

1.4.4.4 Due to the location and scale of the Transmission Assets, SPAs with the potential to be impacted fall variously under the remit of NRW and/or Natural England.

1.4.4.5 Natural England (2015) has published a ‘European Site Conservation Objectives: Supplementary advice on conserving and restoring features’ document. The document presents attributes which are ecological characteristics of the designated species and habitats within a site. Each attribute has a target which is either quantified or qualitative depending on the available evidence. Targets are also listed for the desired state to be achieved for the attribute.

1.4.4.6 For Welsh sites conservation advice has been developed by NRW in the form of a ‘Regulation 37 Document’.

1.4.4.7 For some SPAs under the statutory remit of NRW and/or Natural England, a Conservation Advice Package (CAP) document has been produced. Of the SPAs screened into this HRA Stage 2 ISAA Part 3 – SPA and Ramsar site Assessments, a CAP document has only been produced for the Liverpool Bay/Bae Lerpwl SPA; CAP documents for other SPAs have not yet been produced. This document contains revised and updated conservation objectives for the features of each site, site-specific clarifications and advice in order for the conservation objectives to be achieved and advice on management required to achieve the conservation objectives.

1.4.4.8 For SPAs which fall within both Welsh and English territorial waters the two relevant governing SNCBs can publish separate conservation objectives for the same European site. Where this is the case for SPAs assessed within this HRA Stage 2 ISAA Part 3 – SPA and Ramsar site Assessments, the most recently published conservation objectives have been used.

1.4.4.9 Where Ramsar sites interests coincide with qualifying features within an SPA or an SAC, the advice for overlapping designations is considered to be, in most cases, sufficient to support the management of the Ramsar sites' interests. Therefore, the conservation objectives would be referenced for both designations.

1.4.5 Approach to the in-combination assessments

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

1.4.5.2 When undertaking an in-combination assessment, projects, plans or activities with which the Transmission Assets may interact to produce an in-combination effect must be identified. These interactions may arise within the construction, operation and maintenance or decommissioning phases. The process of identifying those projects, plans or activities for which there is the potential for an interaction to occur is referred to as 'screening'.

1.4.5.3 A specialised process has been developed in order to methodically and transparently screen the large number of projects, plans and activities that may be considered cumulatively alongside the Transmission Assets. This involves a staged process that considers the level of detail available for projects, plans and activities, as well as the potential for interactions on a conceptual, physical and temporal basis.

1.4.5.4 The projects, plans and activities screened into the in-combination assessment have been consulted upon with the SNCBs through this HRA Stage 2 ISAA – Part 2 SAC assessments to seek agreement on the projects, plans and activities to be considered in the in-combination assessment.

1.4.5.5 The Transmission Assets in-combination assessment considers three scenarios; Transmission Assets together with Morecambe Offshore Windfarm: Generation Assets only, Transmission Assets together with Morgan Offshore Wind Project: Generation Assets only and Transmission Assets together with Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets. These in-combination scenarios are followed by the in-combination assessment of all projects,

plans and activities allocated into 'tiers' reflecting their current stage within the planning and development process. This tiered approach is adopted to provide a clear assessment of the Transmission Asses alongside other projects, plans and activities.

1.4.5.6 The in-combination assessment has been undertaken as follows, and is presented in a series of tables (one for each potential in-combination effect).

- Scenario 1: Transmission Assets together with Morecambe Offshore Windfarm: Generation Assets.
- Scenario 2: Transmission Assets together with Morgan Offshore Wind Project: Generation Assets.
- Scenario 3: Transmission Assets together with Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets.
- Scenario 4: Scenario 3 together with Tier 1, Tier 2 and Tier 3 projects, plans and activities, defined as follows.
- Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) and Tier 1 projects, plans and activities which are:
  - under construction;
  - permitted application;
  - submitted application; or
  - those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact.
- Scenario 4b: Scenario 4a and Tier 2 projects, plans and activities which a scoping report has been submitted in the public domain.
- Scenario 4c: Scenario 4b and Tier 3 projects, plans and activities which are:
  - where a scoping report has not been submitted and it is not in the public domain;
  - identified in the relevant Development Plan; or
  - identified in other plans and programmes.

1.4.5.7 An overview of the projects or activities considered for each receptor group are tabulated separately in each of the receptor chapters according to the effect-pathway under consideration.

1.4.5.8 Tier 2 and 3 projects are only included in the following in-combination assessments if sufficient information is available to inform the assessment. In practice, this generally requires that an assessment has been published for these projects although sometimes enough information can be obtained from other sources (e.g. a project's website). Without an assessment it is not possible to provide an indication as to the impact of the project as information such as baseline characterisation and project design are unavailable. (for example the proposed Mooir Vannin offshore wind farm project in IoM

Waters where a Scoping report has been submitted but no assessment is yet available; in addition, it should be noted that it is unlikely that Mooir Vannin array area will result in a LSE on Liverpool Bay SPA, due to its location >20km from this SPA).

1.5 Assessment of potential adverse effects on integrity: offshore ornithological features

1.5.1 Introduction

1.5.1.1 The HRA Stage 1 Screening Report (document reference: E3) identified the potential for LSEs on the three SPA and two Ramsar sites designated for offshore ornithological features listed in **Table 1.4** and shown in **Figure 1.1**.

Table 1.4: SPA and Ramsar sites and relevant offshore ornithological features for which the potential for LSE could not be ruled out and therefore considered in the HRA Stage 2 ISAA

European site	Offshore ornithological features
Liverpool Bay/Bae Lerpwl SPA	• Non-breeding red-throated diver • Non-breeding common scoter • Non-breeding cormorant • Non-breeding red-breasted merganser
Ribble and Alt Estuaries Ramsar site	• Non-breeding red-throated diver • Non-breeding common scoter • Non-breeding cormorant
Ribble and Alt Estuaries SPA	• Non-breeding common scoter • Non-breeding cormorant • Non-breeding scaup
Morecambe Bay and Duddon Estuary SPA	• Non-breeding cormorant • Non-breeding eider • Non-breeding red-breasted merganser
Morecambe Bay Ramsar site	• Non-breeding cormorant • Non-breeding eider • Non-breeding red-breasted merganser

1.5.1.2 LSEs on these SPA and Ramsar sites were identified for the following potential impacts.

- During the construction and decommissioning phases:
  - 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.
  - In-combination effects.

- During the operation and maintenance phase:
  - Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure.
  - Temporary habitat loss/disturbance and increased SSCs.
  - In-combination effects.

1.5.1.3 This section presents the information to inform an Appropriate Assessment (considering effects both alone and in-combination) for each designated site. A summary of all assessments undertaken within this report is provided in the concluding section of this report (**section 1.6**).

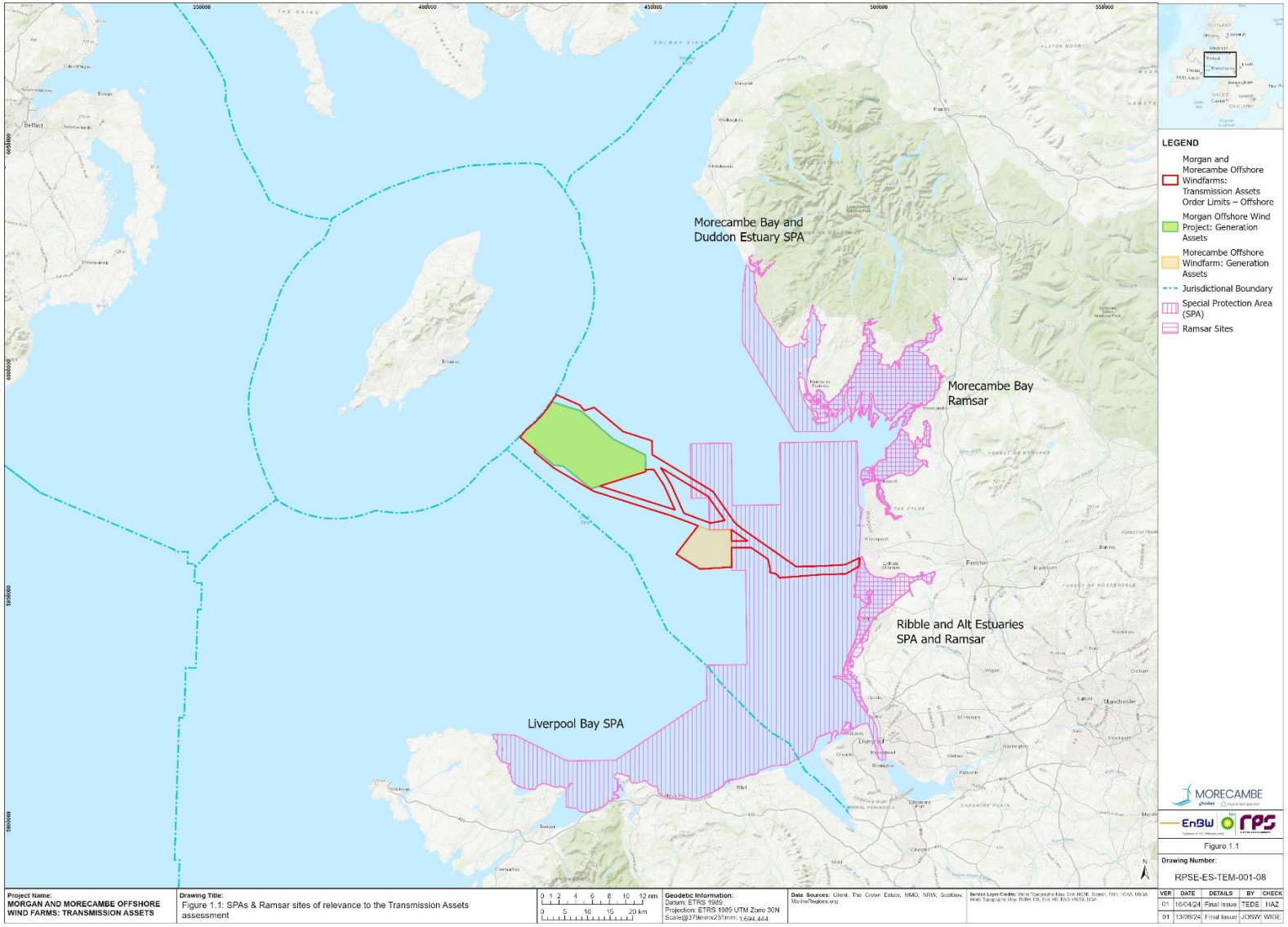

Figure 1.1: SPAs & Ramsar sites of relevance to the Transmission Assets assessments

1.5.2 Baseline information

1.5.2.1 Baseline information on the offshore ornithological features of the SPA and Ramsar sites identified for further assessment within the HRA process has been gathered through a comprehensive desktop review of existing studies and datasets.

Liverpool Bay/Bae Lerpwl SPA

Site description

Overview

1.5.2.1 Liverpool Bay is situated in the east of the Irish Sea, bordering the north west of England and the north of Wales, and running as a broad arc from Morecambe Bay to the east coast of Anglesey.

1.5.2.2 The Liverpool Bay/Bae Lerpwl SPA lies in both English and Welsh territorial waters and in offshore United Kingdom (UK) waters. The border between English and Welsh territorial waters running north west from the Dee Estuary. The Transmission Assets Order Limits: Offshore falls within the SPA.

1.5.2.3 The seabed of Liverpool Bay/Bae Lerpwl SPA contains a wide range of mobile sediments. Sand is the most common substrate, with a concentrated area of gravelly sand located off the Mersey Estuary.

1.5.2.4 The Liverpool Bay/Bae Lerpwl SPA was designated by the UK Government to meet obligations set out in the Birds Directive (2009/147/European Commission (EC)) and is protected by the Conservation of Offshore Marine Habitats and Species Regulations 2017.

1.5.2.5 The SPA qualifies under Article 4.1 of The Habitats Directive for its non-breeding (wintering) populations of red-throated diver and little gull *Hydrocoloeus minutus*, and for providing foraging areas for breeding little tern *Sternula albifrons* and common tern *Sterna hirundo*.

1.5.2.6 The SPA also qualifies under Article 4.2 for its non-breeding (wintering) population of common scoter as well as its wintering waterbird assemblage, which includes over 1% of the Great Britain population of cormorant and red-breasted merganser.

1.5.2.7 The SPA covers an area of approximately 2,528 km^2. The SPA was originally designated in 2010 for its wintering red-throated divers and common scoters and covered an area of approximately 1,703 km^2. The SPA was extended in 2017, in order to support three new protected features: wintering little gulls, and also foraging little terns and common terns. Wintering red-breasted merganser and cormorant also became new named components of the waterbird assemblage.

1.5.2.8 The original SPA boundary was delineated primarily based on the abundance and distribution of red-throated diver except in the north most region which was delineated based on the distribution and abundance of common scoter. When the SPA was extended, the new areas beyond the original boundary were designated due to the abundance and distribution of little gull.

1.5.2.9 The offshore ornithological features of the Liverpool Bay/Bae Lerpwl SPA where LSE could not be ruled out at HRA screening stage are red-throated diver, common scoter, cormorant and red-breasted merganser.

Lawson *et al*. (2016) An assessment of the numbers and distributions of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area of search

1.5.2.10 A study by Lawson *et al*. in 2016 assessed the numbers and distributions of wintering waterbirds and seabirds in Liverpool Bay/Bae Lerpwl area.

1.5.2.11 Liverpool Bay/Bae Lerpwl SPA was classified in 2010 for the protection of wintering red-throated diver, common scoter and an assemblage of greater than 20,000 waterfowl. The Lawson *et al*. (2016) report analyses additional survey data from the winter seasons of 2007 to 2008 and 2010 to 2011 in order to re-assess the number of waterbirds and seabirds within Liverpool Bay/Bae Lerpwl area of search.

1.5.2.12 The aim of the report was to determine whether any species could be considered under the SPA guidelines for protection within the site as interest features in their own right, in addition to the red-throated diver and common scoter populations which were identified for classification in the Liverpool Bay/Bae Lerpwl SPA in 2010. The results were also assessed to see whether any named component species should be added to the existing assemblage within Liverpool Bay/Bae Lerpwl SPA.

1.5.2.13 Eight winter seasons of aerial survey data (2001 to 2002, 2002 to 2003, 2003 to 2004, 2004 to 2005, 2005 to 2006, 2006 to 2007, 2007 to 2008, 2010 to 2011) were analysed assessed against the UK SPA selection guideline thresholds (Stroud *et al.* 2016) to determine whether any species occurred in numbers exceeding these thresholds.

1.5.2.14 In addition to red-throated diver and common scoter, the estimated populations within the area of search indicated this was an important site for little gull, with a mean of peak population estimate of 333 individuals within Liverpool Bay/Bae Lerpwl area of search. The highest densities of little gull were consistently located offshore of Blackpool and the Ribble Estuary, close to the 12 nautical mile line. In addition, cormorant and red-breasted merganser were present in sufficient numbers to be added as named component species of the existing assemblage feature (i.e., nationally important, >1% of the Great Britain population).

1.5.2.15 Red-throated divers were found to be abundant throughout Liverpool Bay/Bae Lerpwl SPA, with the majority of the SPA boundary delineated based on the distribution of this species. The highest densities of the species occur off the Lancashire coast at Formby, off the coast of the Wirral, offshore of Llandulas on the North Wales coast and off the coast of Penmaenmawr, North Wales. Part of the Transmission Assets Order Limits: Offshore passes through an area of moderate density of red-throated divers (**Figure 1.2**).

1.5.2.16 Common scoters were shown to aggregate in two main areas: to the north west of Rhyl and to the west of Blackpool. The Transmission Assets Order Limits passes through the south edge of the aggregation to the west of Blackpool.

1.5.2.17 The distributions of cormorant and red-breasted merganser were not mapped. However, the waterbird assemblage was mapped, and showed similar distributions to the common scoters, with aggregations in two main areas: to the north west of Rhyl and to the west of Blackpool (**Figure 1.3**).

NECR440 (HiDef Aerial Surveying Limited, 2023) Densities of qualifying species within Liverpool Bay/Bae Lerpwl SPA: 2015 to 2020

1.5.2.18 HiDef, on behalf of Natural England, published a Research Report (NECR440) in 2023 (HiDef Aerial Surveying Limited, 2023) on the densities of qualifying species within the Liverpool Bay/Bae Lerpwl SPA (the original boundary as designated in 2010), based on data from 2015 to 2020.

1.5.2.19 Digital video aerial surveys were conducted between 2015 and 2020 by HiDef Aerial Surveying Ltd ('HiDef') and commissioned by DONG and Ørsted as part of their post-consent monitoring programme for Burbo Bank Extension offshore wind farm. In total, eight surveys were completed between January and March in 2015, 2018, 2019 and 2020, covering the original SPA boundary designated in 2010.

1.5.2.20 The aim of this monitoring programme and report was to provide updated density and abundance estimates for red-throated diver, common scoter and the waterbird assemblage within the SPA. Estimates for other species, including little gull, red-breasted merganser, and cormorant were included in the report as components of the waterbird assemblage.

1.5.2.21 Red-throated divers were one of the most abundant species recorded, with population estimates throughout the survey period ranging from 372 birds in January 2018 to 2,073 birds in March 2020. Red-throated divers were shown to aggregate in two main areas: to the north west of Rhyl and a broad area to the west of the Ribble Estuary. The Transmission Assets Order Limits: Offshore passes through the north part of the aggregation to the west of Ribble Estuary (**Figure 1.2**).

1.5.2.22 Common scoters were the most abundant species recorded, with population estimates ranging between 78,797 birds in March 2020 and 202,224 birds in February 2015. Common scoters were well distributed throughout the SPA, with aggregations varying over the survey period. However, the Transmission Assets Order Limits: Offshore encompassed an area of regular high common scoter densities (**Figure 1.3**).

1.5.2.23 Population estimates of cormorants were variable, with population estimates ranging from 234 birds in March 2020, to 3,180 birds in February 2015. Cormorants were distributed throughout the SPA, with the greatest aggregations to the west of the mouth of the River Mersey. The Transmission Assets Order Limits: Offshore does not pass through the greatest aggregations of cormorants.

1.5.2.24 Red-breasted merganser population estimates ranged from 11 birds in February 2020 to 156 birds in February 2019. Red-breasted mergansers were well distributed throughout the SPA, with aggregations varying over the survey period. The Transmission Assets Order Limits: Offshore does not pass through an area of red-breasted merganser aggregations.

1.5.2.25 Over the survey period, population estimates calculated for the waterbird assemblage varied, ranging from 101,831 birds in March 2020 to 216,824 birds in February 2015. The waterbirds were well distributed throughout the SPA. The HiDef surveys are discussed further in **section 1.5.3** in relation to the assessment of adverse effects.

Feature accounts

Red-throated diver

1.5.2.26 The non-breeding population of red-throated divers in Great Britain is estimated to be 17,166 individuals (O'Brien *et al*. 2008), representing between 10% and 19% (depending on the areas included) of the NW Europe biogeographical non-breeding population.

1.5.2.27 The Great Britain wintering population is aggregated in substantial numbers in several areas, from the Moray Firth in the north to NE Norfolk to Kent in the south. It is considered that the wintering population is largely made up of birds which breed in the UK, Greenland and Scandinavia.

1.5.2.28 In the UK, wintering red-throated divers are associated with shallow (between 0-20 m deep and less frequently in depths of around 30 m) inshore waters, often occurring within sandy bays, firths and sea lochs, although open coastline is also frequently used (Skov *et al*., 1995; Stone *et al*., 1995). There is some evidence of association with areas of salinity change (e.g., where low salinity river water meets higher salinity level sea water). Such areas tend to fluctuate with state of tide, volume of river flow and wind conditions. Their diet is principally small fish of a variety of species (particularly of the cod family, herring and sprats) and there is evidence to suggest that in some areas, the higher numbers of birds are associated with shoals of sprats.

1.5.2.29 Red-throated diver is listed on Annex I of the Birds Directive (2009/147/EC). The SPA protects the third largest aggregation of red-throated diver in the UK during the non-breeding season, and red-throated diver was designated as a qualifying feature due to supporting 6.89% of the UK wintering population (five-year peak mean 2004 and 2005 to 2010 and 2011, 1,171 individuals). Webb *et al*. (2006) and Lawson *et al*. (2016) have found large concentrations of red-throated diver along the north Wales coast. The population of red-throated divers at the SPA, as included on the SPA, as estimated by Lawson *et al.* (2016) is 1,171 birds.

1.5.2.30 The latest densities of red-throated divers in the Liverpool Bay/Bae Lerpwl SPA were derived from wintering aerial surveys carried out between 2015 and 2020 (HiDef Aerial Surveying Limited (2023). Red-throated divers were one of the most abundant species recorded, with population estimates throughout the survey period ranging from 372 birds in January 2018 to 2,073 birds in March 2020. Red-throated divers were shown to aggregate in two main areas: to the north west of Rhyl and a broad area to the west of the Ribble Estuary (**Figure 1.2**).

Common scoter

1.5.2.31 Common scoter migrate from their breeding grounds to moulting and overwintering grounds at more southerly latitudes and arrive in Liverpool Bay in large numbers from October onwards (Natural England and CCW, 2010). Male birds arrive first, followed by females from December onwards. The females also depart for the breeding grounds before males (in February). Some birds remain in Liverpool Bay over the summer period but these tend to be immature or birds that are moulting. Liverpool Bay is an important overwintering site for common scoter due to its abundant bivalve shellfish stocks that occur in shallow waters at depths of less than 20 m.

1.5.2.32 In the UK, wintering common scoters are associated with shallow (between 0-20 m deep (less frequently in depths of around 30 m)) offshore areas with sandy sea beds (Lack, 1986). Kaiser *et al*., (2002) conducted a review of the literature concerning the diet of common scoter. This revealed that in each of eight quantitative studies, the percentage value for the occurrence of molluscs in their diet exceeded 90% and that for bivalves exceeded 88%.

1.5.2.33 Common scoter was designated as a qualifying feature due to the SPA supporting 10.31% of the NW European wintering population (five-year peak mean 2004 and 2005 to 2010 and 2011, 56,679 individuals). Common scoters have been shown to aggregate in two main areas of the SPA: to the north west of Rhyl and to the west of Blackpool (Lawson *et al.,* 2016; **Figure 1.3**).

1.5.2.34 The latest densities of common scoters in the Liverpool Bay/Bae Lerpwl SPA were derived from wintering aerial surveys carried out between 2015 and 2020 (HiDef Aerial Surveying Limited, 2023). Common scoters were the most abundant species recorded, with population estimates ranging between 78,797 birds in March 2020 and 202,224 birds in February 2015. Common scoters were well distributed throughout the SPA, with aggregations varying over the survey period.

Cormorant

1.5.2.35 Cormorants form a key component of an internationally important assemblage of wintering birds in the Liverpool Bay/Bae Lerpwl SPA, with the population of wintering cormorants exceeding the threshold of 1% of the Great Britain wintering population or 2,000 individuals. Lawson *et al.* (2016) did not map the distributions of individual species that comprise the waterbird assemblage of the SPA; however, the overall waterbird assemblage was mapped and showed aggregations in two main areas: to the north west of Rhyl and to the west of Blackpool, with this reflecting the distribution of common scoter, the most abundant component of the assemblage.

1.5.2.36 The latest densities of cormorants in the Liverpool Bay/Bae Lerpwl SPA were derived from wintering aerial surveys carried out between 2015 and 2020 (HiDef Aerial Surveying Limited, 2023). Population estimates of cormorants were variable, with population estimates ranging from 234 birds in March 2020, to 3,180 birds in February 2015. Cormorants were distributed throughout the SPA, with the greatest aggregations to the west of the mouth of the River Mersey.

Red-breasted merganser

1.5.2.37 Red-breasted mergansers form a key component of an internationally important assemblage of wintering birds in the Liverpool Bay/Bae Lerpwl SPA, with the population of wintering red-breasted mergansers exceeding the threshold of 1% of the Great Britain wintering population or 2,000 individuals. Lawson *et al.* (2016) did not map the distributions of individual species that comprise the waterbird assemblage of the SPA; however, the overall waterbird assemblage was mapped and showed aggregations in two main areas: to the north west of Rhyl and to the west of Blackpool, with this reflecting the distribution of common scoter, the most abundant component of the assemblage.

1.5.2.38 The latest densities of red-breasted mergansers in the Liverpool Bay/Bae Lerpwl SPA were derived from wintering aerial surveys carried out between 2015 and 2020 (HiDef Aerial Surveying Limited (2023). Red-breasted merganser population estimates ranged from 11 birds in February 2020 to 156 birds in February 2019. Red-breasted mergansers were well distributed throughout the SPA, with aggregations varying over the survey period.

Condition assessment

1.5.2.39 Natural England, NRW and the Joint Nature Conservation Committee (JNCC) published a Liverpool Bay/Bae Lerpwl SPA Conservation Advice Package in December 2022 (Natural England *et al.,* 2022).

Red-throated diver

1.5.2.40 The Conservation Advice Package states that the interest feature red-throated diver will be considered to be in favourable condition only when each of the following three conditions are met.

1. The red-throated diver population shows only non-significant fluctuation around the mean population at the time of classification of the SPA, with due consideration to the potential for natural change.
2. Red-throated diver distribution and ability to use the site does not significantly change (subject to natural fluctuations and variation).
3. The extent and distribution of the supporting habitat available to the red-throated diver population within the site, including its structure, function and supporting processes, is maintained.

1.5.2.41 The Conservation Advice Package sets targets (**Table 1.5**), including targets to restore the distribution of red-throated divers and their suitable habitats within the SPA, due to displacement from large infrastructure, such as windfarms. Points 2 and 3, when considered alongside the targets in **Table 1.5** indicate that Natural England, NRW and JNCC consider the distribution of red-throated diver to be unfavourable, and therefore consider the overall condition of this interest feature to be unfavourable, even though the overall wintering red-throated diver population of the SPA (i.e. the number of birds) is favourable.

1.5.2.42 Therefore, the wintering population of red-throated divers within the Liverpool Bay/Bae Lerpwl SPA is in unfavourable condition.

Common scoter

1.5.2.43 The Conservation Advice Package sets targets (see **Table 1.5** below), all of which are to maintain attributes. The Conservation Advice Package states that '*"Maintain" is used here because existing evidence suggests the feature to be in favourable condition for each attribute with a maintain target, and the objective is for it to remain so'.*

1.5.2.44 Therefore, the wintering population of common scoters within the Liverpool Bay/Bae Lerpwl SPA is in favourable condition.

Cormorant and red-breasted merganser

1.5.2.45 Cormorants and red-breasted mergansers form part of the non-breeding (wintering) assemblage of over 20,000 waterbirds.

1.5.2.46 The Conservation Advice Package sets targets (see below) for the non-breeding (wintering) assemblage, all of which are to maintain attributes. The Conservation Advice Package states that *"Maintain" is used here because existing evidence suggests the feature to be in favourable condition for each attribute with a maintain target, and the objective is for it to remain so'.*

1.5.2.47 Therefore, the non-breeding (wintering) assemblage of waterbirds, including the wintering populations of cormorants and red-breasted mergansers within the Liverpool Bay/Bae Lerpwl SPA is in favourable condition.

Conservation objectives

1.5.2.48 The conservation objectives set out in **Table 1.5** are taken from the Liverpool Bay/Bae Lerpwl SPA Conservation Advice Package (Natural England *et al.*, 2022).

Table 1.5: Conservation objectives (attributes and targets) for the Liverpool Bay/Bae Lerpwl SPA interest features

Feature	Attribute	Target
Red-throated diver	Non-breeding population: abundance	Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020).
	Non-breeding population: distribution	Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.
	Disturbance caused by human activity	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.

Feature	Attribute	Target
	Supporting habitat: Food availability and quality of prey	Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.
	Supporting habitat: extent, distribution and quality of supporting habitat for the non-breeding season	Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).
Common scoter	Non-breeding population: abundance	Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020).
	Non-breeding population: distribution	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.
	Disturbance caused by human activity	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.
	Supporting habitat: Food availability and quality of prey	Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.
	Supporting habitat: extent, distribution and quality of supporting habitat for the non-breeding season	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).
Non-breeding (wintering) assemblage of waterbirds (including the wintering populations of cormorants and red-breasted mergansers)	Assemblage of species: abundance	Maintain the size of the non-breeding population of component species at a level which is at or above 157,952 individuals (mean peak 2015, 2018, 2019 and 2020).
	Assemblage of species: diversity	Maintain the species diversity of the bird assemblage which should include common scoter, red-throated diver, little gull, red-breasted merganser and cormorant.
	Assemblage of species: distribution	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.
	Disturbance caused by human activity	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.

Feature	Attribute	Target
	Supporting habitat: extent, distribution and quality of supporting habitat for the non-breeding season	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).

Ribble and Alt Estuaries SPA

Site description

1.5.2.49 The Ribble and Alt Estuaries SPA lies on the coast of Lancashire and Sefton in North West England. The SPA encompasses all or parts of Ribble Estuary Site of Special Scientific Interest (SSSI) and Sefton Coast SSSI. The SPA covers an area of 12,412.31 ha. The SPA was designated in 1995 (subsuming the Alt Estuary SPA and the Ribble Estuary SPA), and an extension at the south end of the Sefton Coast SSSI, was classified in 2002.

1.5.2.50 The SPA comprises two estuaries (i.e. Ribble and Alt Estuaries), of which the Ribble is by far the larger, together with an extensive area of sandy foreshore along the Sefton Coast, and forms part of the chain of west coast SPAs that fringe the Irish Sea. Indeed, there is considerable interchange in the movements of birds between this site and Morecambe Bay, Mersey Estuary, Dee Estuary and Martin Mere.

1.5.2.51 A large proportion of the SPA is within the Ribble Estuary National Nature Reserve. The site consists of extensive areas of sand and mudflats and, particularly in the Ribble, large areas of saltmarsh. There are also areas of coastal grazing marsh.

1.5.2.52 The site qualifies under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season.

- Breeding ruff *Philomachus pugnax* and common tern.
- Wintering Bewick's swan, whooper swan, European golden plover *Pluvialis apricaria*, bar-tailed godwit.

1.5.2.53 The site qualifies under Article 4.2 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed in Annex I) in any season.

- Breeding lesser black-backed gull.
- Passage populations of common ringed plover, sanderling and common redshank.
- Wintering pink-footed goose, shelduck, Eurasian wigeon, Eurasian teal, northern pintail, oystercatcher, grey plover, red knot, sanderling, dunlin, black-tailed godwit and common redshank.

1.5.2.54 The SPA also qualifies under Article 4.2 of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterbirds: in the non-breeding season, the

area regularly supports 323,861 individual waterbirds (five-year peak mean 1993 and 1994 to 1997 and 1998), including cormorant, common scoter and scaup.

1.5.2.55 The offshore ornithological features of the Ribble and Alt Estuaries SPA where LSE could not be ruled out are cormorant, common scoter and scaup.

Feature accounts

Cormorant

1.5.2.56 Cormorant was designated as a qualifying feature due to the SPA supporting 311 cormorants (five-year peak mean 1993 and 1994 to 1997 and 1998), which equates to 2.4% of the population in Great Britain (JNCC, 2015).

Common scoter

1.5.2.57 Common scoter was designated as a qualifying feature due to the SPA supporting 746 common scoters (five-year peak mean 1993 and 1994 to 1997 and 1998), which equates to 2.7% of the population in Great Britain (JNCC, 2015).

Scaup

1.5.2.58 Scaup was designated as a qualifying feature due to the SPA supporting 114 common scoters (five-year peak mean 1993 and 1994 to 1997 and 1998), which equates to 1.0% of the population in Great Britain (Stroud *et al.,* 2016).

Condition assessment

1.5.2.59 There is no condition assessment available for the relevant offshore ornithological features of the Ribble and Alt Estuaries SPA (common scoter, cormorant and scaup).

Conservation objectives

1.5.2.60 The conservation objectives for the protected features of the SPA (as outlined in Natural England, 2019a) are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the population of each of the qualifying features; and
- the distribution of the qualifying features within the site.

Ribble and Alt Estuaries Ramsar site

Site description

1.5.2.61 The Ribble and Alt Estuaries Ramsar site occupies a stretch of coastline between Liverpool and Preston on the north west coast of England (**Figure 1.5**).

1.5.2.62 The Ramsar site forms a large area, including two estuaries which form part of the chain of west coast sites which fringe the Irish Sea. The site is formed by extensive sand and mudflats backed, in the north, by the saltmarsh of the Ribble Estuary and, to the south, the sand dunes of the Sefton Coast. The tidal flats and saltmarsh support internationally important populations of waterfowl in winter and the sand dunes support vegetation communities and amphibian populations of international importance.

1.5.2.63 Ribble and Alt Estuaries Ramsar site was designated in 1995 and covers an area of 13,464.1 ha.

1.5.2.64 The Ribble and Alt Estuaries Ramsar site is designated under Ramsar Criterion 6 for its:

- breeding population of lesser black-backed gull *Larus fuscus graellsii*;
- spring/autumn passage populations of common ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola*, red knot *Calidris canutus islandica*, sanderling *Calidris alba*, dunlin *Calidris alpina*, black-tailed godwit *Limosa limosa islandica*, common redshank *Tringa totanus totanus* and lesser black-backed gull; and
- winter populations of Bewick's swan *Cygnus columbianus bewickii*, whooper swan *Cygnus cygnus*, pink-footed goose *Anser brachyrhynchus*, shelduck *Tadorna tadorna*, Eurasian wigeon *Anas penelope*, Eurasian teal *Anas crecca*, northern pintail *Anas acuta*, oystercatcher *Haematopus ostralegus* and bar-tailed godwit *Limosa lapponica lapponica*.

1.5.2.65 The Ramsar site is also designated under Ramsar criterion 5 for supporting a wintering waterfowl assemblage of international importance (222,038 waterfowl based on a five-year peak mean 1998 and 1999 to 2002 and 2003).

1.5.2.66 In addition, the Ribble and Alt Estuaries Ramsar site citation also lists a number of noteworthy fauna species, with over 1% of the Great Britain population occurring within the Ramsar site during one of the seasons (breeding, spring/autumn passage and/or winter). This includes wintering red-throated diver, common scoter and cormorant.

1.5.2.67 The offshore ornithological features of the Ribble and Alt Estuaries Ramsar site where LSE could not be ruled out are red-throated diver, common scoter and cormorant.

Feature accounts

Red-throated diver

1.5.2.68 Red-throated diver is listed on Annex I of the Birds Directive (2009/147/EC).

1.5.2.69 The Ribble and Alt Estuaries Ramsar site lists red-throated diver as a noteworthy species, due to the Ramsar site supporting a wintering population of 56 individuals, representing an average of 1.1% of the Great Britain population (five-year peak mean 1998 to 1999 to 2002 to 2003).

Common scoter

1.5.2.70 The Ribble and Alt Estuaries Ramsar site lists common scoter as a noteworthy species, due to the Ramsar site supporting a wintering population of 691 individuals, representing an average of 1.3% of the Great Britain population (five-year peak mean 1998 to 1999 to 2002 to 2003).

Cormorant

1.5.2.71 The Ribble and Alt Estuaries Ramsar site lists cormorant as a noteworthy species, due to the Ramsar site supporting a wintering population of 463 individuals, representing an average of 2% of the Great Britain population (five-year peak mean 1998 to 1999 to 2002 to 2003).

Condition assessment

1.5.2.72 There is no condition assessment available for the relevant offshore ornithological features of the Ribble and Alt Estuaries Ramsar site (red-throated diver, common scoter and cormorant).

Conservation objectives

1.5.2.73 There are no conservation objectives available for the Ribble and Alt Estuaries Ramsar site. However, Ribble and Alt Estuaries Ramsar site falls wholly within the Ribble and Alt Estuaries SPA, and therefore in the absence of site specific objectives, the SPA wide objectives are applicable. These conservation objectives are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the population of each of the qualifying features; and
- the distribution of the qualifying features within the site.

Morecambe Bay and Duddon Estuary SPA

Site description

1.5.2.74 The SPA extends between Rossall Point in Lancashire and Drigg Dunes in Cumbria (**Figure 1.5**). The site includes the former Morecambe Bay SPA and Duddon Estuary SPA and an extension to include the Ravenglass Estuary and intervening coast and the shallow offshore area off south west Cumbria coast. It includes areas of adjoining terrestrial coastal habitat at North and South Walney and at Haverigg Point on the Duddon Estuary and the lagoons at South Walney; Cavendish Dock, Barrow and Hodbarrow, Haverigg. The SPA covers an area of 66,899.97 ha.

1.5.2.75 Morecambe Bay is the second largest embayment in Britain at over 310 km^2, and has four estuaries – the Wyre, Lune, Kent and Leven. It contains the largest continuous area of intertidal mudflats and sandflats in the UK which supports a variety of infaunal communities including cockle beds.

1.5.2.76 The site qualifies under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season.

- Non-breeding whooper swan, little egret *Egretta garzetta*, European golden plover, bar-tailed godwit, ruff, and Mediterranean gull *Larus melanocephalus*.
- Breeding little tern, sandwich tern *Sterna sandvicensis*, and common tern.

1.5.2.77 The site qualifies under Article 4.2 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed in Annex I) in any season.

- Non-breeding pink-footed goose, shelduck, northern pintail, oystercatcher, grey plover, common ringed plover, Eurasian curlew *Numenius arquata*, black-tailed godwit, ruddy turnstone *Arenaria interpres*, red knot *Calidris canutus*, sanderling, dunlin, common redshank, and lesser black-backed gull.
- Breeding lesser black-backed gull and European herring gull *Larus argentatus*.

1.5.2.78 The SPA also qualifies under Article 4.2 of the Directive (79/409/EEC) as it is used regularly by over 20,000 seabirds.

- At time of the 1997 citation of Morecambe Bay SPA, the area supported 40,672 individual seabirds including: European herring gull, lesser black-backed gull, sandwich tern, common tern, and little terns.

1.5.2.79 The SPA also qualifies under Article 4.2 of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterbirds.

- The main components of the assemblage include all of the qualifying features listed above, as well as an additional 19 species present in numbers exceeding 1% of the Great Britain total and/or exceeding 2,000

individuals: great white egret *Ardea alba*, Eurasian spoonbill *Platalea leucorodia*, brent goose *Branta bernicla*, Eurasian wigeon, European teal, green-winged teal *Anas carolinensis*, mallard *Anas platyrhynchos*, ring-necked duck *Aythya collaris*, eider, common goldeneye *Bucephala clangula*, red-breasted merganser, cormorant, northern lapwing *Vanellus vanellus*, little stint *Calidris minuta*, spotted redshank *Tringa erythropus*, common greenshank *Tringa nebularia*, black-headed gull *Chroicocephalus ridibundus*, common gull *Larys canus* and European herring gull.

1.5.2.80 The waders, geese and duck qualifying features of the SPA are typically associated with the intertidal estuary areas (except for eider and red-breasted merganser), rather than the offshore waters. Therefore, waders, geese and ducks (except for eider) have been scoped out of further assessment for offshore impacts.

1.5.2.81 The offshore ornithological features of the Morecambe Bay and Duddon Estuary SPA where LSE could not be ruled out are cormorant, eider and red-breasted merganser.

Feature accounts

Cormorant, eider and red-breasted merganser

1.5.2.82 Cormorant, eider and red-breasted merganser form part of the wintering waterbird assemblage, and the SPA supports over 1.0% of the Great Britain wintering population of these species. No further feature account information is available for the Morecambe Bay and Duddon Estuary SPA.

Condition assessment

1.5.2.83 There is no condition assessment available for the relevant offshore ornithological features of the Morecambe Bay and Duddon Estuary SPA (cormorant, eider and red-breasted merganser).

1.5.2.84 The SPA citation states that *'SPA site selection guidelines have been applied to the most up to date information for the site. However, this contemporary data reveals that some species are no longer present in qualifying numbers (either through declines or because the relevant threshold has increased). It is not clear whether anthropogenic influences have affected the populations at the site. Defra policy indicates that in these circumstances the feature should be retained until such time as the reasons for the reduction in population can be established. Natural England therefore considers that these species should be retained on the citation, and the level of ambition set out in the conservation objectives for these species maintained, until such time as we have evidence to support the conclusion that declines are a result of natural processes and that the SPA is no longer suitable for these species'*. Therefore, it is possible that some features may be in unfavourable condition.

Conservation objectives

1.5.2.85 The conservation objectives for the protected features of the SPA (as outlined in Natural England, 2019b) are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the population of each of the qualifying features; and
- the distribution of the qualifying features within the site.

Morecambe Bay Ramsar site

Site description

1.5.2.86 Morecambe Bay lies between the coasts of South Cumbria and Lancashire and represents the largest continuous intertidal area in Britain. Morecambe Bay comprises the estuaries of five rivers and the accretion of mudflats behind Walney Island. The area is comprised of intertidal mud and sandflats, with associated saltmarshes, shingle beaches and other coastal habitats. It is a component in the chain of west coast estuaries of outstanding importance for passage and overwintering waterfowl (supporting the third largest number of wintering waterfowl in Britain), and breeding waterfowl, gulls and terns.

1.5.2.87 The Morecambe Bay Ramsar site is designated under Ramsar Criterion 6 for its breeding populations of lesser black-backed gull, herring gull and Sandwich tern. The Ramsar is also designated for the following species that have peak counts in the spring/autumn: cormorant, shelduck, pintail, eider, oystercatcher, ringed plover, grey plover, sanderling, curlew, redshank, turnstone and lesser black-backed gull. The Ramsar is also designated for the following species that have peak counts in the winter: great crested grebe, pink-footed goose, wigeon, goldeneye, red-breasted merganser, golden plover, lapwing, knot, dunlin and bar-tailed godwit.

1.5.2.88 The Ramsar site is also designated under Ramsar criterion 5 for supporting a wintering waterfowl assemblage of international importance (223,709 waterfowl (five-year peak mean for 1998 to 1999 to 2002 to 2003)), and under Ramsar Criterion 4 site as a staging area for internationally important numbers of passage ringed plover.

1.5.2.89 In addition, the Morecambe Bay Ramsar site citation also lists a number of noteworthy fauna species, with over 1% of the Great Britain population occurring within the Ramsar site during one of the seasons (breeding, spring/autumn passage and/or winter). This includes breeding black-headed gull, passage ruff, whimbrel, spotted redshank, greenshank and black-headed gull and wintering teal and black-tailed godwit.

1.5.2.90 The offshore ornithological features of the Morecambe Bay Ramsar site where LSE could not be ruled out are cormorant, eider and red-breasted merganser.

Feature accounts

Cormorant

1.5.2.91 The Morecambe Bay Ramsar site lists cormorant as a noteworthy species, due to the Ramsar site supporting a wintering population of 879 individuals, representing an average of 6.7% of the Great Britain population (five-year peak mean 1991 to 1992 to 1995 to 1996).

Eider

1.5.2.92 The Morecambe Bay Ramsar site lists eider as a noteworthy species, due to the Ramsar site supporting a wintering population of 6,400 individuals, representing an average of 8.3% of the Great Britain population (five-year peak mean 1991 to 1992 to 1995 to 1996).

Red-breasted merganser

1.5.2.93 The Morecambe Bay Ramsar site lists red-breasted merganser as a noteworthy species, due to the Ramsar site supporting a wintering population of 292 individuals, representing an average of 2.9% of the Great Britain population (five-year peak mean 1991 to 1992 to 1995 to 1996).

Condition assessment

1.5.2.94 There is no condition assessment available for the relevant offshore ornithological features of the Morecambe Bay Ramsar site (cormorant, eider and red-throated diver).

Conservation objectives

1.5.2.95 There are no conservation objectives available for the Morecambe Bay Ramsar site. However, Morecambe Bay Ramsar site falls wholly within the Morecambe Bay and Duddon Estuary SPA, and therefore it is assumed that the same conservation objectives apply. These conservation objectives are to ensure that subject to natural change, the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- the extent and distribution of the habitats of the qualifying features;
- the structure and function of the habitats of the qualifying features;
- the supporting processes on which the habitats of the qualifying features rely;
- the population of each of the qualifying features; and
- the distribution of the qualifying features within the site.

1.5.3 Assessment of adverse effects alone

1.5.3.1 Measures adopted as part of the Transmission Assets which are of relevance to the assessment of potential impacts on offshore ornithological features are presented in **Table 1.6**.

Table 1.6: Measures (commitments) adopted as part of the Transmission Assets

Commitment number	Measure adopted	How the measure will be secured
Embedded measures		
CoT49	Construction Method Statement(s) (CMSs) including Offshore Cable Specification and Installation Plan(s), will be produced and implemented prior to construction. These will contain: - details of cable installation and methodology; and - details of foundation installation methodology covering scour protection and the deposition of material arising from drilling, dredging, and/or sandwave clearance.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition 18(1)(e) (Pre-construction plans and documentation)[1]
CoT55	Offshore Decommissioning Programme(s) will be developed prior to decommissioning and will include information on the consideration of recycling of materials, where practicable, and if opportunities are available.	DCO Schedule 2A Requirement 21 (Offshore decommissioning) and DCO Schedule 2B Requirement 21 (Offshore decommissioning)
CoT65	Offshore Environmental Management Plan(s) (EMPs) will be developed and will include details of: – a marine pollution contingency plan to address the risks, methods and procedures to deal with any spills and collision incidents during construction and operation of the authorised scheme for activities carried out below MHWS; – a chemical risk review to include information regarding how and when chemicals are to be used, stored and transported in accordance with recognised best practice guidance; – waste management and disposal arrangements; – the appointment and responsibilities of a fisheries liaison officer; – a fisheries liaison and coexistence plan (which accords with the outline fisheries liaison and co-existence plan) to ensure relevant fishing fleets are notified of	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(f) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(f) (Pre-construction plans and documentation).

[1] Please note that DCO references are subject to change as it is updated throughout the examination period.

Commitment number	Measure adopted	How the measure will be secured
	commencement of licensed activities pursuant to condition and to address the interaction of the licensed activities with fishing activities; – measures to minimise disturbance to marine mammals and rafting birds from vessels; and – measures to minimise the potential spread of invasive non-native species, including adherence to IMO ballast water management guidelines.	
CoT69	Detailed Vessel Traffic Management Plan(s) (VTMP) will be developed pre-construction in line with legislation, guidance and industry best practice which will: - determine vessel routing to and from construction areas and ports; - include vessel standards and a code of conduct for vessel operators; and - minimise, as far as reasonably practicable, encounters with marine mammals and basking sharks. These plans will be developed in accordance with the Outline VTMP prepared and submitted with the application for development consent.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(h) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(h) (Pre-construction plans and documentation).
CoT110	Construction activities associated with the offshore cable pull in for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited will be undertaken in accordance with the Outline Offshore Cable Specification and Installation Plan (CSIP). This will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e. during the months of November – February, inclusive), unless otherwise agreed with the MMO, in consultation with Natural England. Detailed CSIP(s) will be developed in accordance with the Outline CSIP.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation).
CoT111	The total number of vessels for both the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited actively working within the Liverpool Bay/Bae Lerpwl SPA during construction or during operation and maintenance phase will be limited to a maximum of five vessels at any one time in the wintering period, i.e. between November and February (inclusive). This will be included within the Offshore Environmental Management Plan(s)'s measures to minimise disturbance to marine mammals and rafting birds from vessels.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 – Condition 18(1)(f) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 – 18(1)(f) (Pre-construction plans and documentation).
CoT113	Where construction activities are undertaken within the Intertidal Infrastructure Area, mitigation measures will be provided at Fairhaven saltmarsh to reduce disturbance upon roosting wader features of Ribble and Alt Estuary SPA. This may comprise	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan).

Commitment number	Measure adopted	How the measure will be secured
	a combination of the employment of a warden, educational signage, and soft fencing. This is detailed within the Outline Ecological Management Plan.	
CoT114	All permanent infrastructure located between Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS) will be buried to a target depth of 3 metres, subject to further pre-construction surveys to be reported within Detailed Cable Burial Risk Assessments (CBRAs). An Outline CBRA has been prepared and submitted with the application for development consent.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 – Condition18(1)(e)(i)(bb) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e)(i)(bb) (Pre-construction plans and documentation).
CoT115	An Offshore In-Principal Monitoring Plan (OIPMP) has been prepared and submitted as part of the application for development consent. The OIPMP includes for monitoring of the recovery of sediments and benthic communities within representative areas of the Fylde MCZ potentially impacted by sandwave clearance, cable installation and cable protection, at appropriate temporal intervals as part of the operational asset integrity surveys. Detailed Offshore Monitoring Plans will be produced prior to operation and maintenance phases in accordance with the OIPMP and will be approved in consultation with statutory advisors and regulators.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(d) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(d) (Pre-construction plans and documentation).
CoT116	Any material arising from sandwave clearance within the Transmission Assets Order Limits will be deposited in close proximity to the works and within the licensed disposal sites within the Order Limits, as detailed in the Dredging and Disposal - Site Characterisation Plan prepared and submitted as part of the application for development consent.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 1 - Condition 2(f) (Design Parameters) and Part 2 – Condition16(4) (Chemicals, drilling and debris); and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets) Part 1 - Condition 2(f) (Design Parameters) and Part 2 – Condition16(4) (Chemicals, drilling and debris).

Disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure

1.5.3.2 Airborne sound and underwater sound generated during construction activities, the presence of vessels and maintenance activities may temporarily disturb/displace birds from foraging areas. Infrastructure will be limited to export cables and associated infrastructure (i.e. cable protection) only with no surface piercing infrastructure. Specifically, the construction and decommissioning phases have the potential to affect birds in the marine environment through disturbance from a number of sources including the

installation and removal of export cables and the movement of vessels and helicopters.

1.5.3.3 Works will be typically carried out by vessels, which will move through the working area, causing similar levels of disturbance as existing vessels. Disturbance will be short-term, localised and temporary.

1.5.3.4 The disturbance created during construction and decommissioning has the potential to result in displacement of birds from the site of construction and decommissioning, from an area around it and from routes used by vessels to access the construction/decommissioning site. This displacement could effectively result in temporary habitat loss through a reduction in the area available to birds for feeding, resting and moulting.

1.5.3.5 The HRA Stage 1 Screening Report (document reference: E3) identified LSEs from the Transmission Assets alone for 6 ornithological species/features across three SPAs and two Ramsar sites, as set out in **Table 1.7.**

Table 1.7: SPA and Ramsar sites and relevant offshore ornithological features from which the potential for an LSE could not be ruled out in relation to disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure

European site	Offshore ornithological features
Liverpool Bay/Bae Lerpwl SPA	• Red-throated diver • Common scoter • Cormorant • Red-breasted merganser
Ribble and Alt Estuaries Ramsar site	• Red-throated diver • Common scoter • Cormorant
Ribble and Alt Estuaries SPA	• Common scoter • Cormorant • Scaup
Morecambe Bay Ramsar site	• Cormorant • Eider • Red-breasted merganser
Morecambe Bay and Duddon Estuary SPA	• Cormorant • Eider • Red-breasted merganser

The MDS considered for the assessment of potential impacts on offshore ornithological features from disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction phase is shown in **Table 1.8**.

Table 1.8: Maximum design scenario considered for the assessment of potential impacts from disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure

Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure	✓	✓	✓	**Pre-Construction and Construction phase** Overview Disturbance during pre-construction due to: • pre-construction site investigation surveys, which are likely to include geophysical and geotechnical surveys; • pre-construction UXO surveys and possible UXO removal; Site preparation and installation of up to 484 km of offshore export cables. Offshore site preparation and construction works anticipated to occur across a 30 month period (sequential construction) noting that there is potential for a gap between the construction periods for Morgan and Morecambe. Disturbance during construction due to: • site preparation boulder clearance; • installation of cables (may involve drilling, trench excavations); and • presence of vessels and possibly helicopters. Pre-construction • Clearance of up to 25 UXOs within the Offshore Order Limits. • A range of UXO sizes assessed from kg up to 907 kg with 130 kg the most likely maximum. • For high order detonation donor charges of 1.2 kg (most common) and 3.5 kg (single barracuda blast charge). • Up to 0.5 kg Net Explosive Quantity clearance shot for neutralisation of residual explosive material at each location. • Clearance during daylight hours only. The MDS is for high order clearance but assessment also considered: • Low order clearance charge size of 0.08 kg.	*UXO Clearance:* The MDS is based upon the maximum number and maximum size of UXOs potentially encountered within the Transmission Assets and is based upon high order clearance. Due to uncertainties in size of UXOs, the assessment presents a range of sizes, highlighting the most likely size to be encountered. *Vessels* The MDS considers the maximum number of vessels on site at any one time and greatest number of round trips during each project phase. This represents the broadest range of vessel types and therefore noise signatures within the marine environment to affect offshore ornithology receptors. The sequential construction scenario is included as the maximum design scenario as this results in the longest duration of impact.

Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		

				• Low yield clearance configurations of 0.75 kg charges (up to 4x0.75 kg).
				
				<u>MDS: Construction vessels and helicopters</u>
				• Vessels on site.
				  • Morgan Offshore Wind Project: Transmission Assets:
				  – Up to a total of 19 construction vessels on site at any one time (two tug/anchor handlers, six cable lay installation and support vessels, one guard vessel, two survey vessels, four seabed preparation vessels, two Crew Transfer Vessels (CTV) and two cable protection installation vessels).
				  • Morecambe Offshore Windfarm: Transmission Assets:
				  – Up to a total of 11 construction vessels on site at any one time (one tug/anchor handlers, four cable lay installation and support vessels, one guard vessel, one survey vessels, two seabed preparation vessels, one CTVs and one cable protection installation vessels).
				• Vessel movements.
				  • Morgan Offshore Wind Project: Transmission Assets:
				  – Up to 226 installation vessel movements (return trips) during construction (8 movements for tug/anchor handlers, 40 movements for cable lay installation and support vessels, 18 movements for guard vessels, four movements for survey vessels, 16 movements for seabed preparation vessels, 120 movements for CTVs and 20 movements for cable protection installation vessels).
				  • Morecambe Offshore Windfarm: Transmission Assets:
				  – Up to 60 installation vessel movements (return trips) during construction (four movements for tug/anchor handlers, eight movements for cable lay installation and support vessels, 12 movements for guard vessels, two movements for survey vessels, four movements for seabed preparation vessels, 28 movements for CTVs and two movements for cable protection installation vessels).	

Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• Helicopters (Morgan only). – Up to a total of one helicopter and 20 flights. **Operation and maintenance phase** The duration of operation and maintenance phase is anticipated to occur across a 35 year period. • Vessels on site. • Morgan Offshore Wind Project: Transmission Assets: – Up to eight operation and maintenance vessels on site at any one time (two CTVs/workboats, one jack-up vessels, one cable repair vessels, two Service Operation Vessels (SOV) or similar and two excavators/backhoe dredgers). • Morecambe Offshore Windfarm: Transmission Assets: – Up to six operation and maintenance vessels on site at any one time (two CTVs/workboats, one jack-up vessels, one cable repair vessels, one SOVs or similar and one excavators/backhoe dredgers). • Vessel movements. • Morgan Offshore Wind Project: Transmission Assets: – Up to 52 operation and maintenance vessel movements (return trips) each year (28 movements for CTVs/workboats, two movements for jack-up vessels, two movements for cable repair vessels, 16 movements for SOVs or similar and four movements for excavators/backhoe dredgers). • Morecambe Offshore Windfarm: Transmission Assets: – Up to 25 operation and maintenance vessels on site at any one time (14 movements for CTVs/workboats, one movement for jack-up vessels, two movements for cable repair vessels, four movements for SOVs or similar and four movements for excavators/backhoe dredgers).	

Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• Helicopters (Morgan only). – Up to a maximum of two helicopters at any one time (concurrent construction scenario). – Total of 16 helicopter movements associated with the Transmission Assets. **Decommissioning phase.** Anticipated to be similar to construction disturbance activities.	

Construction phase

Information to support assessment

1.5.3.6 Disturbance during the construction of the Transmission Assets (visual presence, vessel activity and underwater sound) may displace birds from an area of sea, effectively amounting to habitat loss during the period of disturbance (Drewitt and Langston, 2006). Such activities include:

- construction activities associated with the installation of the offshore export cable;
- movement of vessels and helicopters to and from construction areas;
- pre-construction site investigations including geophysical surveys;
- site preparation activities including surveys for UXOs, UXO removal, boulder removal, existing cable removal; and
- installation of cable crossings.

1.5.3.7 Disturbance caused by construction activities may directly displace birds from foraging or loafing areas thus potentially affecting breeding productivity or survival rates of an individual or population. However, on several occasions during the construction of Lincs offshore wind farm, gulls were clearly associated with the jack-up barge, the guard vessels and with the construction vessels (RPS, 2012). Disturbance caused by construction activities either along the offshore cable corridor are considered to represent the highest risk for relevant species as it is these areas that will be disproportionately affected by the presence of vessels and helicopters. The movements of vessels or helicopters to the Transmission Assets that occur within areas outside of the footprint of the Transmission Assets are not considered to represent an effect larger than that that will occur at the Transmission Assets themselves.

1.5.3.8 The offshore construction phase will be supported by various vessels including jack-up vessels, support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, crew transfer vessels, cable protection installation vessels and cable protection installation vessels. Helicopters may also be used during the construction phase for equipment and personnel transfer.

1.5.3.9 Although the port of origin for vessels has not yet been selected, any vessel movements are likely to occur along well-defined vessel routes, especially in areas closer to shore that may be occupied by sensitive species such as divers or seaducks. In addition, the Irish Sea is used extensively by vessels travelling to ports in the UK and further afield. As an example, shipping statistics for ports located in the Irish Sea (including Fleetwood, Liverpool, Manchester, Barrow-in-Furness, Lancaster, Llandulas, Mostyn and Heysham) show that in 2021 a total of 9,636 vessels arrived at these ports. If it is assumed that each vessel also leaves each port this would represent at least 19,272 vessel movements through the Liverpool Bay/Bae Lerpwl SPA per annum.

1.5.3.10 There are predicted to be 284 vessel movements across per year during the construction phase of the Transmission Assets. This would represent a 3.0% increase on current traffic levels and would equate to less than one additional vessel movement per day. It should be noted, however, that this may represent an over-estimate as some of these vessel movements may originate from ports outside of the UK and therefore will not affect sensitive receptors that have a more coastal distribution. In addition, vessel movements from ports to the Transmission Assets are likely to follow existing shipping routes with these areas not likely to support notable densities of species sensitive to disturbance. Similarly, helicopter movements to the Transmission Assets will do so over areas already transited by other aircraft and vessels.

Liverpool Bay/Bae Lerpwl SPA

Red-throated diver

1.5.3.11 There is potential for disturbance to the red-throated diver feature of the Liverpool Bay/Bae Lerpwl SPA resulting from airborne sound, underwater sound, and presence of vessels and infrastructure associated with the construction of the Transmission Assets, including when cables are laid through the Liverpool Bay/Bae Lerpwl SPA during the non-breeding season. Lawson *et al.* (2016) demonstrated that red-throated divers were abundant throughout Liverpool Bay/Bae Lerpwl SPA (i.e., the Liverpool Bay Area of Search), with the majority of the SPA boundary delineated based on the distribution of this species. The highest densities of the species occur off the Lancashire coast at Formby, off the coast of the Wirral, offshore of Llandulas on the North Wales coast and off the coast of Penmaenmawr, North Wales. Part of the Transmission Assets Order Limits: Offshore passes through an area of moderate density of red-throated divers (**Figure 1.2**).

1.5.3.12 Red-throated diver are vulnerable to human activities in marine areas (Dierschke *et al*., 2017), including through the disturbance effects of vessel traffic (Schwemmer *et al*., 2011; Wade *et al.,* 2016; Mendel *et al*., 2019). Red-throated diver are highly sensitive to non-physical disturbance by sound and visual presence during the winter (Dierschke *et al*., 2017).

1.5.3.13 In order to calculate the magnitude of impact associated with construction activities related to export cable installation, the density surface layers presented in HiDef Aerial Surveying Limited (2023) have been obtained from Natural England. The survey data used to produce the density surface layers were collected during eight surveys undertaken in January, February or March between 2015 and 2020. The surveys covered an area corresponding to the area of the original designation for the Liverpool Bay SPA, stretching from offshore of Fleetwood, Lancashire, south to the Dee Estuary and then west to Point Lynas, Anglesey, extending approximately 22 km offshore in some places (**Figure 1.2**). These density surfaces therefore only provide data for the inshore proportion of the Transmission Assets Order Limits: Offshore. This is the area where red-throated diver will be found within the Irish Sea, as indicated by the designation of the Liverpool Bay SPA and it is considered highly unlikely that significant numbers of red-throated diver will be found outside of this area and therefore the maximum potential impact

can be calculated. This assumption is supported by the data used to support the extension to the Liverpool Bay SPA presented in Lawson *et al.,* (2016) which shows negligible, if any, red-throated diver away from the key aggregations as incorporated into the original SPA designation (**Figure 1.2**).

1.5.3.14 The effects associated with export cable installation are expected to be highly localised as cable laying vessels are slow moving during the installation of cables. Furthermore, cable laying activity will be intermittent and therefore any displacement will be temporary and short term in nature. Vessels moving to and from construction areas will transit areas quickly, limiting the temporal scale of any effects and will likely utilise existing shipping routes. The area of habitat disturbed due to vessel movements is considered to be very small in the context of the distribution of red-throated diver (i.e., limited to the immediate vicinity of where works are being carried out) within the wider Liverpool Bay/Bae Lerpwl SPA. In addition, the increase in vessel traffic associated with the Transmission Assets is expected to be minimal when compared to the levels of vessel traffic already in the area.

1.5.3.15 The maximum area from which red-throated diver could be displaced due to construction activities associated with the Transmission Assets is defined as a 2 km buffer around the work area within which vessels associated with cable installation activities will be located. The worst case scenario for construction during the key period for red-throated diver in Liverpool Bay is represented by the presence of up to five vessels working in two areas within the SPA during the winter period (CoT69, CoT110, CoT111; **Table 1.6**). This includes the cable lay vessel and associated support vessels which are assumed for the purposes of this assessment to be within 1.5 km of the cable lay vessel. The maximum spatial extent associated with potential impacts is therefore 76.97 km^2 comprising two work areas with 3.5 km radii.

1.5.3.16 In order to determine the potential impact on red-throated diver as a result of construction activities along the cable corridor, an estimate of the likely population present is required. The densities that fall within the cable corridor plus a 3.5 km buffer have been extracted from each monthly density surface associated with HiDef Aerial Surveying Limited (2023). For each month the densities for each grid cell have then been averaged to provide an average monthly density. The mean-peak density has been calculated by averaging the peak densities in each year.

1.5.3.17 The mean-peak density of red-throated diver within this area has been calculated as 0.51 birds/km^2. Multiplying this density by the Zone Of Influence (ZOI) (76.97 km^2) gives a population of 39.5 birds.

1.5.3.18 JNCC *et al.,* (2022) recommend the use of a range of displacement rates of 90-100%. Applying these rates provides a displaced population of 35.5 to 39.5 birds. Following JNCC *et al.* (2022) interim guidance, a range of mortality rates have been applied to the displaced population of birds (**Table 1.9**).

1.5.3.19 The average population recorded in the Liverpool Bay SPA, calculated using the population data for the SPA presented in HiDef Aerial Surveying Limited (2023) is 1,800 birds

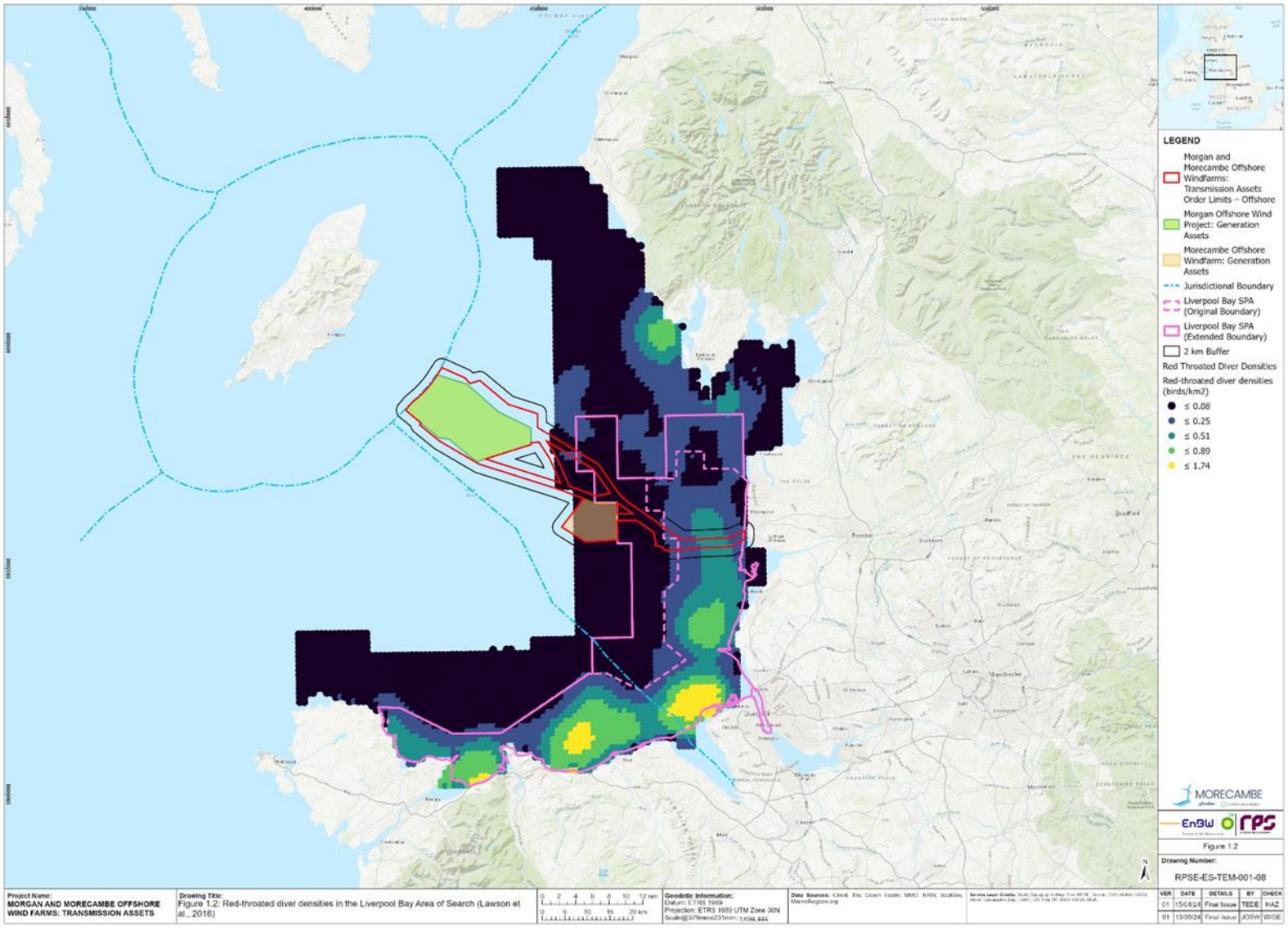

Figure 1.2: Red-throated diver densities in Liverpool Bay Area of Search from Lawson et al. (2016)

Table 1.9: Disturbance mortality of red-throated diver from the Transmission Assets Order Limits: Offshore during construction

Magnitude of impact	Mortality rate (%)			
	1	2	5	10
Disturbance mortality (no. of birds)	0.36 to 0.39	0.71 to 0.79	1.78 to 1.97	3.55 to 3.95
% of regional population	0.02 to 0.02	0.04 to 0.04	0.10 to 0.11	0.20 to 0.22
% increase in baseline mortality	0.09 to 0.10	0.17 to 0.19	0.43 to 0.48	0.87 to 0.96

1.5.3.20 Vessels associated with construction activities (i.e. cable laying) are stationary for large periods of time and move only short distances during construction as the export cable is installed. Vessels will occupy discrete areas for limited periods of time and it is therefore assumed that disturbed birds will return to the area from which they have been disturbed following cessation of the source of disturbance and therefore the temporal extent of any impact will be brief. However, if birds were not to return to the area from which they have been displaced, they would be able to move to other areas of the SPA with the affected area only representing 3.1% of the total SPA area (2,527.58 km^2). It is however, considered reasonable to assume that birds will return following completion of construction activities in a given area.

1.5.3.21 Definitive mortality rates associated with disturbance of red-throated diver are not known. As a result, a precautionary estimate must be applied. The most likely source of mortality, if it were to occur, would be due to increased bird density in areas outside the affected area. This may lead to increased competition for prey resources. However, the area potentially affected by disturbance represents only 3.1% of the total SPA area with any impacts also considered likely to be short-term with birds returning to the affected area upon cessation of the source of disturbance.

1.5.3.22 A review of the ecological consequences for red-throated diver in relation to impacts associated with offshore wind farm developments concluded that '*the available evidence suggested that the most likely result of displacement is that there will be little or no impact on adult survival, and that any impact would probably be undetectable at the population level. Indeed, there is very little evidence to support the upper range of mortality effects for displaced birds advised by Natural England (e.g., up to 10%), and on the basis of a review of the studies (Vattenfall, 2019), even an additional mortality rate of 1% is considered precautionary*' (MacArthur Green and Royal HaskoningDHV, 2021). As the review was undertaken in relation to displacement of red-throated divers from much larger areas of sea than being considered in this assessment, it is therefore considered that the use of a 1% baseline mortality rate is suitably precautionary.

1.5.3.23 This approach aligns with the approach taken in the recent Awel y Môr offshore wind farm Report to Inform Appropriate Assessment (RWE Renewables UK, 2022), which also applied a 1% baseline mortality, and also considered this likely to be over precautionary. This approach was given consent in the Secretary of State's decision letter and the approach was thereby used by the Applicants as a basis for their HRA methodology.

1.5.3.24 The baseline mortality rate for red-throated diver is 0.23 (Horswill and Robinson, 2015). The predicted mortality from displacement therefore represents a 0.09-0.10% increase in the baseline mortality of the SPA population of red-throated diver. This is below the threshold previously advised by Natural England (see **paragraph 1.5.3.22**) as requiring further investigation in relation to potential population-level effects.

1.5.3.25 The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be very low, especially given the large area across which birds are distributed within Liverpool Bay. It is predicted that the impact will affect the receptor directly with less than one bird predicted to be affected when applying appropriate mortality rates (1%) representing a limited proportion of the regional population and a limited increase in the baseline mortality of the affected population.

Common scoter

1.5.3.26 There is potential for disturbance to the common scoter feature of the Liverpool Bay/Bae Lerpwl SPA resulting from airborne sound, underwater sound, and presence of vessels and infrastructure associated with the construction of the Transmission Assets, including when cables are laid through the Liverpool Bay/Bae Lerpwl SPA during the non-breeding season.

1.5.3.27 Common scoter has been identified as being sensitive to human activities in marine areas (Dierschke *et al*., 2017), including through the disturbance effects of vessel traffic (Schwemmer *et al*., 2011; Wade *et al.,* 2016). Common scoter are highly sensitive to non-physical disturbance by sound and visual presence during the winter (Dierschke *et al.* 2017).

1.5.3.28 In order to calculate the magnitude of impact associated with construction activities related to export cable installation, the density surface layers presented in HiDef Aerial Surveying Limited (2023) have been obtained from Natural England. The survey data used to produce the density surface layers were collected during eight surveys undertaken in January, February or March between 2015 and 2020. The surveys covered an area corresponding to the area of the original designation for the Liverpool Bay SPA, stretching from offshore of Fleetwood, Lancashire, south to the Dee Estuary and then west to Point Lynas, Anglesey, extending approximately 22 km offshore in some places (**Figure 1.3**). These density surfaces therefore only provide data for the inshore proportion of the Transmission Assets Order Limits: Offshore. This is the area where common scoter will be found within the Irish Sea, as indicated by the designation of the Liverpool Bay SPA and it is considered highly unlikely that significant numbers of common scoter will be found outside of this area and therefore the maximum potential impact can

be calculated. This assumption is supported by the data used to support the extension to the Liverpool Bay SPA presented in Lawson *et al.* (2016). These data show negligible, if any, common scoter away from the key aggregations as incorporated into the original SPA designation.

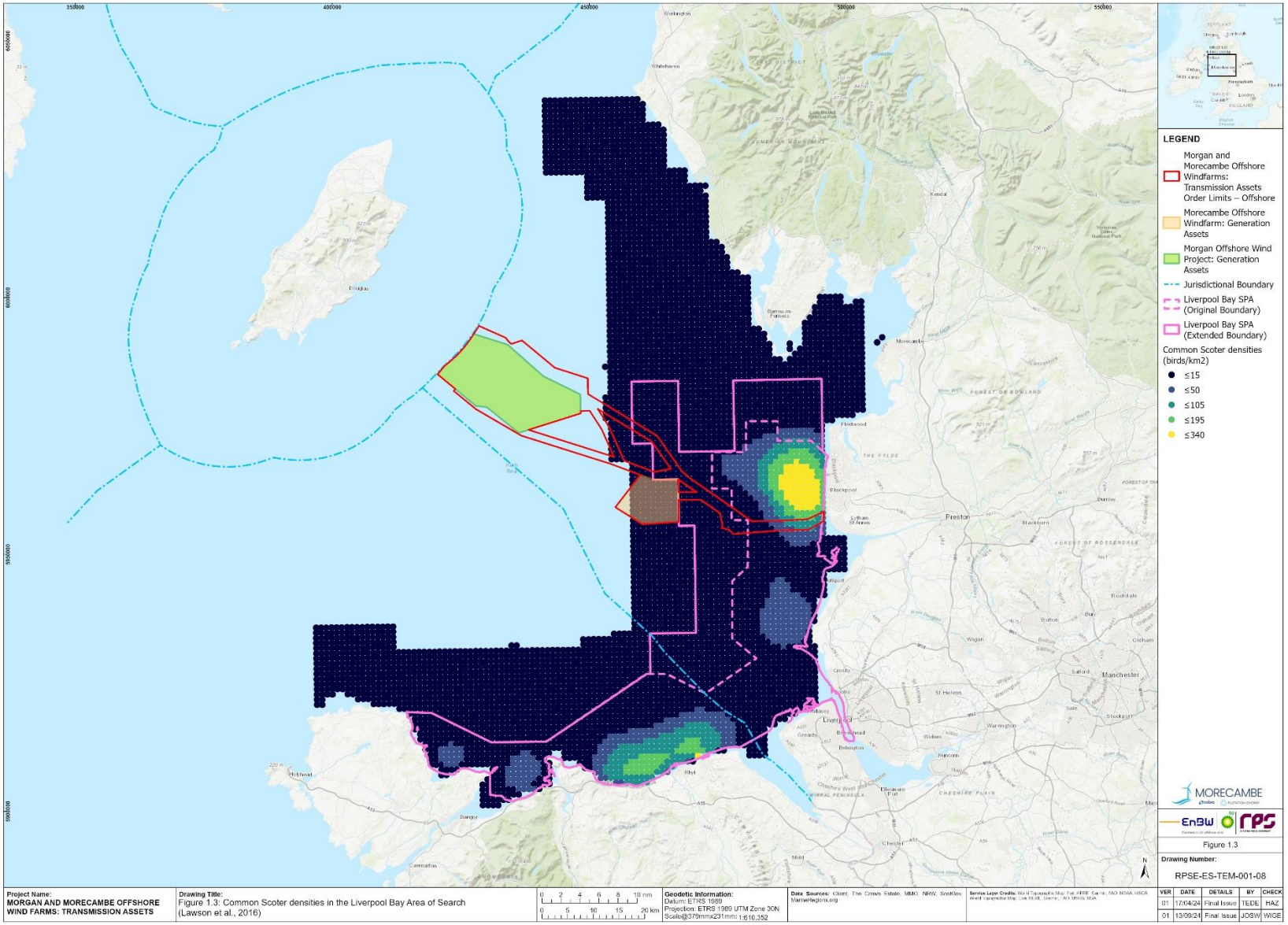

Figure 1.3: Common scoter densities in Liverpool Bay Area of Search from Lawson *et al.* (2016)

1.5.3.29 Lawson *et al.* (2016) demonstrated that common scoters were shown to aggregate in two main areas within the Liverpool Bay Area of Search, to the north west of Rhyl and to the west of Blackpool. The Transmission Assets Order Limits: Offshore passes through the south edge of the aggregation to the west of Blackpool below higher density areas to the north (**Figure 1.3**).

1.5.3.30 The effects associated with export cable installation are expected to be highly localised as cable laying vessels are slow moving during the installation of cables. Furthermore, cable laying activity will be intermittent and therefore any displacement will be temporary and short term in nature. Vessels moving to and from construction areas will transit areas quickly, limiting the temporal scale of any effects and will likely utilise existing shipping routes. The area of habitat disturbed due to vessel movements is considered to be very small in the context of the distribution of common scoter (i.e., limited to the immediate vicinity of where works are being carried out) within the Liverpool Bay Area of Search. In addition, the increase in vessel traffic associated with the Transmission Assets is expected to be minimal when compared to the levels of vessel traffic already in the area.

1.5.3.31 The maximum area from which common scoter could be displaced due to construction activities associated with the Transmission Assets is defined as a 2 km buffer around the work area within which vessels associated with cable installation activities will be located. The worst case scenario for construction during the key period for common scoter (i.e. the winter period) in Liverpool Bay is represented by the presence of up to five vessels working in two areas within the SPA during the winter period (CoT69, CoT110, CoT111; **Table 1.6**). This includes the cable lay vessel and associated support vessels which are assumed for the purposes of this assessment to be within 1.5 km of the cable lay vessel. The maximum spatial extent associated with potential impacts is therefore 76.97 km^2 comprising two work areas with 3.5 km radius. In order to determine the potential impact on common scoter as a result of construction activities along the cable corridor, an estimate of the likely population present is required. The densities in each grid cell that fall within the cable corridor plus a 3.5 km buffer have been extracted from each monthly density surface associated with HiDef Aerial Surveying Limited (2023). For each month, the densities for each grid cell have then been averaged to provide an average monthly density. The mean-peak density has been calculated by averaging the peak densities in each year.

1.5.3.32 The mean-peak density of common scoter within this area has been calculated as 91.49 birds/km^2. Multiplying this density by the ZOI (76.97 km^2) gives a population of 8,368 birds.

1.5.3.33 JNCC *et al*., (2022) recommend the use of a range of displacement rates of 90-100%. Applying these rates provides a displaced population of 7,531 to 8,368 birds. Following JNCC *et al*. (2022) interim guidance, a range of mortality rates have been applied to the displaced population of birds (**Table 1.10**).

1.5.3.34 The average population recorded in the Liverpool Bay SPA, calculated using the population data for the SPA presented in HiDef Aerial Surveying Limited (2023) is 141,801 birds.

Table 1.10: Disturbance mortality of common scoter from the Transmission Assets Order Limits: Offshore during construction

Magnitude of impact	Mortality rate (%)			
	1	2	5	10
Disturbance mortality (no. of birds)	75-84	151-167	377-418	753-837
% of regional population	0.05-0.06	0.11-0.12	0.27-0.30	0.53-0.59
% increase in baseline mortality	0.23-0.26	0.47-0.52	1.17-1.30	2.34-2.60

1.5.3.35 Vessels associated with construction activities are stationary for large periods of time and move only short distances during construction as the export cable is installed. Vessels will occupy discrete areas for limited periods of time and it is therefore assumed that disturbed birds will return to the area from which they have been disturbed following cessation of the source of disturbance and therefore the temporal extent of any impact will be brief (Goodship and Furness, 2022). However, if birds were not to return to the area from which they have been displaced, they would be able to move to other areas of the SPA with the affected area only representing 3.1% of the total SPA area (2,527.58 km^2). It is however, considered reasonable to assume that birds will return following completion of construction activities in a given area.

1.5.3.36 Definitive mortality rates associated with disturbance for common scoter are not known. As a result, a precautionary estimate must be applied. There is no evidence that birds (including common scoter) displaced from wind farms suffer any mortality as a consequence of displacement (e.g., Dierschke *et al*., 2017) with such impacts having a much larger magnitude of impact due to the larger size of the area affected and therefore larger area of habitat potentially unavailable to birds. The most likely source of mortality, if it were to occur, would be due to increased bird density in areas outside the affected area. This may lead to increased competition for prey resources. However, the area potentially affected by disturbance represents only 3.1% of the total SPA area with any impacts also considered likely to be short-term with birds returning to the affected area upon cessation of the source of disturbance.

1.5.3.37 On a precautionary basis, it is therefore considered that the application of a 1% baseline mortality rate is suitably precautionary. This approach aligns with the approach taken in the recently consented Awel y Môr offshore wind farm Report to Inform Appropriate Assessment (RWE Renewables UK, 2022), which also applied a 1% baseline mortality, and also considered this to be likely to be over precautionary.

1.5.3.38 The baseline mortality rate for common scoter is 0.227 (Horswill and Robinson, 2015). The predicted mortality from displacement therefore represents a 0.23-0.26% increase in the baseline mortality of the SPA population of common scoter. This is below the threshold previously advised

by Natural England as requiring further investigation in relation to potential population-level effects.

1.5.3.39 The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be very low, especially given the large area across which birds are distributed within Liverpool Bay. It is predicted that the impact will affect the receptor directly and when applying appropriate mortality rates (1%) will represent a limited proportion of the regional population and a limited increase in the baseline mortality of the affected population.

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorants and red-breasted mergansers)

1.5.3.40 Red-breasted mergansers and cormorants are wintering assemblage components of the Liverpool Bay/Bae Lerpwl SPA and were screened into the assessment due to the potential for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure.

1.5.3.41 Red-breasted merganser has been identified as having a moderate vulnerability to disturbance (Wade *et al.,* 2016) and some studies have shown that the species is weakly attracted to offshore wind developments (Dierschke *et al*., 2017). However, the species has been evidenced to be sensitive to the disturbance effects of vessel traffic in certain environments (Fliessbach *et al*., 2019, Gittings and O'Donoghue, 2016).

1.5.3.42 Fliessbach *et al*. (2019) found that red-breasted mergansers were around 16.5% less vulnerable to the vessel disturbance than red-throated divers. Density maps are not available for red-breasted merganser as it is only an assemblage feature, therefore a quantitative assessment cannot be undertaken for this species. HiDef Aerial Surveying Limited (2023) suggests that the areas of importance for red-breasted merganser within the SPA are predominantly off the North Wales coast with limited densities present in the area in which the Transmission Assets will be installed. It is therefore considered unlikely that a significant proportion of the SPA population of red-breasted merganser will be affected by activities associated with the construction of the Transmission Assets.

1.5.3.43 Cormorant has relatively low to moderate vulnerability to vessel movement disturbance associated with construction and decommissioning activity (Wade *et al.,* 2016; Fliessbach *et al*., 2019).

1.5.3.44 HiDef Aerial Surveying Limited (2023) suggests that relatively high densities of cormorant can be found throughout the SPA with some of these areas overlapping with the Transmission Assets in some months.

1.5.3.45 The effects associated with export cable installation are expected to be highly localised as cable laying vessels are slow moving during the installation of cables. Furthermore, cable laying activity will be intermittent and therefore any displacement will be temporary and short term in nature. Vessels moving to and from construction areas will transit areas quickly, limiting the temporal scale of any effects and will likely utilise existing shipping routes. The area of

habitat disturbed due to vessel movements is considered to be very small in the context of the distribution of either red-breasted merganser or cormorant (i.e., limited to the immediate vicinity of where works are being carried out) within the Liverpool Bay Area of Search. Vessels will occupy discrete areas for limited periods of time and it is therefore assumed that disturbed birds will return to the area from which they have been disturbed following cessation of the source of disturbance and therefore the temporal extent of any impact will be brief. However, if birds were not to return to the area from which they have been displaced, they would be able to move to other areas of the SPA with the affected area only representing 3.1% of the total SPA area.

1.5.3.46 The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be very low, especially given the large area across which birds are distributed within Liverpool Bay and the limited proportion of the SPA affected by construction activities. It is predicted that the impact will affect the receptor directly with a limited population of either species predicted to be affected.

Conclusions

1.5.3.47 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Liverpool Bay/Bae Lerpwl SPA will not occur during the construction phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.11**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.11: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during construction

Receptor	Conservation objective	Conclusion
Red-throated diver	**Maintain the size of the non-breeding population at a level which is at or above 1800 individuals (mean peak, 2015, 2018, 2019 and 2020).**	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction. These impacts have been considered and embedded measures (see CoT111 in **Table 1.6**) will be implemented within the Offshore Environmental Management Plan(s).
	Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	

Receptor	Conservation objective	Conclusion
	Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	Therefore, airborne sound, underwater sound and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.
	Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	There is negligible potential for airborne sound, underwater sound and/or presence of vessels and infrastructure to result in adverse effects on the habitats of red-throated divers during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of red-throated divers from being maintained or restored.
Common scoter	**Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction. These impacts have been considered and embedded measures (see CoT111 in **Table 1.6**) will be implemented within the Offshore Environmental Management Plan(s). Therefore, airborne sound, underwater sound and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of red-throated divers during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of common scoters from being maintained**.**

Receptor	Conservation objective	Conclusion
Non-breeding (wintering) assemblage of waterbirds (including the wintering populations of cormorants and red-breasted mergansers	**Maintain the size of the non-breeding population of component species at a level which is at or above 157,952 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction. Therefore, airborne sound, underwater sound and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.
	Maintain the species diversity of the bird assemblage which should include common scoter, red-throated diver, little gull, red-breasted merganser and cormorant.	
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the assemblage features during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the assemblage features from being maintained**.**

1.5.3.48 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the construction of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

Red-throated diver, common scoter and cormorant

1.5.3.49 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries Ramsar site. This overlap is with the very north section of the Ramsar off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.11** to **1.5.3.48** above).

1.5.3.50 In addition, the Ramsar is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.51 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Ribble and Alt Estuaries Ramsar site will not occur during construction, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.12**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.12: Conclusions against the conservation objectives of the Ribble and Alt Estuaries Ramsar site for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during construction

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.52 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries Ramsar site as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the construction of the Transmission Assets alone.

Ribble and Alt Estuaries SPA

Common scoter and cormorant

1.5.3.53 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.11** to **1.5.3.48** above).

1.5.3.54 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Non-breeding (wintering) assemblage of waterbirds (including wintering population of Scaup)

1.5.3.55 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.11** to **1.5.3.48** above).

1.5.3.56 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.57 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Ribble and Alt Estuaries SPA will not occur during construction, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.13**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.13: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during construction

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.58 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of disturbance

and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the construction of the Transmission Assets alone.

Morecambe Bay Ramsar site

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.59 The Morecambe Bay Ramsar site is located 11 km to the north west of the Transmission Assets Order Limits. However, this distance is measured across land, specifically across the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets, these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the construction of the Transmission Assets would result in disturbance impacts on birds within the Morecambe Bay Ramsar site due to the intervening land mass between the Transmission Assets and the Ramsar.

Conclusions

1.5.3.60 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Morecambe Bay Ramsar site will not occur during the construction phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.14**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.14: Conclusions against the conservation objectives of the Morecambe Bay Ramsar site for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during construction

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is no pathway for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained.
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in

Conservation objective	Conclusion
The distribution of the qualifying features within the site [are maintained or restored]	mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction.

1.5.3.61 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay Ramsar site as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the construction of the Transmission Assets alone.

Morecambe Bay and Duddon Bay SPA

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.62 The Morecambe Bay and Duddon Estuary SPA is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the construction of the Transmission Assets would result in disturbance impacts on birds within the Morecambe Bay and Duddon Estuary SPA due to the intervening land mass between the Transmission Assets and the SPA.

Conclusions

1.5.3.63 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Morecambe Bay and Duddon Bay SPA will not occur during the construction phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact ‘disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure’ against each relevant conservation objective is presented in **Table 1.15**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.15: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Bay SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during construction

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is no pathway for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during construction. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.64 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Bay SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the construction of the Transmission Assets alone.

Operation and maintenance

Information to support assessment

1.5.3.65 Disturbance to birds due to operational activities associated with the Transmission Assets is considered to be of a lower intensity than during construction/decommissioning phases; limited to maintenance activities as well as vessel and helicopter trips to and from the site, and also post-construction monitoring survey activity. The MDS for the wind farm considered for operation and maintenance disturbance is outlined in **Table 1.8**. On an annual basis, the number of vessel movements to and from the Transmission Assets during operation will be considerably reduced when compared to the number of movements in the construction phase. As a result, it is considered that the assessments undertaken for disturbance in the construction phase also apply to vessel activity, on a precautionary basis, applicable to the operation and maintenance phase.

1.5.3.66 Although the port of origin for vessels has not yet been selected, any vessel movements are likely to occur along well-defined vessel routes, especially in areas closer to shore that may be occupied by sensitive species such as divers or seaducks. In addition to this, the Irish Sea is used extensively by vessels travelling to ports in the UK and further afield. As an example, shipping statistics for ports located in the Irish Sea (including Fleetwood,

Liverpool, Manchester, Barrow-in-Furness, Lancaster, Llandulas, Mostyn and Heysham) show that in 2021 a total of 9,636 vessels arrived at these ports. If it is assumed that each vessel also leaves each port this would represent at least 19,272 vessel movements through the Liverpool Bay/Bae Lerpwl SPA per annum.

1.5.3.67 There are predicted to be up to 77 return vessel movements per year during the operation and maintenance phase of the Transmission Assets (**Table 1.8**), although not all of these will affect the qualifying features for which LSE has been identified occurring outside of the period during which these species will be present within the SPA. This would represent a 0.8% increase on current traffic levels. It should be noted, however, that this may represent an over-estimate as some of these vessel movements may originate from ports outside of the UK and therefore will not affect sensitive receptors that have a more coastal distribution. In addition, vessel movements from ports to the Transmission Assets are likely to follow existing shipping routes with these areas not likely to support notable densities of species sensitive to disturbance. Similarly, helicopter movements to the Transmission Assets will do so over areas already transited by other aircraft and vessels.

Liverpool Bay/Bae Lerpwl SPA

Red-throated diver

1.5.3.68 There is potential for disturbance of the red-throated diver feature of the Liverpool Bay/Bae Lerpwl SPA due to the presence of vessels associated with the operation and maintenance of the Transmission Assets.

1.5.3.69 The increase in vessel traffic associated with the operation and maintenance phase of the Transmission Assets is negligible when contextualised against the current levels of shipping traffic in the area in which the Transmission Assets are located. It is not anticipated that this increase will cause a measurable change in the level of disturbance already being experienced by receptors in this area.

1.5.3.70 The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay.

Common scoter

1.5.3.71 There is potential for disturbance of the common scoter feature of the Liverpool Bay/Bae Lerpwl SPA due to the presence of vessels and infrastructure associated with the operation and maintenance of the Transmission Assets.

1.5.3.72 The increase in vessel traffic associated with the operation and maintenance phase of the Transmission Assets is negligible when contextualised against the current levels of shipping traffic in the area in which the Transmission Assets are located. It is not anticipated that this increase will cause a

measurable change in the level of disturbance already being experienced by receptors in this area.

1.5.3.73 The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay.

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorants and red-breasted mergansers)

1.5.3.74 Red-breasted mergansers and cormorants are wintering assemblage components of the Liverpool Bay/Bae Lerpwl SPA and were screened into the assessment due to the potential for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure.

1.5.3.75 The increase in vessel traffic associated with the operation and maintenance phase of the Transmission Assets is negligible when contextualised against the current levels of shipping traffic in the area in which the Transmission Assets are located. It is not anticipated that this increase will cause a measurable change in the level of disturbance already being experienced by receptors in this area.

1.5.3.76 The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay.

Conclusions

1.5.3.77 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Liverpool Bay/Bae Lerpwl SPA will not occur during the operation and maintenance phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure against each relevant conservation objective is presented in **Table 1.16**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.16: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during operation and maintenance

Receptor	Conservation objective	Conclusion
Red-throated diver	**Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020).**	Impacts associated with the Transmission Assets during the operation and maintenance phase will impact a negligible proportion of the SPA population. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance. Therefore, disturbance and displacement impacts will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.
	Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	
	Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of red-throated divers during operation and maintenance. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of red-throated divers from being maintained or restored.
Common scoter	**Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020).**	Impacts associated with the Transmission Assets during the operation and maintenance phase will impact a negligible proportion of the SPA population. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	

Receptor	Conservation objective	Conclusion
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	during the operation and maintenance phase. Therefore, disturbance and displacement impacts will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.
	Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of common scoters. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the operation and maintenance of the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of common scoters from being maintained**.**
Non-breeding (wintering) assemblage of waterbirds (including the wintering populations of cormorants and red-breasted mergansers)	**Maintain the size of the non-breeding population of component species at a level which is at or above 157,952 individuals (mean peak 2015, 2018, 2019 and 2020).**	Impacts associated with the Transmission Assets during the operation and maintenance phase are considered highly unlikely to result in an adverse effect on the non-breeding waterbird assemblage due to negligible magnitude of impacts or very low vulnerability of component features to displacement impacts. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance. Therefore, disturbance and displacement will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.
	Maintain the species diversity of the bird assemblage which should include common scoter, red-throated diver, little gull, red-breasted merganser and cormorant.	
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	

Receptor	Conservation objective	Conclusion
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the assemblage features during operation and maintenance. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the assemblage features from being maintained**.**

1.5.3.78 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the operation and maintenance phase of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

Red-throated diver, common scoter and cormorant

1.5.3.79 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries Ramsar site. This overlap is with the very north section of the Ramsar off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.68** to **1.5.3.78** above).

1.5.3.80 In addition, the Ramsar is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.81 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Ribble and Alt Estuaries Ramsar site will not occur during the operation and maintenance phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact ‘disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure’ against each relevant conservation objective is presented in **Table 1.17**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.17: Conclusions against the conservation objectives of the Ribble and Alt Estuaries Ramsar site for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during operation and maintenance

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during operation and maintenance. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.82 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries Ramsar site as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the operation and maintenance of the Transmission Assets alone.

Ribble and Alt Estuaries SPA

Common scoter and cormorant

1.5.3.83 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.68** to **1.5.3.78** above).

1.5.3.84 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Non-breeding (wintering) assemblage of waterbirds (including wintering population of scaup)

1.5.3.85 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the

impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.68** to **1.5.3.78** above).

1.5.3.86 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.87 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Ribble and Alt Estuaries SPA will not occur during operation and maintenance, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.18**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.18: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during operation and maintenance

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during operation and maintenance. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.88 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the operation and maintenance of the Transmission Assets alone.

Morecambe Bay and Duddon Estuary Ramsar site

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.89 The Morecambe Bay Ramsar site is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the Ramsar site and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the operation of the Transmission Assets would result in disturbance impacts on birds within the Morecambe Bay Ramsar site due to the intervening land mass between the Transmission Assets and the Ramsar site.

Conclusions

1.5.3.90 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Morecambe Bay Ramsar site will not occur during the operation and maintenance phase, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.19**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.19: Conclusions against the conservation objectives of the Morecambe Bay Ramsar site for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during operation and maintenance

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is no pathway for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during operation and maintenance. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets operation impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or

Conservation objective	Conclusion
The distribution of the qualifying features within the site [are maintained or restored]	displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.

1.5.3.91 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay Ramsar site as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the operation and maintenance phase of the of the Transmission Assets alone.

Morecambe Bay and Duddon Bay SPA

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.92 The Morecambe Bay and Duddon Estuary SPA is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the operation of the Transmission Assets would result in disturbance impacts on birds within the Morecambe Bay and Duddon Estuary SPA due to the intervening land mass between the Transmission Assets and the SPA.

Conclusions

1.5.3.93 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Morecambe Bay and Duddon Bay SPA will not occur during the operation and maintenance phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact ‘disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure’ against each relevant conservation objective is presented in **Table 1.20**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.20: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Bay SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during operation and maintenance

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is no pathway for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during operation and maintenance. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.94 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Bay SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the operation and maintenance of the Transmission Assets alone.

Decommissioning phase

Information to support assessment

1.5.3.95 Decommissioning activities within the Transmission Assets Order Limits: Offshore are equal to or less than those to be carried out during the construction phase. Therefore, for the purpose of this assessment it is assumed that the level of disturbance is likely to be similar and the potential impact on each species is deemed to be reversible in the short-term as birds are likely to return when activities have been completed.

Liverpool Bay/Bae Lerpwl SPA

Red-throated diver

1.5.3.96 The Construction section in **paragraphs 1.5.3.11** to **1.5.3.25** describes that the impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay. It is predicted that the impact will affect the receptor directly

with less than one bird predicted to be affected when applying appropriate mortality rates (1%), representing a limited proportion of the regional population and a limited increase in the baseline mortality of the affected population.

Common scoter

1.5.3.97 The Construction section in **paragraphs 1.5.3.26** to **1.5.3.37** describes that the impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay. It is predicted that the impact will affect the receptor directly with less than one bird predicted to be affected when applying appropriate mortality rates (1%), representing a limited proportion of the regional population and a limited increase in the baseline mortality of the affected population.

Non-breeding (wintering) assemblage)

1.5.3.98 The Construction section in **paragraphs 1.5.3.38** to **1.5.3.46** describes that the impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay and the limited proportion of the SPA affected by decommissioning activities. It is predicted that the impact will affect the receptor directly with a limited population of either species predicted to be affected.

Conclusions

1.5.3.99 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Liverpool Bay/Bae Lerpwl SPA will not occur during the decommissioning phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact ‘disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure’ against each relevant conservation objective is presented in **Table 1.31**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.21: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during decommissioning

Receptor	Conservation objective	Conclusion
Red-throated diver	**Maintain the size of the non-breeding population at a level which is at or above 1800 individuals (mean peak, 2015, 2018, 2019 and 2020).**	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.
	Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	
	Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of red-throated divers during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of red-throated divers from being maintained or restored.
Common scoter	**Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning.
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	

Receptor	Conservation objective	Conclusion
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.
	Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of common scoter during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of common scoters from being maintained**.**
Non-breeding (wintering) assemblage of waterbirds (including the wintering populations of cormorants and red-breasted mergansers	**Maintain the size of the non-breeding population of component species at a level which is at or above 157,952 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.
	Maintain the species diversity of the bird assemblage which should include common scoter, red-throated diver, little gull, red-breasted merganser and cormorant.	
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	

Receptor	Conservation objective	Conclusion
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the assemblage features during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the assemblage features from being maintained**.**

1.5.3.100 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the decommissioning of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

Red-throated diver, common scoter and cormorant

1.5.3.101 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries Ramsar site. This overlap is with the very north section of the Ramsar off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.96** to **1.5.3.100** above).

1.5.3.102 In addition, the Ramsar is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.103 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Ribble and Alt Estuaries Ramsar site will not occur during decommissioning, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.22**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.22: Conclusions against the conservation objectives of the Ribble and Alt Estuaries Ramsar site for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.104 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries Ramsar site as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the decommissioning of the Transmission Assets alone.

Ribble and Alt Estuaries SPA

Common scoter and cormorant

1.5.3.105 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA (see **paragraphs 1.5.3.96** to **1.5.3.100** above).

1.5.3.106 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Non-breeding (wintering) assemblage of waterbirds (including wintering population of scaup)

1.5.3.107 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features

of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.96** to **1.5.3.100** above).

1.5.3.108 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.109 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Ribble and Alt Estuaries SPA will not occur during decommissioning, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.23**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.23: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is negligible potential for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.110 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the decommissioning of the Transmission Assets alone.

Morecambe Bay Ramsar site

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.111 The Morecambe Bay Ramsar site is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the Ramsar and impacts associated with the Transmission Assets, these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the decommissioning of the Transmission Assets would result in disturbance impacts on birds within the Morecambe Bay Ramsar site due to the intervening land mass between the Transmission Assets and the Ramsar.

Conclusions

1.5.3.112 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Morecambe Bay Ramsar site will not occur during the decommissioning phase, as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact 'disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure' against each relevant conservation objective is presented in **Table 1.24**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.24: Conclusions against the conservation objectives of the Morecambe Bay Ramsar site for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is no pathway for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the

Conservation objective	Conclusion
The distribution of the qualifying features within the site [are maintained or restored]	assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.

1.5.3.113 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay Ramsar site as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the decommissioning of the Transmission Assets alone.

Morecambe Bay and Duddon Bay SPA

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.114 The Morecambe Bay and Duddon Estuary SPA is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the decommissioning of the Transmission Assets would result in disturbance impacts on birds within the Morecambe Bay and Duddon Estuary SPA due to the intervening land mass between the Transmission Assets and the SPA.

Conclusions

1.5.3.115 Adverse effects which undermine the conservation objectives of the qualifying offshore ornithological features of the Morecambe Bay and Duddon Bay SPA will not occur during the decommissioning phase as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure. An assessment of the potential impact ‘disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure’ against each relevant conservation objective is presented in **Table 1.25**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.25: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Bay SPA for disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features [are maintained or restored]	There is no pathway for airborne sound, underwater sound, and/or presence of vessels and infrastructure to result in adverse effects on the habitats of any of the features during decommissioning. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features [are maintained or restored]	
The supporting processes on which the habitats of the qualifying features rely [are maintained or restored]	
The population of each of the qualifying features [are maintained or restored]	The Transmission Assets decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during decommissioning. Therefore, the population and distribution of assemblage features will not be prevented from being maintained or restored.
The distribution of the qualifying features within the site [are maintained or restored]	

1.5.3.116 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Bay SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure with respect to the decommissioning of the Transmission Assets alone.

Indirect impacts from underwater sound affecting prey species

1.5.3.117 Potential effects on the fish assemblages during construction and decommissioning phases of the Transmission Assets, as identified in Volume 2 Chapter 3: Fish and shellfish ecology (document reference: F2.3) and Volume 2, Chapter 2: Benthic ecology (document reference: F2.2) of the ES, may have indirect effects on offshore ornithology receptors.

1.5.3.118 Underwater sound produced during UXO clearance and cable installation during the construction phase may impact upon the availability of prey items. Indeed, underwater sound may cause fish and mobile invertebrates to avoid the construction area. Underwater sound may also affect the physiology and behaviour of fish and mobile invertebrates.

1.5.3.119 Species were screened and progressed for the assessment of significance on the basis of habitat specialisation (using scoring from Wade *et al*., 2016), knowledge of the prey species targeted by each species (Cramp and Simmons, 1983) and their abundance in the Transmission Assets Order Limits: Offshore.

1.5.3.120 The HRA Stage 1 Screening Report (document reference: E3) identified LSEs from the Transmission Assets alone for 16 features between three

SPAs and two Ramsar sites, as set out in **Table 1.26** (noting some features are common to several sites).

Table 1.26: SPA and Ramsar sites and relevant offshore ornithological features from which the potential for an LSE could not be ruled out in relation to indirect impacts from underwater sound affecting prey species

SPA and Ramsar sites	Offshore ornithological features
Liverpool Bay/Bae Lerpwl SPA	• Red-throated diver • Common scoter • Cormorant • Red-breasted merganser
Ribble and Alt Estuaries Ramsar site	• Red-throated diver • Common scoter • Cormorant
Ribble and Alt Estuaries SPA	• Common scoter • Cormorant • Scaup
Morecambe Bay Ramsar site	• Cormorant • Eider • Red-breasted merganser
Morecambe Bay and Duddon Estuary SPA	• Cormorant • Eider • Red-breasted merganser

1.5.3.121 The MDS considered for the assessment of potential impacts on offshore ornithological features from underwater sound affecting prey species during construction and decommissioning are shown in **Table 1.27**.

Table 1.27: Maximum design scenario considered for the assessment of potential impacts from underwater sound affecting prey species

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Indirect impacts from underwater sound, habitat loss and increased SSCs affecting prey species	✓	x	✓	**Construction phase** Installation of up to 484 km of offshore export cables will lead to sound disturbance during construction (as described above). The MDS is that associated with the greatest impact on prey receptors (concurrent construction). MDS on prey receptors can be found in Volume 2, Chapter 3: Fish and shellfish ecology and Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES. **Decommissioning phase** Anticipated to be similar to or less than construction disturbance activities.	Represents the maximum length of cables and the associated activities required for their construction and decommissioning. As described in Volume 2, Chapter 3: Fish and shellfish ecology and Volume 2, Chapter 2: Benthic subtidal and intertidal ecology of the ES.

Construction and decommissioning phases

Information to support assessment

1.5.3.122 Potential effects on the fish and shellfish assemblages during construction decommissioning phases of the Transmission Assets, as identified in Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference: F2.3), may have indirect effects on offshore ornithology receptors.

1.5.3.123 Volume 2, Chapter 2: Benthic ecology of the ES (document reference: F2.2) discounted underwater sound as having a potential impact on bivalves.

1.5.3.124 Detailed assessments of the following potential underwater sound impacts have been undertaken in Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference: F2.3) for key seabird prey species (including cod, sprat, herring, mackerel and sandeel species).

1.5.3.125 Herring and sandeel are sensitive to offshore wind development (including underwater sound). Both species are listed as main prey items for several seabird species (Cramp and Simmons, 1983). Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference: F2.3) determined the Transmission Assets Order Limits: Offshore to be largely unsuitable for herring and sandeel, and therefore effects of habitat loss/disturbance on these species are expected to be limited within the Transmission Assets Order Limits: Offshore, given the abundance of similar substrate types and the extensive nature of fish spawning grounds across the wider study area.

1.5.3.126 Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference: F2.3) details the findings of the desktop studies in the Fish and Shellfish Ecology study area. This chapter assessed the sensitivity of the receptors and the magnitudes of the impacts in order to ascertain the significance of the effects.

1.5.3.127 Details of the fish and shellfish ecology assessment are summarised in **Table 1.28**. Justifications for this assessment will not be repeated in this chapter. Evidence, modelling and justifications for these assessments are provided in Volume 2, Chapter 3: Fish and shellfish ecology and Volume 2, Chapter 2: Benthic ecology of the ES (document reference: F2.3; F2.2).

Table 1.28: Significance of effects of impacts on fish and shellfish ecology in the construction and decommissioning phases

Potential impact	Species	Significance of effect
Construction phase		
Underwater sound from UXO clearance and geophysical surveys (construction phase)	Fish (including herring, cod, sprat, allis shad and twaite shad)	Minor adverse: small, localised and short-term changes of minor significance
	Shellfish	Minor adverse: small, localised and short-term changes of minor significance

Potential impact	Species	Significance of effect
Underwater sound from all other activities during all phases	Fish (including herring, cod, sprat, allis shad and twaite shad)	Minor adverse: small, localised and short-term changes of minor significance
	Shellfish	Minor adverse: small, localised and short-term changes of minor significance
Decommissioning phase		
Underwater sound from all other activities during all phases	All receptors	Negligible: limited spatial extent, medium-term, intermittent

1.5.3.128 An assessment of the significance of indirect effects on sensitive receptors was made on the basis of knowledge of the prey species targeted by each species, as well as their level of inflexibility of habitat use (Wade *et al*., 2016). The results of these analyses were evaluated against the indirect impacts on seabird prey resource and habitats as detailed in Volume 2, Chapter 3: Fish and shellfish ecology of the ES (document reference: F2.3) and prior information from operational wind farms.

Liverpool Bay/Bae Lerpwl SPA

Red-throated diver

1.5.3.129 Lawson *et al.* (2016) demonstrated that red-throated diver were abundant throughout Liverpool Bay SPA, with the majority of the SPA boundary delineated based on the distribution of this species. The highest densities of the species occur off the Lancashire coast at Formby, off the coast of the Wirral, offshore of Llandulas on the north Wales coast and off the coast of Penmaenmawr, north Wales. Part of the Transmission Assets Order Limits: Offshore passes through an area of moderate density of red-throated diver (**Figure 1.2**).

1.5.3.130 Red-throated divers feed on a variety of fish species (Kleinschmidt *et al*., 2019). Due to the construction of the Transmission Assets leading to a minor adverse effect on fish within an extremely localised area (as set out in Volume 2, Chapter 3: Fish and shellfish ecology of the ES; document reference: F2.3), the impacts of construction on the prey sources of red-throated diver as a result of indirect impacts from underwater sound will be of negligible significance when considered against the wide areas over which red-throated divers forage.

Common scoter

1.5.3.131 Common scoter are mussel specialists. A study of common scoter in the North Sea found bivalves to form 95% of a common scoter's diet (Durinck *et al*. 1993).

1.5.3.132 Volume 2, Chapter 2: Benthic ecology of the ES (document reference: F2.2) ruled out underwater sound as a potential impact on bivalves and therefore

there will be no impact on the foraging resource of common scoter within the SPA.

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorants and red-breasted mergansers

1.5.3.133 Red-breasted mergansers and cormorants are wintering assemblage components of the Liverpool Bay/Bae Lerpwl SPA and were screened into the assessment due to the potential for indirect impacts resulting from underwater sound during construction and decommissioning affecting prey species.

1.5.3.134 Due to the construction of the Transmission Assets leading to a minor adverse effect on fish and shellfish within an extremely localised area (as set out in Volume 2, Chapter 3: Fish and Shellfish Ecology; document reference: F2.3), the impacts of construction on the prey sources of cormorants and red-breasted mergansers as a result of indirect impacts from underwater sound will be of negligible significance when considered against the wide areas over which they forage.

Conclusions

1.5.3.135 Adverse effects on the qualifying offshore ornithological features of the Liverpool Bay/Bae Lerpwl SPA which undermine the conservation objectives of the SPA will not occur during construction or decommissioning, as a result of indirect impacts from underwater sound affecting prey species. An assessment of the potential impact 'indirect impacts from underwater sound affecting prey species' against each relevant conservation objective is presented in **Table 1.29**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.29: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA for indirect impacts from underwater sound affecting prey species during construction and decommissioning

Receptor	Conservation objective	Conclusion
Red-throated diver	**Maintain the size of the non-breeding population at a level which is at or above 1800 individuals (mean peak, 2015, 2018, 2019 and 2020).**	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of indirect impacts from underwater sound affecting prey species during construction or decommissioning. Therefore, underwater sound will not prevent the population, distribution or prey
	Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	

Receptor	Conservation objective	Conclusion
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	availability of red-throated divers from being maintained or restored.
	Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	
	Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	There is negligible potential for indirect impacts from underwater sound affecting prey species to result in adverse effects on the habitats of red-throated divers. Therefore, underwater sound will not prevent the extent, distribution and/or availability of suitable habitat of red-throated divers from being maintained or restored.
Common scoter	**Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of indirect impacts from underwater sound affecting prey species during construction or decommissioning. Therefore, underwater sound will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for indirect impacts from underwater sound affecting prey species to result in adverse effects on the habitats of common scoters. Therefore, underwater sound will not prevent the extent, distribution and/or availability of suitable habitat of common scoters from being maintained or restored.
Non-breeding (wintering) assemblage of waterbirds (including the wintering	**Maintain the size of the non-breeding population of component species at a level which is at or above 157,952 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of the

Receptor	Conservation objective	Conclusion
populations of cormorants and red-breasted mergansers)	**Maintain the species diversity of the bird assemblage which should include common scoter, red-throated diver, little gull, red-breasted merganser and cormorant.**	assemblage features or their prey as a result of indirect impacts from underwater sound affecting prey species during construction or decommissioning. Therefore, underwater sound will not prevent the population, distribution, or prey availability of the assemblage features from being maintained or restored.
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for indirect impacts from underwater sound affecting prey species to result in adverse effects on the habitats of the assemblage features. Therefore, underwater sound will not prevent the extent, distribution and/or availability of suitable habitat of the assemblage features from being maintained or restored.

1.5.3.136 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA as a result of indirect impacts from underwater sound affecting prey species with respect to the construction and decommissioning phases of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

Red-throated diver, common scoter and cormorant

1.5.3.137 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries Ramsar site. This overlap is with the very north section of the Ramsar off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.129** to **1.5.3.136** above).

1.5.3.138 In addition, the Ramsar is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Conclusions

1.5.3.139 Adverse effects on the qualifying offshore ornithological features of the Ribble and Alt Estuaries Ramsar site which undermine the conservation objectives of the Ramsar site will not occur during construction or decommissioning, as a result of indirect impacts from underwater sound affecting prey species. An assessment of the potential impact ‘indirect impacts from underwater sound affecting prey species’ against each relevant

conservation objective is presented in **Table 1.30**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.30: Conclusions against the conservation objectives of the Ribble and Alt Estuaries Ramsar site for indirect impacts from underwater sound affecting prey species during construction and decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features (are maintained or restored)	There is negligible potential for indirect impacts from underwater sound to result in adverse effects on the habitats of any of the features during construction or decommissioning. Therefore, indirect impacts from underwater sound associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features (are maintained or restored)	
The supporting processes on which the habitats of the qualifying features rely (are maintained or restored)	
The population of each of the qualifying features (are maintained or restored)	The Transmission Assets impacts will be temporary and localised during all phases. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of indirect impacts from underwater sound during construction or decommissioning. Therefore, underwater sound will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site (are maintained or restored)	

1.5.3.140 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries Ramsar site as a result of indirect impacts from underwater sound with respect to construction and decommissioning of the Transmission Assets alone.

Ribble and Alt Estuaries SPA

Common scoter and cormorant

1.5.3.141 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.129** to **1.5.3.136** above).

1.5.3.142 In addition, the SPA is tidally influenced, meaning that birds utilising the Ramsar site will also make use of the Liverpool Bay/Lerpwl Bay SPA.

Non-breeding (wintering) assemblage of waterbirds (including wintering population of Scaup)

1.5.3.143 The Ribble and Alt Estuaries SPA falls wholly within the Liverpool Bay/Bae Lerpwl SPA. Therefore, the non-breeding waterbird assemblage associated with the Ribble and Alt Estuaries SPA forms part of the non-breeding

waterbird assemblage associated with the Liverpool Bay/Bae Lerpwl SPA, and this has been covered in the Liverpool Bay/Bae Lerpwl SPA section in **paragraphs 1.5.3.133** to **1.5.3.136** above.

Conclusions

1.5.3.144 Adverse effects on the qualifying offshore ornithological features of the Ribble and Alt Estuaries SPA which undermine the conservation objectives of the SPA will not occur during construction or decommissioning, as a result of disturbance and displacement from indirect impacts from underwater sound. An assessment of the potential impact 'indirect impacts from underwater sound affecting prey species' against each relevant conservation objective is presented in **Table 1.31**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.31: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for indirect impacts from underwater sound affecting prey species during construction and decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features (are maintained or restored)	There is negligible potential for indirect impacts from underwater sound to result in adverse effects on the habitats of any of the features during construction or decommissioning. Therefore, indirect impacts from underwater sound associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features (are maintained or restored)	
The supporting processes on which the habitats of the qualifying features rely (are maintained or restored)	
The population of each of the qualifying features (are maintained or restored)	The Transmission Assets construction impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of indirect impacts from underwater sound during construction or decommissioning. Therefore, underwater sound will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site (are maintained or restored)	

1.5.3.145 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of indirect impacts from underwater sound with respect to construction and decommissioning of the Transmission Assets alone.

Morecambe Bay Ramsar site

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.146 The Morecambe Bay Ramsar site is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire

coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the Ramsar and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the construction or decommissioning of the Transmission Assets would result in indirect impacts from underwater sound affecting prey species within the Morecambe Bay Ramsar site due to the intervening land mass between the Transmission Assets and the Ramsar.

1.5.3.147 Additionally, the distance between the Ramsar and the Transmission Assets is beyond the 15 km ZOI associated with the impact as used as part of the screening exercise in HRA Stage 1 Screening Report (document reference: E3).

Conclusions

1.5.3.148 Adverse effects on the qualifying offshore ornithological features of the Morecambe Bay Ramsar site which undermine the conservation objectives of the Ramsar site will not occur during construction and decommissioning, as a result of indirect impacts from underwater sound. An assessment of the potential impact 'indirect impacts from underwater sound affecting prey species' against each relevant conservation objective is presented in **Table 1.32**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.32: Conclusions against the conservation objectives of the Morecambe Bay Ramsar site for indirect impacts from underwater sound affecting prey species during construction and decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features (are maintained or restored)	There is no pathway for indirect impacts from underwater sound to result in adverse effects on the habitats of any of the features during construction or decommissioning. Therefore, indirect impacts from underwater sound associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features (are maintained or restored)	
The supporting processes on which the habitats of the qualifying features rely (are maintained or restored)	
The population of each of the qualifying features (are maintained or restored)	The Transmission Assets impacts will be temporary and localised during construction and decommissioning. It is not expected that there will be any detectable increase in mortality of any of the assemblage features or their prey as a result of indirect impacts from underwater sound during construction or decommissioning. Therefore, underwater sound will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site (are maintained or restored)	

1.5.3.149 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay Ramsar site as a result of indirect impacts from underwater sound with respect to construction and decommissioning of the Transmission Assets alone.

Morecambe Bay and Duddon Bay SPA

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.150 The Morecambe Bay and Duddon Estuary SPA is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with the construction and decommissioning phases of the Transmission Assets would result in indirect impacts from underwater sound affecting prey species within the Morecambe Bay and Duddon Estuary SPA due to the intervening land mass between the Transmission Assets and the SPA.

1.5.3.151 Additionally, the distance between the SPA and the Transmission Assets is beyond the 15 km ZOI associated with the impact as used as part of the screening exercise in HRA Stage 1 Screening Report (document reference: E3).

Conclusions

1.5.3.152 Adverse effects on the qualifying offshore ornithological features of the Morecambe Bay and Duddon Bay SPA which undermine the conservation objectives of the site will not occur during construction and decommissioning phases, as a result of indirect impacts from underwater sound. An assessment of the potential impact 'indirect impacts from underwater sound affecting prey species' against each relevant conservation objective is presented in **Table 1.33**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.33: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Bay SPA for indirect impacts from underwater sound affecting prey species during construction and decommissioning

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features (are maintained or restored)	There is no pathway for indirect impacts from underwater sound to result in adverse effects on the habitats of any of the features during construction or decommissioning. Therefore, indirect impacts from underwater sound associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features (are maintained or restored)	
The supporting processes on which the habitats of the qualifying features rely (are maintained or restored)	
The population of each of the qualifying features (are maintained or restored)	The Transmission Assets impacts will be temporary and localised during construction and decommissioning. It is not expected that there will be any detectable increase in

Conservation objective	Conclusion
The distribution of the qualifying features within the site (are maintained or restored)	mortality of any of the assemblage features or their prey as a result of indirect impacts from underwater sound during construction or decommissioning. Therefore, underwater sound will not prevent the population or distribution of the assemblage features from being maintained or restored.

1.5.3.153 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Bay SPA as a result of indirect impacts from underwater sound with respect to construction and decommissioning of the Transmission Assets alone.

Temporary habitat loss/disturbance and increased SSCs

1.5.3.154 There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of activities during all phases (e.g., seabed preparation, UXO detonation, cable installation and repair/reburial and removal of infrastructure). This has potential to affect the foraging efficiency of diving birds as well as indirect effects from impacts on fish, shellfish and bivalve prey.

1.5.3.155 Seabirds may be indirectly disturbed and displaced during the construction, and decommissioning phases as a result of direct impacts on habitat and increased SSCs which may result in the loss of a food resource to birds within the Transmission Assets Order Limits: Offshore. The increase in suspended sediments may also reduce the ability of birds to capture prey in the water column.

1.5.3.156 As a result, displaced seabirds may move to areas already occupied by other birds and thus face higher intra/inter-specific competition due to a higher density of individuals competing for the same resource. Alternatively, displaced birds may be forced to move into areas of lower quality (e.g., areas of lower prey availability). Such disturbance and resulting displacement could ultimately affect their demographic fitness (i.e., survival rates and breeding productivity) as well as potentially impacting other birds in areas that displaced birds move to.

1.5.3.157 The potential impacts on fish and shellfish receptors are provided in Volume 2, Chapter 3: Fish and shellfish ecology and Volume 2 , Chapter 2: Benthic ecology of the ES (document reference: F2.3; F2.2), and include temporary subtidal habitat loss/disturbance and increased SSCs and associated sediment deposition.

1.5.3.158 The increase in SSCs may lead to a short-term avoidance of affected areas that support fish and shellfish species which are susceptible to increased SSCs. However, many fish and shellfish species are considered to be tolerant of turbid environments and regularly experience changes in the SSC due to the natural variability in the Irish Sea.

1.5.3.159 The impact is predicted to be of local spatial extent, short-duration, intermittent and reversible. It is predicted that the impact will affect the features indirectly.

1.5.3.160 The HRA Stage 1 Screening Report (document reference: E3) identified LSEs from the Transmission Assets alone for 16 features between three SPAs and two Ramsar sites (noting some features are common to several sites) in relation to indirect impacts from temporary habitat loss/disturbance and increased SSCs, as set out in **Table 1.34**.

Table 1.34: SPA and Ramsar sites and relevant offshore ornithological features from which the potential for an LSE could not be ruled out in relation to temporary habitat loss/disturbance and increased SSCs

SPA and Ramsar sites	Offshore ornithological features
Liverpool Bay/Bae Lerpwl SPA	• Red-throated diver • Common scoter • Cormorant • Red-breasted merganser
Ribble and Alt Estuaries Ramsar site	• Red-throated diver • Common scoter • Cormorant
Ribble and Alt Estuaries SPA	• Common scoter • Cormorant • Scaup
Morecambe Bay Ramsar site	• Cormorant • Eider • Red-breasted merganser
Morecambe Bay and Duddon Estuary SPA	• Cormorant • Eider • Red-breasted merganser

1.5.3.161 The MDS considered for the assessment of potential impacts on offshore ornithological features from temporary habitat loss/disturbance and increased SSCs during construction and decommissioning are shown in **Table 1.35**.

Table 1.35: Maximum design scenario considered for the assessment of potential impacts from temporary habitat loss/disturbance and increased SSCs

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Temporary habitat loss/disturbance and increased SSCs	✓	✓	✓	**Pre-Construction and Construction phase** *Up to 14,805,472 m² of* subtidal *habitat loss/disturbance.* Pre-construction UXO removal: clearance of up to 25 UXOs (22 for Morgan Offshore Wind Project and 3 for the Morecambe Offshore Windfarm) ranging from 25 kg up to 907 kg, with 130 kg being the most likely maximum. Export cable installation: up to 11,331,680 m² of temporary habitat disturbance from installation of up to 484 km of buried offshore export cables (assumes 100% of all cables are buried) installed over 30 month sequential construction scenario: • Morgan Offshore Wind Project up to 400 km of offshore export cables – sandwave clearance: required for up to 9% of Morgan export cables – site preparation (boulder and debris clearance): is likely to be required across all export cables. Although, for the purposes of the MDS, boulder clearance only has been assumed across up to 91% of Morgan export cables and 91% (see justification); – seabed disturbance width of up to 60 m for sandwave clearance along Morgan export cables – seabed disturbance width of up to 20 m for boulder clearance along Morgan export cables; and	**Construction phase** **Site preparation.** • The volume of material to be cleared from individual sandwaves will vary according to the local dimensions of the sandwave (height, length and shape) and the level to which the sandwave must be reduced. These details are not fully known at this stage, however based on the available data, it is anticipated that the sandwaves requiring clearance in the Transmission Assets are likely to be 8 m in height. • Site clearance activities may be undertaken using a range of techniques, the suction hopper dredger will result in the greatest increase in suspended sediment and largest plume extent as material is released near the water surface during the disposal of material. • Boulder clearance activities will result in minimal increases in SSCs and have therefore not been considered in the assessment. • The scenario assessed relates to the largest potential volume of material related to site preparation activities <u>Cable installation.</u> • Cable routes inevitably include a variety of seabed material and in some areas 3 m depth may not be achieved or may be of a coarser nature which settles in the vicinity of the cable route. The assessment therefore considers the upper bound in terms of suspended sediment and dispersion

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				– seabed disturbance width of up 3 m for cable burial. • Morecambe Offshore Wind Project up to 84 km of offshore export cables – sandwave clearance: required for up to 9% of Morecambe export cables; – site preparation (boulder and debris clearance): is likely to be required across all export cables. Although, for the purposes of the MDS, boulder clearance only has been assumed across up to 91% of Morecambe export cables (see justification); – seabed disturbance width of up to 48 m for Morecambe export cables; – seabed disturbance width of up to 20 m for boulder clearance along Morecambe export cables; and – seabed disturbance width of up 3 m for cable burial. • Sandwave clearance material deposition: up to 2,853,600 m^2 of temporary habitat loss/disturbance associated with the deposition of: – up to 1,080,000 m3 of sandwave clearance material associated with the Morgan export cables affecting up to 2,160,000 m^2; and – up to 346,800 m3 of sandwave clearance material associated with the Morecambe export cables affecting up to 693,600 m^2. • Anchor placements: up to 60,000 m^2 of habitat disturbance from a 100 m^2 anchor set placement (five anchors per set) event every 500 m during offshore export cable installation within the	potential assuming a trench with "v" shape cross section. • Cables may be buried by ploughing, trenching or jetting with jetting mobilising the greatest volume of material to increase SSCs. • The sequential construction scenario is included as the maximum design scenario as this results in the longest duration of impact. **Operations and maintenance phase** • The greatest foreseeable number of cable reburial and repair events is considered to the MDS for sediment dispersion. **Decommissioning phase** Cables may be left *in situ* or may be removed. MDS considers the impacts of cables being removed and these are anticipated to be no greater than the impact assessed for the construction phase

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				nearshore area (10 km for each of the four Morgan export cables and each of the two Morecambe export cables). • Cable removal: up to 560,000 m^2 from the removal of 28 km of disused cables (disturbance width of up to 20 m). • Jack-up events to support offshore export cable pull: up to 192 m^2 of temporary habitat disturbance associated with two jack-up events for each of the four Morgan export cables and each of the two Morecambe export cables. Four legs per vessel, each with a 4 m^2 spud can affecting up to 16 m^2 per jack-up. **Operation and maintenance phase** • Project lifetime of 35 years for Morecambe and 35 years for Morgan. Up to 4,397,680 m^2 of temporary subtidal habitat disturbance *due to repair/reburial of export cables:* • Cable repair events: up to 1,680,000 m^2 of temporary habitat disturbance comprising: – up to 1,120,000 m^2 for repair of Morgan subtidal export cables: up to 14 repair events (one repair event for each of the four export cables every 10 years) affecting up to 4 km per repair event with a 20 m width of disturbance; and – up to 560,000 m^2 for repair of Morecambe subtidal export cables: up to seven repair events (one repair for each of the two export cables every 10 years) affecting up to 4 km per repair event with a 20 m width of disturbance.	

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				• Cable reburial events: up to 2,716,000 m^2 of temporary habitat disturbance comprising: – up to 2,240,000 m^2 for the reburial of Morgan subtidal export cables: one reburial event every five years (seven reburial events in total) affecting up to 16 km of export cables per event with a 20 m width of disturbance; and – up to 476,000 m^2 for the reburial of Morecambe subtidal export cables: one reburial event every five years (seven reburial events in total) affecting up to 3.4 km of export cables per event with a 20 m width of disturbance. • Jack-up events: up to 1,680 m^2 from up to two jack-up events per year for the Morgan export cables, and up to one jack-up event per year for the Morecambe export cables. Four legs per vessel, each with a 4 m^2 spud can affecting up to 16 m^2 per jack-up. **Decommissioning phase** Temporary subtidal habitat loss/disturbance due to: • Subtidal cable removal: disturbance from the removal of up to 484 km of Morgan and Morecambe export cables.	

All project phases

Information to support assessment

1.5.3.162 Offshore ornithological features may be indirectly disturbed and displaced during all project phases as a result of temporary impacts on habitat and increased SSCs, which may result in the loss of a food resource to birds within the Transmission Assets Order Limits: Offshore.

1.5.3.163 As a result, displaced offshore ornithological features may move to areas already occupied by other birds and thus face higher intra/inter-specific competition due to a higher density of individuals competing for the same resource. Alternatively, displaced birds may be forced to move into areas of lower quality (e.g., areas of lower prey availability). Such disturbance and resulting displacement could ultimately affect their demographic fitness (i.e., survival rates and breeding productivity) as well as potentially impacting other birds in areas that displaced birds move to.

1.5.3.164 The potential impacts on fish and shellfish receptors are provided in Volume 2, Chapter 3: Fish and shellfish ecology and Volume 2, Chapter 3: Benthic ecology of the ES (document reference: F2.3; F2.2) and include temporary subtidal habitat loss/disturbance and increased SSCs and associated sediment deposition.

1.5.3.165 There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of activities during all phases (e.g., seabed preparation, UXO detonation, cable installation and repair/reburial and removal of infrastructure).

1.5.3.166 This has potential to affect the foraging efficiency of diving birds as well as indirect effects from impacts on fish, shellfish and bivalve prey.

Liverpool Bay/Bae Lerpwl SPA

All features (red-throated diver, common scoter, cormorant and red-breasted merganser)

1.5.3.167 The increase in SSCs may lead to a short-term avoidance of affected areas that support fish and shellfish species which are susceptible to increased SSCs. However, many fish and shellfish species are considered to be tolerant of turbid environments and regularly experience changes in the SSC due to the natural variability in the Irish Sea.

1.5.3.168 Any benthic habitat loss or disturbance to sediments during all phases of the project is predicted to be of local spatial extent, short-duration, intermittent and reversible.

1.5.3.169 It is therefore predicted that any impacts on features would be indirect and of negligible magnitude when considered against the wide areas over which seabirds forage.

1.5.3.170 In addition, the assessment for the displacement from airborne sound, underwater sound, and presence of vessels and infrastructure has already

assumed a precautionary, displacement-caused mortality rate from the Transmission Assets.

Conclusions

1.5.3.171 Adverse effects on the qualifying offshore ornithological features of the Liverpool Bay/Bae Lerpwl SPA which undermine the conservation objectives of the SPA will not occur during any phases, as a result of temporary habitat loss/disturbance and increased SSCs. An assessment of the potential impact against each relevant conservation objective is presented in **Table 1.36**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.36: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA for temporary habitat loss/disturbance and increased SSCs during all project phases

Receptor	Conservation objective	Conclusion
Red-throated diver	**Maintain the size of the non-breeding population at a level which is at or above 1800 individuals (mean peak, 2015, 2018, 2019 and 2020).**	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during all project phases. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution, or prey availability of red-throated divers from being maintained or restored.
	Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	
	Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	There is negligible potential for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of red-throated divers. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the extent, distribution and/or availability of suitable habitat of red-throated divers from being maintained or restored.

Receptor	Conservation objective	Conclusion
Common scoter	**Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during any of the phases. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
	Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.	
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of common scoters. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the extent, distribution and/or availability of suitable habitat of common scoters from being maintained or restored.
Non-breeding (wintering) assemblage of waterbirds (including the wintering populations of cormorants and red-breasted mergansers)	**Maintain the size of the non-breeding population of component species at a level which is at or above 157,952 individuals (mean peak 2015, 2018, 2019 and 2020).**	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of the assemblage features or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during any of the phases. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution, or prey availability of the assemblage features from being maintained or restored.
	Maintain the species diversity of the bird assemblage which should include common scoter, red-throated diver, little gull, red-breasted merganser and cormorant.	
	Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
	Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	

Receptor	Conservation objective	Conclusion
	Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	There is negligible potential for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of the assemblage features during any phase. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the extent, distribution and/or availability of suitable habitat of the assemblage features from being maintained or restored.

1.5.3.172 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA as a result of temporary habitat loss/disturbance and increased SSCs with respect to all phases of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

All features (red-throated diver, common scoter and cormorant)

1.5.3.173 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries Ramsar site. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries Ramsar site will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA. (see **paragraphs 1.5.3.171** to **1.5.3.172** above).

1.5.3.174 Any benthic habitat loss or disturbance to sediments during all phases of the project is predicted to be of local spatial extent, short-duration, intermittent and reversible.

Conclusions

1.5.3.175 Adverse effects on the qualifying offshore ornithological features of the Ribble and Alt Estuaries Ramsar site which undermine the conservation objectives of the Ramsar site will not occur during any phases, as a result of temporary habitat loss/disturbance and increased SSCs. An assessment of the potential impact 'temporary habitat loss/disturbance and increased SSCs' against each relevant conservation objective is presented in **Table 1.37**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.37: Conclusions against the conservation objectives of the Ribble and Alt Estuaries Ramsar site for temporary habitat loss/disturbance and increased SSCs during all project phases

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features are maintained or restored	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of the

Conservation objective	Conclusion
The structure and function of the habitats of the qualifying features are maintained or restored	assemblage features or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during any of the phases.
The supporting processes on which the habitats of the qualifying features rely are maintained or restored	Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of the assemblage features from being maintained or restored.
The population of each of the qualifying features are maintained or restored	There is negligible potential for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of the assemblage features during any phase. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site are maintained or restored	

1.5.3.176 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries Ramsar site as a result of temporary habitat loss/disturbance and increased SSCs with respect to the construction and decommissioning phases of the Transmission Assets alone.

Ribble and Alt Estuaries SPA

All features (common scoter, cormorant and scaup)

1.5.3.177 The Transmission Assets overlap with only a small part of the Ribble and Alt Estuaries SPA. This overlap is with the very north section of the SPA off the coast of Blackpool. It is therefore considered that the impacts on the features of the Ribble and Alt Estuaries SPA will be no greater than the impacts predicted for the same features at the Liverpool Bay SPA (see **paragraphs 1.5.3.171** to **1.5.3.172** above).

1.5.3.178 Any benthic habitat loss or disturbance to sediments during all phases of the project is predicted to be of local spatial extent, short-duration, intermittent and reversible.

Conclusions

1.5.3.179 Adverse effects on the qualifying offshore ornithological features of the Ribble and Alt Estuaries SPA which undermine the conservation objectives of the SPA will not occur during any phases, as a result of temporary habitat loss/disturbance and increased SSCs. An assessment of the potential impact 'temporary habitat loss/disturbance and increased SSCs' against each relevant conservation objective is presented in **Table 1.38**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.38: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for temporary habitat loss/disturbance and increased SSCs during all project phases

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features are maintained or restored	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of the assemblage features or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during any of the phases. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of the assemblage features from being maintained or restored.
The structure and function of the habitats of the qualifying features are maintained or restored	
The supporting processes on which the habitats of the qualifying features rely are maintained or restored	
The population of each of the qualifying features are maintained or restored	There is negligible potential for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of the assemblage features during any phase. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site are maintained or restored	

1.5.3.180 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of temporary habitat loss/disturbance and increased SSCs with respect to all phases of the Transmission Assets alone.

Morecambe Bay Ramsar site

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.181 The Morecambe Bay Ramsar site is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with all phases Transmission Assets would result in temporary habitat loss/disturbance and increased SSCs within the Morecambe Bay Ramsar site due to the intervening land mass between the Transmission Assets and the SPA.

1.5.3.182 Additionally, the distance between the Ramsar and the Transmission Assets is beyond the 15 km ZOI associated with the impact as used as part of the screening exercise in HRA Stage 1 Screening Report (document reference: E3).

Conclusions

1.5.3.183 Adverse effects on the qualifying offshore ornithological features of the Morecambe Bay Ramsar site which undermine the conservation objectives of the Ramsar site will not occur during any project phase, as a result of temporary habitat loss/disturbance and increased SSCs. An assessment of the potential impact 'temporary habitat loss/disturbance and increased SSCs' against each relevant conservation objective is presented in **Table 1.39**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.39: Conclusions against the conservation objectives of the Morecambe Bay Ramsar site for temporary habitat loss/disturbance and increased SSCs during all project phases

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features are maintained or restored	The Transmission Assets impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of the assemblage features or their prey as a result of temporary habitat loss/disturbance and increased SSCs during any of the phases. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of the assemblage features from being maintained or restored.
The structure and function of the habitats of the qualifying features are maintained or restored	
The supporting processes on which the habitats of the qualifying features rely are maintained or restored	
The population of each of the qualifying features are maintained or restored	There is no pathway for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of the assemblage features during any phase. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site are maintained or restored	

1.5.3.184 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay Ramsar site as a result of temporary habitat loss/disturbance and increased SSCs with respect to the all project phases of the Transmission Assets alone.

Morecambe Bay and Duddon Bay SPA

Non-breeding (wintering) assemblage of waterbirds (including wintering populations of cormorant, eider and red-breasted merganser)

1.5.3.185 The Morecambe Bay and Duddon Estuary SPA is located 11 km to the north west of the Transmission Assets Order Limits: Offshore. However, this distance is measured across land, specifically the town of Blackpool on the Lancashire coast, and any direct connectivity is over 15 km from the Transmission Assets Order Limits: Offshore. If there were to be interaction between the SPA and impacts associated with the Transmission Assets these would have to propagate across this land mass. It is considered highly unlikely that the activities associated with all phases Transmission Assets would result in Temporary habitat loss/disturbance and increased SSCs

within the Morecambe Bay and Duddon Estuary SPA due to the intervening land mass between the Transmission Assets and the SPA.

1.5.3.186 The distance between the SPA and the Transmission Assets is beyond the 15 km ZOI associated with the impact as used as part of the screening exercise in HRA Stage 1 Screening Report (document reference: E3). It is therefore concluded that there will be no potential for an adverse effect on integrity to the population conservation or distribution objectives of the non-breeding waterbird assemblage associated with the Morecambe Bay and Duddon Estuary SPA (of which cormorant, eider and red-breasted merganser are named features), or their prey, in relation to Temporary habitat loss/disturbance and increased SSCs resulting from the proposed Transmission Assets alone. In addition, there will be no potential for an adverse effect on integrity to the supporting habitat conservation objective of the non-breeding waterbird assemblage associated with the Morecambe Bay and Duddon Bay SPA, in relation to Temporary habitat loss/disturbance and increased SSCs resulting from the proposed Transmission Assets alone.

Conclusions

1.5.3.187 Adverse effects on the qualifying offshore ornithological features of the Morecambe Bay and Duddon Bay SPA which undermine the conservation objectives of the SPA will not occur during any phase, as a result of temporary habitat loss/disturbance and increased SSCs. An assessment of the potential impact 'temporary habitat loss/disturbance and increased SSCs' against each relevant conservation objective is presented in **Table 1.40**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.40: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Bay SPA for disturbance and displacement from temporary habitat loss/disturbance and increased SSCs during all project phases

Conservation objective	Conclusion
The extent and distribution of the habitats of the qualifying features are maintained or restored	There is no pathway for temporary habitat loss/disturbance and increased SSCs to result in adverse effects on the habitats of any of the features during any phase. Therefore, temporary habitat loss/disturbance and increased SSCs associated with the Transmission Assets will not prevent the extent, distribution and/or availability of suitable habitat of any of the features from being maintained**.**
The structure and function of the habitats of the qualifying features are maintained or restored	
The supporting processes on which the habitats of the qualifying features rely are maintained or restored	
The population of each of the qualifying features are maintained or restored	The Transmission Assets impacts will be temporary and localised during all project phases. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of temporary habitat loss/disturbance and increased SSCs during any phase. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population or distribution of the assemblage features from being maintained or restored.
The distribution of the qualifying features within the site are maintained or restored	

1.5.3.188 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Bay SPA as a result of temporary habitat loss/disturbance and increased SSCs with respect to all project phases of the Transmission Assets alone.

1.5.4 Assessment of adverse effects in-combination

1.5.4.1 The other developments (projects/plans) that could result in, in-combination effects associated with the Transmission Assets on offshore ornithological features of the designated sites identified have been summarised in **Table 1.41** and are shown in **Figure 1.4**.

1.5.4.2 The screening process for in-combination effects on ornithological features has been based on the species and their associated population designation (i.e., breeding species, over-wintering species and passage species) enabling a ZOI to be defined in which in-combination effects may occur. This has been defined as a 50 km buffer from the Transmission Asserts (**Figure 1.4**).

1.5.4.3 The only features for which LSE has been identified are associated with the relevant SPA in the non-breeding season. As a result, only those projects that have the potential to directly impact the SPAs of relevance are considered in the in-combination assessment.

1.5.4.4 All potential impacts considered for the Transmission Assets alone have been considered in the in-combination assessment for all relevant features at each designated site.

- 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.

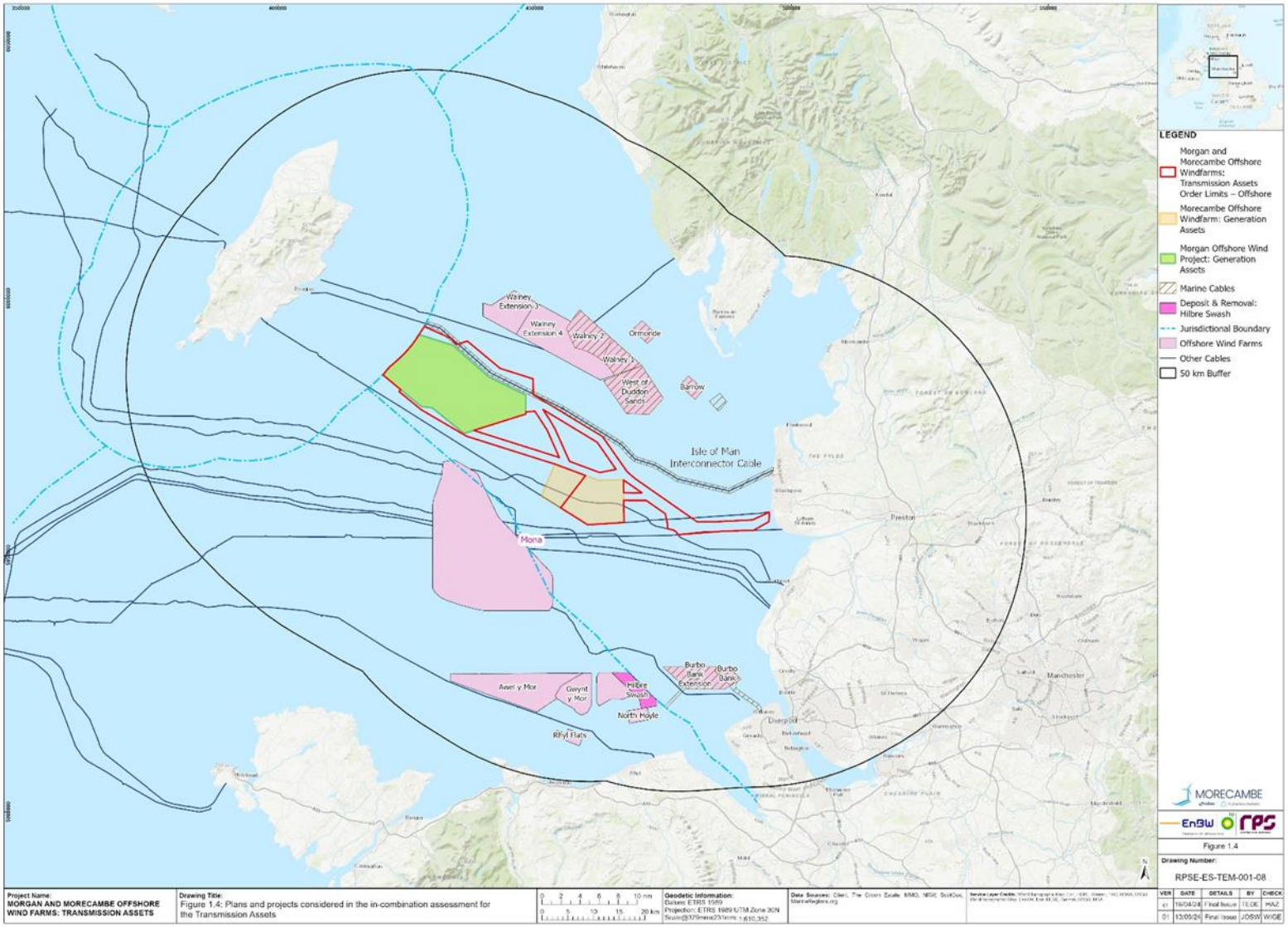

Figure 1.4: Plans and projects considered in the in-combination assessment for the Transmission Assets

1.5.4.5 It is considered highly unlikely that the Transmission Assets will impact the features of the Morecambe Bay Ramsar site and Morecambe Bay and Duddon Estuary SPA at any phase. The Transmission Assets will provide no contribution to the existing in-combination impact on these sites and therefore an assessment of the Transmission Assets in-combination with other plans and projects with regards to Morecambe Bay Ramsar site and Morecambe Bay and Duddon Estuary SPA will not be undertaken.

1.5.4.6 In addition, there are no plans or projects that overlap with the boundary of the Ribble and Alt Estuaries Ramsar site and/or SPA, and therefore no potential for an in-combination impact with the Transmission Assets. Therefore, an assessment of the Transmission Assets in-combination with other plans and projects with regards to the Ribble and Alt Estuaries Ramsar site and SPA will not be undertaken.

1.5.4.7 Therefore, the in-combination assessment will focus solely on plans or projects with the potential to have impacts on the Liverpool Bay/Bae Lerpwl SPA within the same timeframe as the construction, operation and maintenance, and/or decommissioning of the Transmission Assets.

1.5.4.8 The in-combination effects assessment follows the methodology set out in **section 1.4.5** and is presented in a series of tables (one for each potential in-combination effect).

Table 1.41: List of other projects and plans with potential for in-combination effects on offshore ornithological features

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Morecambe Offshore Windfarm: Generation Assets	Application submitted	0	Offshore wind farm (generating assets)	2026 - 2029	2029 - 2064	The construction, operation and maintenance and decommissioning phases of this project will overlap with the construction, operation and maintenance and decommissioning phases of the Transmission Assets.
Morgan Offshore Wind Project: Generation Assets	Application submitted	0	Offshore wind farm (generating assets)	2026 - 2030	2030 - 2065	The construction, operation and maintenance and decommissioning phases of this project will overlap with the construction, operation and maintenance and decommissioning phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Tier 1						
Offshore Renewable Projects						
Mona Offshore Wind Project	Application submitted	5.2	Offshore wind farm (generating assets) and offshore export cable (transmission assets)	2026 - 2030	2030 - 2065	The construction, operation and maintenance and decommissioning phases of this project will overlap with the construction, operation and maintenance and decommissioning phases of the Transmission Assets.
Walney Extension Offshore Wind Farm	Operational (with ongoing activities)	5.71	Up to 659 MW (87 wind turbines)	Constructed	2018 - 3038	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
West of Duddon Sands Offshore Wind Farm	Operational (with ongoing activities)	6.47	Up to 389 MW (108 wind turbines)	Constructed	2014 - 2034	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
West of Duddon Sands Offshore Wind Farm Operational Marine Licence operations and maintenance activities (MLA/2016/00150/3)	Operational	6.47	Covers licensable operations and maintenance activities to be carried out as and when required over the lifetime of the wind farm.	n/a	2016 - 2037	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Walney 2 Offshore Wind Farm	Operational (with ongoing activities)	10.17	Up to 367 MW (51 wind turbines)	Constructed	2012 - 2032	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Walney 1 and 2 Offshore Wind Farms Operational Marine Licence - operations and maintenance activities (MLA/2016/00151/3)	Operational	10.17	Covers licensable operations and maintenance activities to be carried out as and when required over the lifetime of the wind farms.	n/a	2016 - 2032	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Walney Offshore Wind Farm Operational Marine Licence - inter array cable repair (MLA/2013/00426/2)	Operational	10.17	Emergency inter-array cable repairs over the operational life time of the Walney Offshore Wind Farm (1 and 2). To ensure adequate contingency plans are in place to react to a major breakage/fault in an inter array cable.	n/a	2018 - 2032	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Walney 2 Offshore Wind Farm, Composite Operational and Maintenance Marine Licence Application	Operational	10.17	Operations and maintenance events including removal of marine growth and/or guano from substation, export cable repair events, with associated anchoring/jacking-up/vessel beaching, remediation events (via jetting and/or mass flow excavator) of up to 7 km length per event, potential jacking-up to and removal and/or replacement of cable/scour protection and deployment of additional cable protection adjacent to existing	n/a	2018 - 2038	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
			cable protection to resolve secondary scour issues.			
Walney 1 Offshore Wind Farm	Operational	11.40	Up to 367 MW (51 wind turbines)	2010 - 2011	2011 - 2031	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Walney Offshore Wind Farm Operational Marine Licence - phase 2 export cable (MLA/2014/00027/7)	Operational	11.91	Emergency export cable repairs over the operational life time of the Walney Offshore Wind Farm export cables (2) to ensure adequate contingency plans are in place to react to a major breakage/fault within a reasonable period of time	n/a	2014 - 2027	These maintenance activities will temporally overlap with the construction phase of the Transmission Assets.
Walney Offshore Wind Farm Operational Marine Licence - composite operations and maintenance activities (MLA/2017/00081/2)	Operational	15.32	For future cable repair/remediation/protection works on the Walney 1 export cable and also for potential repair works on the Walney 1 Offshore Substation Platform.	n/a	2017 - 2037	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Walney Offshore Wind Farm Operational Marine Licence - phase 1 export cable (MLA/2014/00028/5)	Operational	15.32	Emergency export cable repairs over the operational life time of the Walney Offshore Wind Farm export cables (2) to ensure adequate contingency plans are in place to react to a major breakage/fault in a reasonable period of time.	n/a	2014 - 2027	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Routine operations and maintenance activities at five Offshore Substation Platforms (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands) (MLA/2017/00100/1)	Operational	19.66	Repainting of offshore structures, removal of algal growth/bird guano and removal of growth around J Tubes.	n/a	2017 - 2038	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Ormonde Offshore Wind Farm Operational Marine Licence - operations and maintenance activities (MLA/2016/00224/2)	Operational	20.05	Operations and maintenance activities to be carried out as and when required over the lifetime of the wind farm.	n/a	2017 - 2037	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Ormonde Offshore Wind Farm Operational Marine Licence - export cable repair and remediation (MLA/2015/00086/2)	Operational	20.48	Five x cable repair events, with associated jacking-up; and 10 x cable remediation events (via jetting).	n/a	2015 - 2030	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Burbo Bank Extension Offshore Wind Farm	Operational (with ongoing activities)	25.77	Up to 258 MW (32 wind turbines)	2016 – 2017	2017 – 2042	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Burbo Bank Offshore Wind Farm Operational Marine Licence – cable repair and remediation (MLA/2014/00336/1)	Operational	25.77	Burbo Bank cable repair and remediation works (no further information)	n/a	2018 – 2043	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Burbo Bank Extension Operational Marine Licence – array cable repair and remediation activities (MLA/2017/00164)	Operational	25.77	Up to 10 discrete array cable repair or remediation events over the lifetime of the wind farm (25 years).	n/a	2018 – 2042	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Burbo Bank Offshore Wind Farm	Operational (with ongoing activities)	26.24	Up to 90 MW (25 wind turbines)	2004 - 2005	2007 - 2032	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Burbo Bank Offshore Wind Farm Operational Marine Licence - export cable repair/remediation activities (MLA/2016/00406)	Operational	26.24	Up to four discrete export cable repair/remediation events over the remaining lifetime of the wind farm (15 years).	n/a	2018 - 2032	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Burbo Bank Offshore Wind Farm Operational Marine Licence - inter-array cable repair (MLA/2014/00336/1)	Operational	26.24	For works which would be undertaken should any inter array cables at Burbo Bank Offshore Wind Farm fail. This is a pre-emptive application which is designed to limit downtime in any such situation where the cables fail.	n/a	2014 - 2032	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Burbo Bank Extension Operational Marine Licence - export cable repair and remediation activities (MLA/2017/00166/1)	Operational	27.52	Up to four discrete export cable repair or remediation events over the lifetime of the wind farm (25 years).	n/a	2017 - 2042	These maintenance activities will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Gwynt y Môr Offshore Wind Farm	Operational (with ongoing activities)	28.86	Up to 750 MW (150 to 250 wind turbines)	2008 - 2011	2011 - 2061	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Awel y Môr Offshore Wind Farm	Consented	28.87	Up to 100 MW (48 to 91 wind turbines)	2026 - 2030	2030 - 2055	The construction, operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Ormonde Offshore Wind Farm	Operational (with ongoing activities)	34.20	Up to 150 MW (30 wind turbines)	2009 - 2010	2011 - 2036	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets.
Cables and Pipelines						

Project/Plan	Status	Distance from the Transmission Assets (nearest point, km)	Description of project/plan	Anticipated Dates of construction (if applicable)	Anticipated Dates of operation (if applicable)	Overlap with the Transmission Assets
Isle of Man to UK Interconnector Cable - Maintenance and Repair	Operational (with ongoing activities)	0	Placement of additional armouring or protection whilst carrying out contingency repair and maintenance works	n/a	2018-2033	The activities associated with this site will overlap with the construction and operation and maintenance phases of the Transmission Assets.
Isle of Man Interconnector Cable - Cable Protection Remedial Works	Permitted but not yet implemented	0.62	Potential repair and maintenance activities along the Isle of Man interconnector cable route in UK waters, should any works be required. Two original concrete mattresses used for cable protection will be removed	n/a	2018-2033	Should any activities associated with this site be carried out, they could overlap with the construction and operation and/or maintenance phases of the Transmission Assets.
Tier 3						
MaresConnect – Wales-Ireland Interconnector Cable	Pre-application	34.44	A proposed subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain.	2025	2027 - 2037	The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction, operation and maintenance phases of the Transmission Assets.

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

In-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure

1.5.4.9 The assessment of LSE (in HRA Stage 1 Screening Report; document reference: E3) identified that LSE could not be ruled out for the potential in-combination impacts of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during construction. With regards to in-combination assessments, this relates solely to Liverpool Bay/Bae Lerpwl SPA. The relevant offshore ornithological features are listed in **Table 1.42**.

Table 1.42: SPA and Ramsar sites and relevant offshore ornithological features from which the potential for an LSE could not be ruled out in relation to in-combination impacts

SPA and Ramsar sites	Offshore ornithological features
Liverpool Bay/Bae Lerpwl SPA	• Red-throated diver • Common scoter • Cormorant • Red-breasted merganser

Construction and decommissioning phases

1.5.4.10 The assessment for red-throated diver in relation to in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phases is provided in **Table 1.43** and **Table 1.44**. For common scoter this information is provided in **Table 1.45** and **Table 1.46**. For the non-breeding waterbird assemblage of which red-breasted merganser and cormorant are component features, this information is provided in **Table 1.47** and **Table 1.48**.

Table 1.43: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phase for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. During the construction and decommissioning of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Vessel and helicopter movements to and from the wind farm. • Sound and vibrations associated with construction, such as piling works for the installation of foundations for wind turbines and associated offshore substations. • Lighting of construction sites, vessels and other structures. The Transmission Assets will service the Morecambe Offshore Windfarm: Generation Assets, and therefore the construction and decommissioning	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. During the construction and decommissioning of the Morgan Offshore Wind Project: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Vessel and helicopter movements to and from the wind farm. • Sound and vibrations associated with construction, such as piling works for the installation of foundations for wind turbines and associated offshore substations. • Lighting of construction sites, vessels and other structures. The Morgan Offshore Wind Project: Generation Assets will be constructed at the same time as the Transmission	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Red-throated diver were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	phases will take place at the same time. Disturbance and displacement impacts from decommissioning activities are equal to or less than those to be carried out during the construction phase. Red-throated diver are considered to be of high sensitivity to disturbance and displacement during construction of Morecambe Offshore Windfarm: Generation Assets. During baseline aerial surveys of the project, red-throated divers were recorded in small numbers, being most abundant in the winter period with a mean-peak population of 12 birds. The assessments for the Morecambe Offshore Windfarm: Generation Assets concluded that there would be no in-combination contribution as the projects' effects are temporary and reversible, with best practice construction methods, similar to those proposed for the Transmission Assets, proposed for the Morecambe Offshore Windfarm: Generation Assets. The Transmission Assets construction mortality is anticipated to be 0.36 to 0.39 red-throated divers. This level of mortality is considered to be	Assets and therefore there will be a temporal overlap. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for indirect impacts during construction and decommissioning with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-throated divers were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.	

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	precautionary and falls below any perceptible threshold of significance that could be considered in combination with any other projects. It is therefore concluded that there will not be an adverse effect on the integrity of the red-throated diver feature of the Liverpool Bay/Bae Lerpwl SPA as a result of disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure associated with the construction and decommissioning phases of the Transmission Assets in combination with the Morecambe Offshore Windfarm: Generation Assets. Subject to natural change, the red-throated diver feature will therefore be maintained in the long term. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of red-throated divers from being maintained or restored.		
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	underwater sound and these conservation objectives.	underwater sound and these conservation objectives.	underwater sound and these conservation objectives.

Table 1.44: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phase for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41**. The construction phase of the Transmission Assets will overlap with the construction or operation and maintenance phase of projects identified in Tier 1. Projects for which the construction phase may overlap with the Transmission Assets are the: - Mona Offshore Wind Project (Transmission Assets only) - Awel y Môr Offshore Wind Farm The operation and maintenance phase of all other Tier 1 projects will overlap temporally, to some extent, with the construction phase of the Transmission Assets. Assessments undertaken for the operation and maintenance phase of projects considered cumulatively focus on the impact of displacement. Displacement is a permanent impact, persisting throughout the lifetime of a project, whereas disturbance, such as that	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41**. As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of red-throated divers from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	associated with the operations and maintenance phase of the Transmission Assets is a temporary, intermittent impact. The two impacts are therefore not necessarily additive. Red-throated diver has a very high vulnerability to disturbance associated with vessel movements and displacement associated with structures. There are however, only a limited number of projects that may act cumulatively to materially impact important areas for both of these species. This includes the: - Mona Offshore Wind Project (transmission assets only) - Burbo Bank Extension - Burbo Bank - Gwynt y Môr - Awel y Môr These projects are located in or within close proximity to the Liverpool Bay SPA. Other Tier 1 projects identified in **Table 1.41** are located beyond the key areas for red-throated diver within the SPA (i.e. areas commensurate with the original SPA designation) and are therefore not considered to contribute to any cumulative impact. The most recent assessments undertaken for red-throated diver as a feature of the Liverpool Bay SPA were included as part of the assessments conducted for the Awel		throated diver). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 is scheduled to be operational during the Transmission Assets operational phase. There is currently very limited information available on this project however it is understood that the project is likely to commence construction before 2030 (Manx Utilities, 2023). Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of red-throated divers from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	y Môr offshore wind farm. The Secretary of State concluded that, an adverse effect could be excluded. No objections were raised in relation to the Awel y Môr applicant's conclusion of no adverse effect on red-throated diver feature of the SPA. It is worth noting that the in-combination assessments presented for the Awel y Môr Offshore Wind Farm incorporated a number of projects that are scheduled to be decommissioned soon and therefore the in-combination impact will therefore decrease. The application for the Mona offshore wind farm also concluded that in-combination disturbance and displacement impacts from airborne sound and presence of vessels and infrastructure will not lead to a significant reduction in the population and/or distribution of red-throated diver, due to the predicted impact being minimal. The area affected by the Transmission Assets within which red-throated diver may be disturbed is 76.97 km^2. Activities within this area will be temporary and intermittent and it is anticipated that any impact is highly reversible with birds able to return to affected areas rapidly after the cessation of activities. The magnitude of the increase in vessel numbers associated with the		

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	Transmission Assets (see section 1.5) is not considered to represent a material increase in the existing in-combination effect on red-throated diver. The operation of existing offshore wind farms, deposit and removal projects, and cables and pipelines projects will require some activities, such as vessel movements that could lead to temporary and localised disturbance and displacement. However, the Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during all phases in-combination with Tier 1 plans/projects. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of red-throated divers from being maintained or restored.		
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	underwater sound and these conservation objectives.	underwater sound and these conservation objectives.	underwater sound and these conservation objectives.

Table 1.45: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phase for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. During the construction and decommissioning of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Vessel and helicopter movements to and from the wind farm. • Sound and vibrations associated with construction, such as piling works for the installation of foundations for wind turbines and associated offshore substations. • Lighting of construction sites, vessels and other structures. The Transmission Assets will service the Morecambe Offshore Windfarm: Generation Assets, and therefore the construction and decommissioning	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. During the construction and decommissioning of the Morgan Offshore Wind Project: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Vessel and helicopter movements to and from the wind farm. • Sound and vibrations associated with construction, such as piling works for the installation of foundations for wind turbines and associated offshore substations. • Lighting of construction sites, vessels and other structures. The Morgan Offshore Wind Project: Generation Assets will be constructed at the same time as the Transmission	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Common scoters were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	phases will take place at the same time. Disturbance and displacement impacts from decommissioning activities are equal to or less than those to be carried out during the construction phase. The assessments for the Morecambe Offshore Windfarm: Generation Assets concluded that there would be no in-combination contribution as the projects' effects are temporary and reversible, with best practice construction methods, similar to those proposed for the Transmission Assets, proposed for the Morecambe Offshore Windfarm: Generation Assets. The Transmission Assets' construction mortality is anticipated to be 75 to 84 common scoters. This level of mortality is considered to be precautionary and falls below any perceptible threshold of significance that could be considered in combination with any other projects. The Transmission Assets construction and decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of	Assets and therefore there will be a temporal overlap. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for indirect impacts during construction and decommissioning with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Common scoters were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.	

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	common scoters or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during construction and decommissioning in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.		
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.46: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phase for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The construction phase of the Transmission Assets will overlap with the construction or operation and maintenance phase of projects identified in Tier 1. Projects for which the construction phase may overlap with the Transmission Assets are the: - Mona Offshore Wind Project (transmission assets only) - Awel y Môr Offshore Wind Farm The operations and maintenance phase of all other Tier 1 projects will overlap temporally, to some extent, with the construction phase of the Transmission Assets. Assessments undertaken for the operation and maintenance phase of projects considered cumulatively focus on the impact of displacement. Displacement is a permanent impact, persisting throughout the lifetime of a project, whereas disturbance, such as that	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41**. In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	associated with the operations and maintenance phase of the Transmission Assets is a temporary, intermittent impact. The two impacts are therefore not necessarily additive. Common scoter has a very high vulnerability to disturbance associated with vessel movements and displacement associated with structures. There are however, only a limited number of projects that may act cumulatively to materially impact important areas for both of these species. This includes the: - Mona Offshore Wind Project (Transmission Assets) - Burbo Bank Extension - Burbo Bank - Gwynt y Môr - Awel y Môr These projects are located in or within close proximity to the Liverpool Bay SPA. Other Tier 1 projects identified in **Table 1.41** are located beyond the key areas for common scoter within the SPA (i.e. areas commensurate with the original SPA designation) and are therefore not considered to contribute to any cumulative impact. The Report to Inform Appropriate Assessment for the Awel y Môr Offshore Wind Farm (RWE Renewables UK, 2022) considered the offshore wind farms and cable		common scoter). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	projects that could also have an effect on Liverpool Bay/Bae Lerpwl SPA, and undertook an in-combination assessment for common scoter, identifying an in-combination 0.04% increase in baseline mortality per annum. The Secretary of State concluded that, an adverse effect could be excluded. No objections were raised in relation to the Awel y Môr applicant's conclusion of no adverse effect on the common scoter feature of the SPA. It is worth noting that the cumulative and in-combination assessments presented for the Awel y Môr Offshore Wind Farm incorporated a number of projects that will soon be decommissioned and therefore the cumulative impact will therefore decrease. The application for the Mona offshore wind farm also concluded that in-combination disturbance and displacement impacts from airborne sound and presence of vessels and infrastructure will not lead to a significant reduction in the population and/or distribution of common scoter due to the predicted impact being minimal. The area affected by the Transmission Assets and Generation Assets within which common scoter may be disturbed is 76.97 km^2.		

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	Activities within this area will be temporary and intermittent and it is anticipated that any impact is highly reversible with birds able to return to affected areas rapidly after the cessation of activities The magnitude of the increase in vessel numbers associated with the Transmission Assets (see section 1.5) is not considered to represent a material increase in the existing in-combination effect on common scoter. The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during all phases in-combination with Tier 1 plans/projects. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.		
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound,

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	underwater sound and these conservation objectives.	underwater sound and these conservation objectives.	underwater sound and these conservation objectives.

Table 1.47: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phase for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. During the construction and decommissioning of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Vessel and helicopter movements to and from the wind farm. • Sound and vibrations associated with construction, such as piling works for the installation of foundations for wind turbines and associated offshore substations. • Lighting of construction sites, vessels and other structures. Cormorants and red-breasted mergansers were not screened in for consideration as part of the Morecambe Offshore Windfarm:	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. During the construction and decommissioning of the Morgan Offshore Wind Project: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Vessel and helicopter movements to and from the wind farm. • Sound and vibrations associated with construction, such as piling works for the installation of foundations for wind turbines and associated offshore substations. • Lighting of construction sites, vessels and other structures. The Morgan Offshore Wind Project: Generation Assets will be constructed at the same time as the Transmission	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Cormorant and red-breasted merganser were not screened into the assessments undertaken for the Morecambe Offshore Windfarm: Generation Assets or the Morgan Offshore Wind Project: Generation Assets. Therefore, the in-combination impacts will remain the same as those identified for the construction and decommissioning impacts of the Transmission Assets alone. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on the non-breeding waterbird assemblage.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	Generation Assets assessment. Therefore, the in-combination impacts will remain the same as those identified for the construction and decommissioning impacts of the Transmission Assets alone, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary and being limited to low frequencies of vessel, there is no potential for an adverse effect on integrity to the conservation objectives of the waterbird assemblage feature, of which cormorant and red-breasted merganser are named features from the Transmission Assets alone or in-combination with the Morecambe Offshore Windfarm: Generation Assets. Therefore, with respect to the potential for disturbance and displacement, the waterbird assemblage feature, subject to natural change, will be maintained in the long term at Liverpool Bay/Bae Lerpwl SPA.	Assets and therefore there will be a temporal overlap. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for indirect impacts during construction and decommissioning with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-breasted merganser and cormorant were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on the non-breeding waterbird assemblage.	
Maintain the distribution, abundance and availability of key	No impact pathway exists in relation to in-combination disturbance and	No impact pathway exists in relation to in-combination disturbance and	No impact pathway exists in relation to in-combination disturbance and

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	displacement from airborne sound, underwater sound and these conservation objectives.	displacement from airborne sound, underwater sound and these conservation objectives.	displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.48: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the construction and decommissioning phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41**. The Report to Inform Appropriate Assessment for the Awel y Môr Offshore Wind Farm considered the offshore wind farms and cable projects that could also have an effect on Liverpool Bay/Bae Lerpwl SPA, and undertook an in-combination assessment, but did not include cormorants and red-breasted mergansers as features with an LSE. Therefore, the in-combination impacts will remain the same as those identified for the impacts of the Transmission Assets alone for the construction and decommissioning phases, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, the in-combination impacts will remain the same as those identified for the impacts of the Transmission Assets alone for the construction and decommissioning phases, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary and being limited to low frequencies of vessels.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	and being limited to low frequencies of vessels.		it's qualifying features (including red-breasted merganser and cormorant). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. Therefore, the in-combination impacts will remain the same as those identified for the impacts of the Transmission Assets alone for the construction and decommissioning phases, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary and being limited to low frequencies of vessels.
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Operation and maintenance phase

1.5.4.11 The assessment for red-throated diver in relation to in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase is provided in **Table 1.49** and **Table 1.50**. For common scoter this information is provided in **Table 1.51** and **Table 1.52**. For the non-breeding waterbird assemblage of which red-breasted merganser and cormorant are component features, this information is provided in **Table 1.53** and **Table 1.54**.

Table 1.49: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. During the operation and maintenance phase of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Operational (rotating) wind turbines. • Vessel and helicopter movements to and from the wind farm. • Lighting of turbines and other structures. The Transmission Assets will service the Morecambe Offshore Windfarm: Generation Assets, and therefore the operational phase will take place at the same time. Red-throated diver are considered to be of high sensitivity to disturbance	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. During the operation and maintenance phase of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Operational (rotating) wind turbines. • Vessel and helicopter movements to and from the wind farm. • Lighting of turbines and other structures. The Morgan Offshore Wind Project: Generation Assets will be constructed at the same time as the Transmission Assets and therefore there will be a temporal overlap. The Morgan Offshore Wind Project: Generation Assets HRA screening	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Red-throated diver were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	and displacement during operation of Morecambe Offshore Windfarm: Generation Assets. During baseline aerial surveys of the project, red-throated divers were recorded in small numbers, being most abundant in the winter period with a mean-peak population of 12 birds. It was concluded that there would no adverse effect on the integrity of the Liverpool Bay SPA when considering the Morecambe Offshore Windfarm: Generation Assets in-combination with other plans and projects. The increase in vessel traffic associated with the operations and maintenance phase of the Transmission Assets is negligible when contextualised against the current levels of shipping traffic in the area in which the Transmission Assets are located. It is not anticipated that this increase will cause a measurable change in the level of disturbance already being experienced by receptors in this area. The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality,	ruled out LSEs for indirect impacts during operation and maintenance with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-throated divers were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.	

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	disturbance or displacement of red-throated divers or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of red-throated divers from being maintained or restored.		
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.50: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The operation and maintenance phase of the Transmission Assets will overlap with the operation and maintenance phase of all Tier 1 projects. The assessments undertaken for the operation and maintenance phase of offshore wind farm projects focus on the impact of displacement. Displacement is a permanent impact, persisting throughout the lifetime of a project, whereas disturbance, such as that associated with the operations and maintenance phase of the Transmission Assets is a temporary, intermittent impact. In the operation and maintenance phase, disturbance may be caused by vessel movements associated with maintenance activities. The most recent assessments undertaken for red-throated diver as a	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. As the impact in the operation and maintenance phase is lower than that predicted in the construction phase it is considered that the conclusions reached for the construction phase are applicable here.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	feature of the Liverpool Bay SPA were included as part of the assessments conducted for the Awel y Môr offshore wind farm. The Secretary of State concluded that, an adverse effect could be excluded. No objections were raised in relation to the Awel y Môr applicant's conclusion of no adverse effect on red-throated diver feature of the SPA. It is worth noting that the in-combination assessments presented for the Awel y Môr Offshore Wind Farm incorporated a number of projects that will soon be decommissioned and therefore the in-combination impact will therefore decrease. The application for the Mona offshore wind farm also concluded that in-combination disturbance and displacement impacts from airborne sound and presence of vessels and infrastructure will not lead to a significant reduction in the population and distribution of red-throated diver due to the predicted impact being minimal. Operation and maintenance activities associated with the Transmission Assets will be temporary and intermittent and it is anticipated that any impact is highly reversible with birds able to return to affected areas rapidly after the cessation of activities. As discussed in **section 1.5.3**, the		throated diver). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 will be operational during the Transmission Assets operational phase. There is currently very limited information available on this project however it is understood that the project is likely to commence construction before 2030 (Manx Utilities, 2023). The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a grid connection at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). There is the potential for both the Mooir Vannin – UK Transmission Assets and the Isle of Man to UK Interconnector 2 to overlap with the Liverpool Bay SPA and result in disturbance to the designated features during maintenance activities. However, the is currently no information available regarding the

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	predicted increase in vessel movements associated with the Transmission Assets represents only a 0.8% increase in current shipping levels in the region. This is not considered to be a material increase in current shipping levels and therefore the contribution of the Transmission Assets to the existing cumulative impact is negligible. As the impact from the Transmission Assets in the operation and maintenance phase is lower than that predicted in the construction phase it is considered that the conclusions reached for the construction phase are applicable here.		cable route or corridor and therefore this cannot be accounted for in the in-combination assessment. As the impact in the operation and maintenance phase is lower than that predicted in the construction phase it is considered that the conclusions reached for the construction phase are applicable here.
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.51: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. During the operation and maintenance phase of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Operational (rotating) wind turbines. • Vessel and helicopter movements to and from the wind farm. • Lighting of turbines and other structures. The Transmission Assets will service the Morecambe Offshore Windfarm: Generation Assets, and therefore the operational phase will take place at the same time. It was concluded that there would no adverse effect on the integrity of the	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. During the operation and maintenance phase of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Operational (rotating) wind turbines. • Vessel and helicopter movements to and from the wind farm. • Lighting of turbines and other structures. The Morgan Offshore Wind Project: Generation Assets will be constructed at the same time as the Transmission Assets and therefore there will be a temporal overlap. The Morgan Offshore Wind Project: Generation Assets HRA screening	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Common scoters were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	Liverpool Bay SPA when considering the Morecambe Offshore Windfarm: Generation Assets in-combination with other plans and projects which included the Transmission Assets as assessed at PEIR stage. The increase in vessel traffic associated with the operations and maintenance phase of the Transmission Assets is negligible when contextualised against the current levels of shipping traffic in the area in which the Transmission Assets are located. It is not anticipated that this increase will cause a measurable change in the level of disturbance already being experienced by receptors in this area. The impact is predicted to be of local spatial extent, medium term duration, intermittent and with high reversibility. It is therefore considered that the rate of mortality experienced by birds affected by disturbance will be low, especially given the large area across which birds are distributed within Liverpool Bay. The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any	ruled out LSEs for indirect impacts during operation and maintenance with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Common scoters were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.	

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during operation and maintenance in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.		
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.52: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41**. The operation and maintenance phase of the Transmission Phase will overlap with the operation and maintenance phase of all Tier 1 projects. The assessments undertaken for the operation and maintenance phase of offshore wind farm projects focus on the impact of displacement. Displacement is a permanent impact, persisting throughout the lifetime of a project, whereas disturbance, such as that associated with the operations and maintenance phase of the Transmission Assets is a temporary, intermittent impact. In the operation and maintenance phase, disturbance may be caused by vessel movements associated with maintenance activities. The most recent assessments undertaken for common scoter as a	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. As the impact in the operation and maintenance phase is lower than that predicted in the construction phase it is considered that the conclusions reached for the construction phase are applicable here.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	feature of the Liverpool Bay SPA were included as part of the assessments conducted for the Awel y Môr offshore wind farm. The Secretary of State concluded that, an adverse effect could be excluded. No objections were raised in relation to the Awel y Môr applicant's conclusion of no adverse effect on the common scoter feature of the SPA. It is worth noting that the in-combination assessments presented for the Awel y Môr Offshore Wind Farm incorporated a number of projects that will soon be decommissioned and therefore the in-combination impact will therefore decrease. The application for the Mona offshore wind farm also concluded that in-combination disturbance and displacement impacts from airborne sound and presence of vessels and infrastructure will not lead to a significant reduction in the population and distribution of common scoter due to the predicted impact being minimal. Operation and maintenance activities associated with the Transmission Assets will be temporary and intermittent and it is anticipated that any impact is highly reversible with birds able to return to affected areas rapidly after the cessation of activities. As discussed in **section 1.5.3**, the		common scoter). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 will be operational during the Transmission Assets operational phase. There is currently very limited information available on this project however it is understood that the project is likely to commence construction before 2030 (Manx Utilities, 2023). The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a grid connection at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). There is the potential for both the Mooir Vannin – UK Transmission Assets and the Isle of Man to UK Interconnector 2 to overlap with the Liverpool Bay SPA and result in disturbance to the designated features during maintenance activities. However, the is currently no information available regarding the

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	predicted increase in vessel movements associated with the Transmission Assets represents only a 0.8% increase in current shipping levels in the region. This is not considered to be a material increase in current shipping levels and therefore the contribution of the Transmission Assets to the existing cumulative impact is negligible. As the impact from the Transmission Assets in the operation and maintenance phase is lower than that predicted in the construction phase it is considered that the conclusions reached for the construction phase are applicable here.		cable route or corridor and therefore this cannot be accounted for in the in-combination assessment. As the impact in the operation and maintenance phase is lower than that predicted in the construction phase it is considered that the conclusions reached for the construction phase are applicable here.
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.53: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. During the operation and maintenance phase of the Morecambe Offshore Windfarm: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Operational (rotating) wind turbines. • Vessel and helicopter movements to and from the wind farm. • Lighting of turbines and other structures. The Transmission Assets will service the Morecambe Offshore Windfarm: Generation Assets, and therefore the operational phase will take place at the same time. Cormorant and red-breasted merganser were not screened in for	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. During the operation and maintenance phase of the Morgan Offshore Wind Project: Generation Assets, there are several activities that could potentially cause impacts on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA. • Operational (rotating) wind turbines. • Vessel and helicopter movements to and from the wind farm. • Lighting of turbines and other structures. Cormorant and red-breasted merganser were not screened in for consideration as part of the Morgan Offshore Wind Project: Generation Assets assessment. Therefore, the in-combination impacts will remain the same as those	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Cormorant and red-breasted merganser were not screened into the assessments undertaken for the Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets. Therefore, the in-combination impacts will remain the same as those identified for the operation and maintenance impacts of the Transmission Assets alone.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	consideration as part of the Morecambe Offshore Windfarm: Generation Assets assessment. Therefore, the in-combination impacts will remain the same as those identified for the operation and maintenance impacts of the Transmission Assets alone, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary with limited to low frequencies of vessels.	identified for the operation and maintenance impacts of the Transmission Assets alone, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary with limited to low frequencies of vessels.	
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

Table 1.54: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination disturbance and displacement from airborne sound, underwater sound, and presence of vessels and infrastructure during the operation and maintenance phase for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The Report to Inform Appropriate Assessment for the Awel y Môr Offshore Wind Farm considered the offshore wind farms and cable projects that could also have an effect on Liverpool Bay/Bae Lerpwl SPA, and undertook an in-combination assessment, but did not include cormorants and red-breasted mergansers as features with an LSE. Therefore, the in-combination impacts will remain the same as those identified for the impacts of the Transmission Assets alone for the operation and maintenance phases, i.e., based on the vulnerability of both species to disturbance, and the spatial and temporal coverage of activities being short term, intermittent and temporary and being limited to low frequencies of vessels.	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of the waterbird assemblage features from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	The Transmission Assets operation and maintenance impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance, or displacement of any of the assemblage features or their prey as a result of airborne sound, underwater sound, and/or presence of vessels and infrastructure during all phases in-combination with Tier 1 plans/projects. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of the waterbird assemblage features from being maintained or restored.		breasted merganser and cormorant). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 will be operational during the Transmission Assets operational phase. There is currently very limited information available on this project however it is understood that the project is likely to commence construction before 2030 (Manx Utilities, 2023). The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a grid connection at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). There is the potential for both the Mooir Vannin – UK Transmission Assets and the Isle of Man to UK Interconnector 2 to overlap with the Liverpool Bay SPA and result in disturbance to the designated features during maintenance activities. However, the is currently no information available regarding the

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
			cable route or corridor and therefore this cannot be accounted for in the in-combination assessment. Therefore, airborne sound, underwater sound, and/or presence of vessels and infrastructure will not prevent the population, distribution, or prey availability of the waterbird assemblage features from being maintained or restored.
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.	No impact pathway exists in relation to in-combination disturbance and displacement from airborne sound, underwater sound and these conservation objectives.

In-combination indirect impacts from underwater sound affecting prey species

Construction and decommissioning phases

1.5.4.12 The assessment for red-throated diver in relation to in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases is provided in **Table 1.55** and **Table 1.56**. For common scoter this information is provided in **Table 1.57** and **Table 1.58**. For the non-breeding waterbird assemblage of which red-breasted merganser and cormorant are component features, this information is provided in **Table 1.59** and **Table 1.60**.

Table 1.55: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. The Morecambe Generation Ornithology ES determined that the Morecambe Generation Assets will only lead to minor, localised impacts on prey species (fish and shellfish) as a result of underwater sound. The Transmission Assets assessment of indirect impacts from underwater sound affecting prey species for Liverpool Bay/Bae Lerpwl SPA, as set out in **section 1.5.3**, determined that there would be no potential for an adverse effect on integrity to the conservation objectives of any qualifying features. Therefore, any in-combination indirect impacts from underwater sound affecting prey species will be minor, localised and short-term.	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for indirect impacts during construction and decommissioning phases with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-throated divers were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2.	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Red-throated diver were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
existing anthropogenic influences impacting the extent and quality (including water quality).	The impacts associated with the Transmission Assets will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of indirect impacts from underwater sound affecting prey species during construction and decommissioning phases in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.	The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.	

Table 1.56: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The spatial scale of activities associated with all projects identified in Tier 1 are limited representing negligible proportions of the area available for all receptors for foraging, roosting and other maintenance behaviours. The majority of offshore renewables projects that may overlap temporally with the Transmission Assets are in the operations phase where activities that may cause indirect impacts on prey species are reduced, when compared to the construction or decommissioning phases. Any activities that may result in impacts are limited in number, intermittent and will occur over short time periods and are highly unlikely to be significant for any offshore ornithological receptor. Assessments undertaken for the Mona Offshore Wind Project in	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and phase of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-throated diver). Therefore, the

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	relation to indirect impacts from underwater sound affecting prey species considered impacts on guillemot, razorbill and puffin only. There was considered to be no impact pathways for other species and therefore the Mona Offshore Wind Project will not contribute to any cumulative impact with the Transmission Assets. The assessments undertaken for the Awel y Môr offshore wind farm also concluded that any impacts would be temporary, short-term and small in extent with no significant effects predicted for potential prey species. The assessments concluded that there was no potential for any indirect effects of an adverse significance to occur. The impacts associated with the Transmission Assets will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of indirect impacts from underwater sound affecting prey species during construction and decommissioning phases in-combination with Tier 1 plans and projects. Therefore, indirect impacts from underwater sound affecting prey		conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 may be under construction during the Transmission Assets, Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets construction phases. There is currently very limited information available on this project however it is understood that the project is likely to commence construction from 2030 (Manx Utilities, 2023). Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	species will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.		

Table 1.57: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. The Morecambe Generation Ornithology Environmental Statement determined that the Morecambe Generation Assets will only lead to minor, localised impacts on prey species (fish and shellfish) as a result of underwater sound. The Transmission Assets assessment of indirect impacts from underwater sound affecting prey species for Liverpool Bay/Bae Lerpwl SPA, as set out in **section 1.5.3**, determined that	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for indirect impacts during construction and decommissioning phases with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Common scoters were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project:	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Common scoters were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population. **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	there would be no potential for an adverse effect on integrity to the conservation objectives of any qualifying features. Therefore, any in-combination indirect impacts from underwater sound affecting prey species will be minor, localised and short-term. The impacts associated with the Transmission Assets will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement common scoters or their prey as a result of indirect impacts from underwater sound affecting prey species during construction and decommissioning phases in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.	Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.	3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.

Table 1.58: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The spatial scale of activities associated with all projects identified in Tier 1 are limited representing negligible proportions of the area available for all receptors for foraging, roosting and other maintenance behaviours. The majority of offshore renewables projects that may overlap temporally with the Transmission Assets are in the operations phase where activities that may cause indirect impacts on prey species are reduced, when compared to the construction or decommissioning phases. Any activities that may result in impacts are limited in number, intermittent and will occur over short time periods and are highly unlikely to be significant for any offshore ornithological receptor. Assessments undertaken for the Mona Offshore Wind Project in	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction phase of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including common scoter). Therefore, the

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	relation to indirect impacts from underwater sound affecting prey species considered impacts on guillemot, razorbill and puffin only. There was considered to be no impact pathways for other species and therefore the Mona Offshore Wind Project will not contribute to any cumulative impact with the Transmission Assets. The assessments undertaken for the Awel y Môr offshore wind farm also concluded that any impacts would be temporary, short-term and small in extent with no significant effects predicted for potential prey species. The assessments concluded that there was no potential for any indirect effects of an adverse significance to occur. The impacts associated with the Transmission Assets will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of common scoters or their prey as a result of indirect impacts from underwater sound affecting prey species during construction and decommissioning phases in-combination with Tier 1 plans and projects. Therefore, indirect impacts from underwater sound affecting prey		conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 may be under construction during the Transmission Assets, Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets construction phases. There is currently very limited information available on this project however it is understood that the project is likely to commence construction from 2030 (Manx Utilities, 2023). Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	species will not prevent the population, distribution, or prey availability of common scoters from being maintained or restored.		

Table 1.59: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. The Morecambe Generation Ornithology ES determined that the Morecambe Generation Assets will only lead to minor, localised impacts on prey species (fish and shellfish) as a result of underwater sound. The Transmission Assets assessment of indirect impacts from underwater sound affecting prey species for Liverpool Bay/Bae Lerpwl SPA, as set out in **section 1.5.3**, determined that there would be no potential for an adverse effect on integrity to the conservation objectives of any qualifying features. Therefore, any in-combination indirect impacts from underwater sound affecting prey species will be minor, localised and short-term.	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for indirect impacts during construction and decommissioning phases with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-breasted merganser and cormorant were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2.	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Red-breasted merganser and cormorant were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on the non-breeding waterbird assemblage.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
existing anthropogenic influences impacting the extent and quality (including water quality).	The impacts associated with the Transmission Assets will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-breasted mergansers and cormorant, or their prey as a result of indirect impacts from underwater sound affecting prey species during construction and decommissioning phases in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, indirect impacts from underwater sound affecting prey species will not prevent the population, distribution or prey availability of red-breasted mergansers and cormorant from being maintained or restored.	The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on the non-breeding waterbird assemblage.	

Table 1.60: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination indirect impacts from underwater sound affecting prey species during construction and decommissioning phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The spatial scale of activities associated with all projects identified in Tier 1 are limited representing negligible proportions of the area available for all receptors for foraging, roosting and other maintenance behaviours. The majority of offshore renewables projects that may overlap temporally with the Transmission Assets are in the operations phase where activities that may cause indirect impacts on prey species are reduced, when compared to the construction or decommissioning phases. Any activities that may result in impacts are limited in number, intermittent and will occur over short time periods and are highly unlikely to be significant for any offshore ornithological receptor. Assessments undertaken for the Mona Offshore Wind Project in	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, underwater sound will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-breasted merganser and cormorant).

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	relation to indirect impacts from underwater sound affecting prey species considered impacts on guillemot, razorbill and puffin only. There was considered to be no impact pathways for other species and therefore the Mona Offshore Wind Project will not contribute to any cumulative impact with the Transmission Assets. The assessments undertaken for the Awel y Môr offshore wind farm also concluded that any impacts would be temporary, short-term and small in extent with no significant effects predicted for potential prey species. The assessments concluded that there was no potential for any indirect effects of an adverse significance to occur. The impacts associated with the Transmission Assets will be temporary and localised. It is not expected that there will be any detectable increase in mortality, disturbance or displacement of red-throated divers or their prey as a result of indirect impacts from underwater sound affecting prey species during construction and decommissioning phases in-combination with Tier 1 plans and projects. Therefore, underwater sound will not prevent the population, distribution or		Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 may be under construction during the Transmission Assets, Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets construction phases. There is currently very limited information available on this project however it is understood that the project is likely to commence construction from 2030 (Manx Utilities, 2023). Therefore, underwater sound will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	prey availability of the waterbird assemblage features from being maintained or restored.		

In-combination temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs)

All project phases

1.5.4.13 The assessment for red-throated diver in relation to in-combination temporary habitat loss/disturbance and increased SSCs during the construction and decommissioning phases is provided in **Table 1.61** and **Table 1.62**. For common scoter this information is provided in **Table 1.63** and **Table 1.64**. For the non-breeding waterbird assemblage of which red-breasted merganser and cormorant are component features, this information is provided in **Table 1.65** and **Table 1.66**.

Table 1.61: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination temporary habitat loss/disturbance and increased SSCs during all project phases for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. The Morecambe Offshore Windfarm: Generation Assets determined that for benthic prey species, fish and shellfish impacts from temporary habitat loss/disturbance and increased SSCs will be minor. The Transmission Assets assessment of temporary habitat loss/disturbance and increased SSCs for Liverpool Bay/Bae Lerpwl SPA, as set out in **section 1.5.3**, determined that there would be no potential for an adverse effect on integrity to the conservation objectives of any qualifying features. Therefore, any in-combination temporary habitat loss/disturbance and increased SSCs will be minor, localised and short-term. The Transmission Assets construction and decommissioning impacts will be	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for temporary habitat loss/disturbance during all project phases with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-throated divers were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Red-throated diver were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
existing anthropogenic influences impacting the extent and quality (including water quality).	temporary and localised. It is not expected that there will be any detectable increase in mortality of red-throated divers or their prey as a result of temporary habitat loss/disturbance and increased SSCs during all phases in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.	adverse effects on the integrity of the SPA in relation to impacts on red-throated diver.	

Table 1.62: Assessment against the conservation objectives of the Liverpool Bay SPA for red-throated diver for in-combination temporary habitat loss/disturbance and increased SSCs during the all project phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41.** The construction phase of the Transmission Assets will overlap with the construction or operation and maintenance phase of projects identified in Tier 1. Projects for which the construction phase may overlap with the Transmission Assets are the: - Mona Offshore Wind Project (Transmission Assets only) - Awel y Môr Offshore Wind Farm The operation and maintenance phase of the Transmission Assets will overlap with the operation and maintenance phase of all Tier 1 projects. Impacts associated with the plans and projects identified in **section 1.5.3** that may affect ornithological receptors are:	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	• temporary habitat loss and disturbance from installation and maintenance operations; and • disturbance/remobilisation of sediment-bound contaminants during installation and maintenance activities. The spatial scale of activities associated with all projects identified in Tier 1 are limited representing negligible proportions of the area available for all receptors for foraging, roosting and other maintenance behaviours. The majority of offshore renewables projects that may overlap temporally with the Transmission Assets are in the operations phase where activities that may cause temporary habitat loss/disturbance and increased SSCs are reduced, when compared to the construction or decommissioning phases. Any activities that may result in impacts are limited in number, intermittent and will occur over short time periods and are highly unlikely to be significant for any offshore ornithological receptor. The project timeframes of the Mona Offshore Wind Project, Awel y Môr Offshore Wind Farm will overlap with the project timeframes of the Transmission Assets. Assessments undertaken for the Mona Offshore		throated diver). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 may be under construction during the Transmission Assets, Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets construction phases. There is currently very limited information available on this project however it is understood that the project is likely to commence construction from 2030 (Manx Utilities, 2023). The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a grid connection at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). There is the potential for both the Mooir Vannin – UK Transmission Assets and the Isle of Man to UK Interconnector 2 to overlap with the Liverpool Bay SPA and result in disturbance to the designated

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	Wind Project concluded that the impact magnitude would be of local spatial extent, short-duration, intermittent and reversible. It was predicted that the impact would affect the receptor indirectly. The magnitude was therefore, considered to be low for all receptors and the impact significance minor. The assessments undertaken for the Awel y Môr offshore wind farm also concluded that any impacts would be temporary, short-term and small in extent. The assessments concluded that there was no potential for any indirect effects of an adverse significance to occur. Due to the length of the Isle of Man to UK Interconnector Cable and the relatively small area of overlap with the Transmission Assets, it is considered that the Interconnector Cable maintenance and remedial works are unlikely to overlap spatially and/or temporally with Transmission Assets during construction, operations and maintenance and/or decommissioning activities. In addition, both activities are short-term, localised and temporary in nature. The Transmission Assets impacts during all phases will be temporary and localised. It is not expected that there will be any detectable increase		features during maintenance activities. However, the is currently no information available regarding the cable route or corridor and therefore this cannot be accounted for in the in-combination assessment. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	in mortality, disturbance or displacement of red-throated divers or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during all phases in-combination with Tier 1 plans and projects. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of red-throated divers from being maintained or restored.		

Table 1.63: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination temporary habitat loss/disturbance and increased SSCs during all project phases for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. The Morecambe Offshore Windfarm: Generation Assets determined that for benthic prey species, fish and	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for temporary habitat	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
influences impacting feature distribution. **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	shellfish impacts from temporary habitat loss/disturbance and increased SSCs will be minor. The Transmission Assets assessment of temporary habitat loss/disturbance and increased SSCs for Liverpool Bay/Bae Lerpwl SPA, as set out in **section 1.5.3**, determined that there would be no potential for an adverse effect on integrity to the conservation objectives of any qualifying features. Therefore, any in-combination temporary habitat loss/disturbance and increased SSCs will be minor, localised and short-term. The Transmission Assets construction and decommissioning impacts will be temporary and localised. It is not expected that there will be any detectable increase in mortality of common scoters or their prey as a result of temporary habitat loss/disturbance and increased SSCs during all phases in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of	loss/disturbance during all project phases with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Common scoter were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.	Common scoter were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on common scoter.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
	common scoters from being maintained or restored.		

Table 1.64: Assessment against the conservation objectives of the Liverpool Bay SPA for common scoter for in-combination temporary habitat loss/disturbance and increased SSCs during all project phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41**. The construction phase of the Transmission Assets will overlap with the construction or operation and maintenance phase of projects identified in Tier 1. Projects for which the construction phase may overlap with the Transmission Assets are the: - Mona Offshore Wind Project (Transmission Assets only) - Awel y Môr Offshore Wind Farm The operation and maintenance phase of the Transmission Assets will overlap with the operation and maintenance phase of all Tier 1 projects. Impacts associated with the plans and projects identified in **section 1.5.3** that may affect ornithological receptors are:	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41.** As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	• temporary habitat loss and disturbance from installation and maintenance operations; and • disturbance/remobilisation of sediment-bound contaminants during installation and maintenance activities. The spatial scale of activities associated with all projects identified in Tier 1 are limited representing negligible proportions of the area available for all receptors for foraging, roosting and other maintenance behaviours. The majority of offshore renewables projects that may overlap temporally with the Transmission Assets are in the operations phase where activities that may cause temporary habitat loss/disturbance and increased SSCs are reduced, when compared to the construction or decommissioning phases. Any activities that may result in impacts are limited in number, intermittent and will occur over short time periods and are highly unlikely to be significant for any offshore ornithological receptor. The project timeframes of the Mona Offshore Wind Project, Awel y Môr Offshore Wind Farm will overlap with the project timeframes of the Transmission Assets. Assessments undertaken for the Mona Offshore		common scoter). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 may be under construction during the Transmission Assets, Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets construction phases. There is currently very limited information available on this project however it is understood that the project is likely to commence construction from 2030 (Manx Utilities, 2023). The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a grid connection at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). There is the potential for both the Mooir Vannin – UK Transmission Assets and the Isle of Man to UK Interconnector 2 to overlap with the Liverpool Bay SPA and result in disturbance to the designated

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	Wind Project concluded that the impact magnitude would be of local spatial extent, short-duration, intermittent and reversible. It was predicted that the impact would affect the receptor indirectly. The magnitude was therefore, considered to be low for all receptors and the impact significance minor. The assessments undertaken for the Awel y Môr offshore wind farm also concluded that any impacts would be temporary, short-term and small in extent. The assessments concluded that there was no potential for any indirect effects of an adverse significance to occur. Due to the length of the Isle of Man to UK Interconnector Cable and the relatively small area of overlap with the Transmission Assets, it is considered that the Interconnector Cable maintenance and remedial works are unlikely to overlap spatially and/or temporally with Transmission Assets during construction, operations and maintenance and/or decommissioning activities. In addition, both activities are short-term, localised and temporary in nature. The Transmission Assets impacts during all phases will be temporary and localised. It is not expected that there will be any detectable increase		features during maintenance activities. However, the is currently no information available regarding the cable route or corridor and therefore this cannot be accounted for in the in-combination assessment. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	in mortality, disturbance or displacement of common scoters or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during all phases in-combination with Tier 1, Tier 2 and Tier 3 plans and projects. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of common scoters from being maintained or restored.		

Table 1.65: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination temporary habitat loss/disturbance and increased SSCs during all project phases for Scenarios 1-3

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any**	The in-combination effects assessment for Scenario 1 considers: • the Transmission Assets; and • the Morecambe Offshore Windfarm: Generation Assets. The Morecambe Offshore Windfarm: Generation Assets determined that for benthic prey species, fish and shellfish the impacts from temporary habitat loss/disturbance and increased SSCs will be minor. The Transmission Assets assessment of temporary habitat loss/disturbance and increased SSCs for Liverpool Bay/Bae Lerpwl SPA, as set out in **section 1.5.3**, determined that there would be no potential for an adverse effect on integrity to the conservation objectives of any qualifying features. Therefore, any in-combination temporary habitat loss/disturbance and increased SSCs will be minor, localised and short-term. The Transmission Assets impacts will be temporary and localised. It is not	The in-combination effects assessment for Scenario 2 considers: • the Transmission Assets; and • the Morgan Offshore Wind Project: Generation Assets. The Morgan Offshore Wind Project: Generation Assets HRA screening ruled out LSEs for temporary habitat loss/disturbance during all project phases with regards to the Liverpool Bay/Bae Lerpwl SPA, both alone and in-combination. Red-breasted mergansers and cormorants were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments conducted for the project. As a result, the conclusions reached for the Transmission Assets alone are considered applicable to Scenario 2. The assessment conducted for the Transmission Assets concluded no	The in-combination effects assessment for Scenario 3 considers: • the Transmission Assets; • the Morecambe Offshore Windfarm: Generation Assets; and • the Morgan Offshore Wind Project: Generation Assets. Red-breasted mergansers and cormorants were not recorded in site-specific surveys undertaken to characterise the baseline at the Morgan Offshore Wind Project: Generation Assets and were therefore screened out of the assessments on conducted for the project on the basis that LSE could be excluded. The assessment conclusions for Scenario 3 are therefore identical to those concluded for Scenario 1. The assessment conducted for Scenario 3 concluded no adverse effects on the integrity of the SPA in relation to impacts on the non-breeding waterbird assemblage.

Conservation Objective	Scenario 1: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets	Scenario 2: Transmission Assets + Morgan Offshore Wind Project: Generation Assets	Scenario 3: Transmission Assets + Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets
existing anthropogenic influences impacting the extent and quality (including water quality).	expected that there will be any detectable increase in mortality of red-breasted mergansers and cormorants or their prey as a result of temporary habitat loss/disturbance and increased SSCs during all phases in-combination with Morecambe Offshore Windfarm: Generation Assets. Therefore, temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of red-breasted mergansers and cormorants from being maintained or restored.	adverse effects on the integrity of the SPA in relation to impacts on the non-breeding waterbird assemblage.	

Table 1.66: Assessment against the conservation objectives of the Liverpool Bay SPA for the non-breeding waterbird assemblage for in-combination temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs) during all project phases for Scenarios 4a-4c

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
Maintain the size of the non-breeding population at a level which is at or above 1,800 individuals (mean peak, 2015, 2018, 2019 and 2020). **Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.** **Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.** **Maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population.** **Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).**	The in-combination effects assessment for Scenario 4a considers: • Scenario 3 (Transmission Assets and Generation Assets); and • the Tier 1 projects listed in **Table 1.41**. The construction phase of the Transmission Assets will overlap with the construction or operation and maintenance phase of projects identified in Tier 1. Projects for which the construction phase may overlap with the Transmission Assets are the: - Mona Offshore Wind Project (Transmission Assets only) - Awel y Môr Offshore Wind Farm The operation and maintenance phase of the Transmission Assets will overlap with the operation and maintenance phase of all Tier 1 projects. Impacts associated with the plans and projects identified in **section 1.5.3** that may affect ornithological receptors are:	The in-combination effects assessment for Scenario 4b considers: • Scenario 4a; and • the Tier 2 projects listed in **Table 1.41**. As no Tier 2 projects have been identified as contributing to an in-combination impact alongside the Transmission Assets and those projects considered in Scenario 4a, the conclusions reached in Scenario 4a are also applicable to Scenario 4b. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.	The in-combination effects assessment for Scenario 4c considers: • Scenario 4b; and • the Tier 3 projects listed in **Table 1.41.** In addition to those projects considered as part of Scenario 4b, Scenario 4c also considers impacts associated with the MaresConnect – Wales to Ireland Interconnector cable. The MaresConnect cable project will commence in 2025 and consists of a subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain. The operation and maintenance and decommissioning phases of this project will temporally overlap with the construction and operation and maintenance phases of the Transmission Assets. The MaresConnect Interconnector Supporting Information for Screening for Appropriate Assessments (MaresConnect, 2023) ruled out any pathways to any effects of the Liverpool Bay/Bae Lerpwl SPA and/or it's qualifying features (including red-

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	• temporary habitat loss and disturbance from installation and maintenance operations; and • disturbance/remobilisation of sediment-bound contaminants during installation and maintenance activities. The spatial scale of activities associated with all projects identified in Tier 1 are limited representing negligible proportions of the area available for all receptors for foraging, roosting and other maintenance behaviours. The majority of offshore renewables projects that may overlap temporally with the Transmission Assets are in the operations phase where activities that may cause temporary habitat loss/disturbance and increased SSCs are reduced, when compared to the construction or decommissioning phases. Any activities that may result in impacts are limited in number, intermittent and will occur over short time periods and are highly unlikely to be significant for any offshore ornithological receptor. The project timeframes of the Mona Offshore Wind Project, Awel y Môr Offshore Wind Farm will overlap with the project timeframes of the Transmission Assets. Assessments undertaken for the Mona Offshore		breasted merganser and cormorant). Therefore, the conclusions for Scenario 4c will be the same as concluded for Scenario 4a. The Isle of Man to UK Interconnector 2 may be under construction during the Transmission Assets, Morgan Offshore Wind Project: Generation Assets and Morecambe Offshore Windfarm: Generation Assets construction phases. There is currently very limited information available on this project however it is understood that the project is likely to commence construction from 2030 (Manx Utilities, 2023). The Mooir Vannin – UK Transmission Assets are likely to be constructed and become operational in the operation and maintenance phase of the Transmission Assets. Based on current information the Mooir Vannin – UK Transmission Assets is likely to comprise multiple HVAC or HVDC cables, with a grid connection at Penwortham, and could potentially include a booster station if HVAC cables are utilised (Mooir Vannin Offshore Wind Farm Limited, 2024). There is the potential for both the Mooir Vannin – UK Transmission Assets and the Isle of Man to UK Interconnector 2 to overlap with the Liverpool Bay SPA and result in disturbance to the designated

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	Wind Project concluded that the impact magnitude would be of local spatial extent, short-duration, intermittent and reversible. It was predicted that the impact would affect the receptor indirectly. The magnitude was therefore, considered to be low for all receptors and the impact significance minor. The assessments undertaken for the Awel y Môr offshore wind farm also concluded that any impacts would be temporary, short-term and small in extent. The assessments concluded that there was no potential for any indirect effects of an adverse significance to occur. Due to the length of the Isle of Man to UK Interconnector Cable and the relatively small area of overlap with the Transmission Assets, it is considered that the Interconnector Cable maintenance and remedial works are unlikely to overlap spatially and/or temporally with Transmission Assets during construction, operations and maintenance and/or decommissioning activities. In addition, both activities are short-term, localised and temporary in nature. The Transmission Assets impacts during all phases will be temporary and localised. It is not expected that there will be any detectable increase		features during maintenance activities. However, the is currently no information available regarding the cable route or corridor and therefore this cannot be accounted for in the in-combination assessment. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.

Conservation Objective	Scenario 4a: Scenario 3 (Transmission Assets and Generation Assets) +Tier 1	Scenario 4b: Scenario 4a + Tier 2	Scenario 4c: Scenario 4b + Tier 3
	in mortality, disturbance or displacement of any of the assemblage features or their prey as a result of indirect impacts from temporary habitat loss/disturbance and increased SSCs during all phases in-combination with Tier 1 plans and projects. Therefore, indirect impacts from temporary habitat loss/disturbance and increased SSCs will not prevent the population, distribution or prey availability of the waterbird assemblage features from being maintained or restored.		

1.6 Assessment of potential adverse effects on integrity: onshore and intertidal ornithological features

1.6.1.1 The HRA Stage 1 Screening Report (document reference: E3) identified the potential for LSEs on the seven SPA and Ramsar sites designated for the ornithological features listed in **Table 1.3**.

1.6.1.2 LSEs on these SPA and Ramsar sites were identified for the following potential impacts.

- During the construction and decommissioning phases.
  - Permanent loss of supporting habitats.
  - Temporary loss of supporting habitats and/or resource availability.
  - Disturbance and displacement from activities associated with construction and decommissioning.
- During the operation and maintenance phase.
  - Temporary loss of supporting habitats and/or resource availability.
  - Disturbance and displacement from activities associated with, operation and maintenance.
  - In-combination effects.

1.6.1.3 This section presents the information to inform an Appropriate Assessment (considering effects both alone and in-combination) for each designated site. A summary of all assessments undertaken within this report is provided in the concluding section of this report (**section 1.6**).

1.6.2 Baseline information

1.6.2.1 Baseline information on the onshore and intertidal ornithological features of the SPA and Ramsar sites identified for further assessment within the HRA process has been gathered through a comprehensive desktop study of existing studies and datasets and supported by site-specific survey data, full details of which are presented within Volume 3, Chapter 4: onshore and intertidal ornithology of the ES (document reference: F3.4). For further details on survey methodologies and monthly count data see Volume 3. Annex 4.1: Breeding birds of the ES, Volume 3. Annex 4.2: Wintering and migratory birds of the ES, Volume 3. Annex 4.3: Intertidal birds of the ES, and Volume 3. Annex 4.4: Onshore and intertidal ornithology methodologies (document references F3.4.1, F3.4.2, F3.4.3, and F3.4.4).

1.6.2.2 All SPA features recorded as part of the site-specific surveys are shown in **Table 1.67** alongside the two-year peak count recorded from the site-specific surveys. The peak counts for each feature are shown in **Appendix A** with the monthly count data in **Appendix B** and the seasonality of the features with relevance to the SPAs is shown in **Appendix C**.

1.6.2.3 Where features were designated for both passage and wintering the passage season was taken as April to October and the wintering as November to March (Stroud *et al*., 2016).

1.6.2.4 Breeding season counts were taken over the protracted season (between March/April to August/September) as per the SPA guidance (**Appendix C**). Nonetheless, for some species such as sandwich tern, and common tern that were only observed in low numbers during the egg laying and chick rearing period (for full details see Volume 3, Annex 4.3: Intertidal ornithology, document reference: F3.4.3), the August peak counts reported in **Table 1.67** are likely to represent post breeding passage birds.

1.6.2.5 As no apportioning was undertaken, and many of the SPAs and Ramsar sites share features, there is uncertainty regarding the origin of some birds. For this assessment a precautionary approach has been taken and it is assumed that 100% of the birds originated from each site in turn. In reality this is impossible, e.g., the 353 lesser black-backed gull reported in **Table 1.67** cannot all belong to the Ribble and Alt SPA, Morecambe Bay and Duddon Estuary SPA and Ramsar, and the Bowland Fells SPA. However, due to the uncertainty regarding the origin of the birds each site is assessed using this precautionary basis.

1.6.2.6 Full details on the peak counts reported in **Table 1.67**, **Appendix A** and **Appendix B** can be found in Volume 3, Annex 4.1: Onshore and intertidal ornithology - breeding birds technical report of the ES (document reference: F3.4.1), Volume 3, Annex 4.2: Onshore and intertidal ornithology - wintering and migratory birds technical report of the ES (document reference: F3.4.2), and Volume 3, Annex 4.3: Onshore and intertidal ornithology – intertidal birds technical report of the ES (document reference: F3.4.3), with all monthly count data reported in Appendices of these reports for clarity.

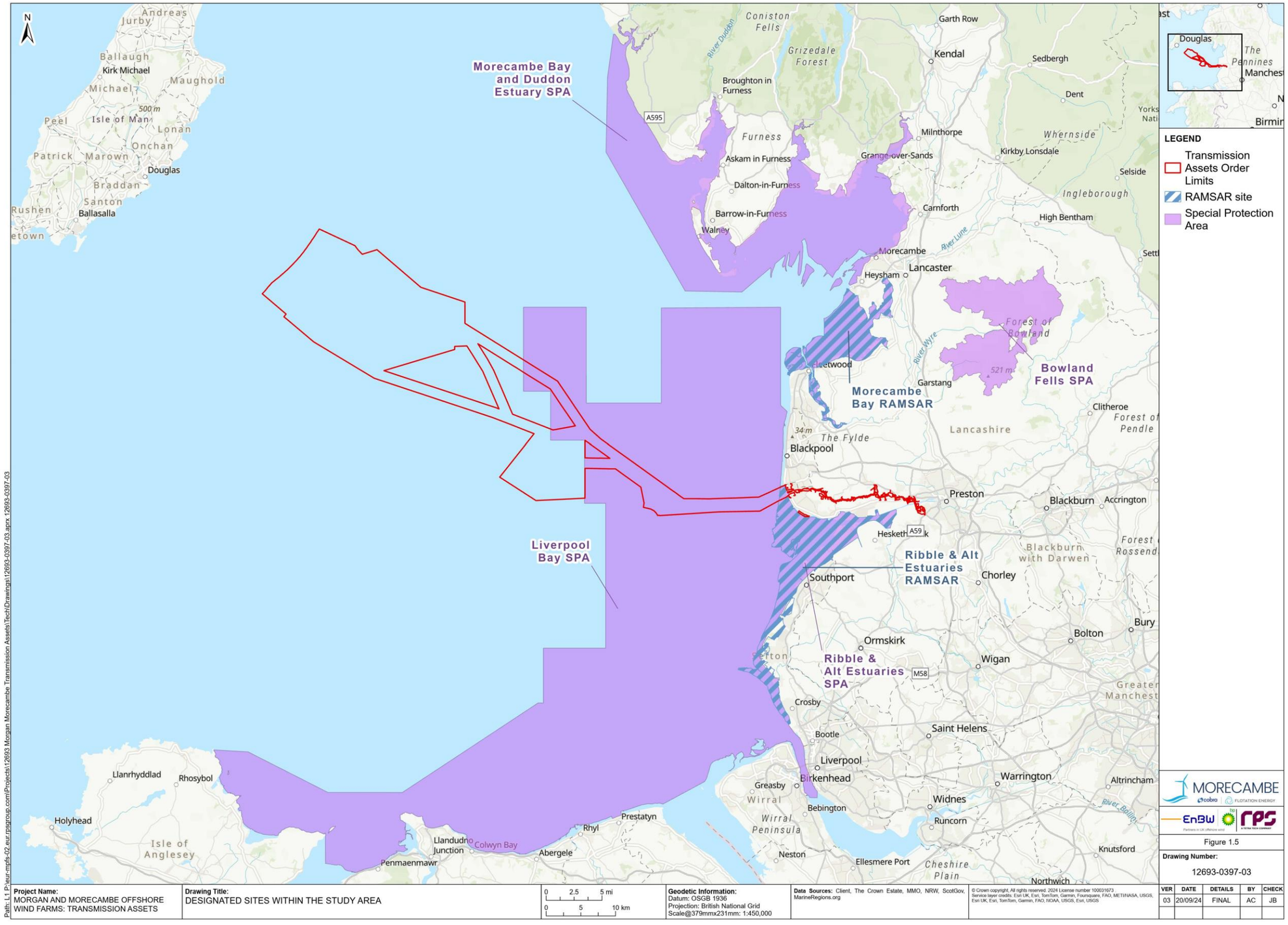

Figure 1.5: SPA and Ramsar sites of relevance to the Transmission Assets onshore and intertidal ornithology assessment

Table 1.67: The citation counts and the peak count recorded during the site-specific surveys (Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference: F3.4)). Proportion of peak count from SPA populations (using citation counts) are shown within bracket

Species	Two year survey peak count	Citation counts in number of individuals (site-specific surveys peak count as a percentage of citation count)								
		Liverpool Bay/Bae Lerpwl SPA (2004/2005 to 2010/2011)	Ribble and Alt Estuaries SPA (1993/1994 to 1997/1998)	Ribble and Alt Ramsar (1998/1999 to 2002/2003	Morecambe Bay and Duddon Estuary SPA (2009/2010 to 2013/2014)	Morecambe Bay Ramsar (1991/1992 to 1995/1996)	Martin Mere SPA (1984)	Martin Mere Ramsar (1985)	Bowland Fells SPA (2009 to 2012)	Latest population estimate
Pink-footed goose (wintering)	**8,319**	N/A	11,764 (70.72%)	6,552 (126.97%)	15,648 (56.16%)	2,475 (336.12%)	18,000 (46.22%)	8,186 (101.62%)	N/A	55,686 [1] (14.9%)
Whooper swan (wintering)	**132**	N/A	182 (72.53%)	211 (62.56%)	N/A	N/A	N/A	N/A	N/A	711 [2] (18.57%)
Shelduck (wintering)	**374**	N/A	4,925 (7.59%)	N/A	N/A	N/A	N/A	N/A	N/A	5,050 [2] (7.41%)
Wigeon (wintering)	**1,647**	N/A	85,259 (1.93%)	69,841 (2.36%)	N/A	N/A	N/A	N/A	N/A	51,178 [2] (3.22%)
Teal (wintering)	**312**	N/A	7,157 (4.36%)	5,107 (6.11%)	N/A	N/A	N/A	N/A	N/A	8,556 [2] (3.65%)
Common scoter (non-breeding)	**4,000**	56,679 (7.06%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	141,801 [3] (2.82%)
Oystercatcher (wintering)	**1,073**	N/A	18,535 (5.79%)	18,926 (5.67%)	N/A	N/A	N/A	N/A	N/A	16,165 [2] (6.64%)
Ringed plover (passage)	**93**	N/A	1,657 (5.61%)	3,761 (2.47%)	N/A	N/A	N/A	N/A	N/A	4334 [2] (2.15%)
Golden plover (wintering)	**381**	N/A	3,598 (10.59%)	3,588 (10.62%)	1,900 (20.05%)	4,097 (9.30%)	N/A	N/A	N/A	5,038 [2] (7.56%)
Grey plover (wintering)	**118**	N/A	9,355 (1.26%)	11,021 (1.07%)	N/A	N/A	N/A	N/A	N/A	4,929 [2] (2.39%)
Curlew (wintering)	**696**	N/A	N/A	N/A	12,209 (5.7%)	13,620 (5.11%)	N/A	N/A	N/A	2,644 [2] (26.32%)
Bar-tailed godwit (wintering)	**625**	N/A	20,086 (3.11%)	13,935 (4.49%)	N/A	N/A	N/A	N/A	N/A	5,842 [2] (10.70%)
Black-tailed godwit (passage)	**137**	N/A	N/A	3,323 (4.12%)	N/A	N/A	N/A	N/A	N/A	4,522 [2] (3.03%)
Black-tailed godwit (wintering)	**423**	N/A	1,273 (33.23%)	N/A	N/A	N/A	N/A	N/A	N/A	4,522 [2] (9.35%)
Ruff (breeding)	**0**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dunlin (passage)	**1,031**	N/A	N/A	38,196 (2.70%)	N/A	N/A	N/A	N/A	N/A	57,757 [2] (1.79%)
Dunlin (wintering)	**4,200**	N/A	39,376 (10.67%)	N/A	N/A	N/A	N/A	N/A	N/A	57,757 [2] (7.27%)
Sanderling (passage)	**2,134**	N/A	6,535 (32.65%)	7,401 (28.83%)	N/A	N/A	N/A	N/A	N/A	8,016 [2] (26.62%)
Sanderling (wintering)	**4,702**	N/A	2,882 (163.15%)	N/A	N/A	N/A	N/A	N/A	N/A	8,016 [2] (58.66%)
Knot (wintering)	**370**	N/A	68,922 (0.54%)	42,692 (0.87%)	N/A	N/A	N/A	N/A	N/A	49,569 [2] (0.75%)
Redshank (passage)	**14**	N/A	3,247 (0.43%)	4,465 (0.31%)	N/A	N/A	N/A	N/A	N/A	2,470 [2] (0.61%)
Redshank (wintering)	**70**	N/A	2,505 (2.79%)	N/A	N/A	N/A	N/A	N/A	N/A	2,470 [2] (2.83%)
Herring gull (breeding)	**1,600**	N/A	N/A	N/A	20,000 (8%)	22,000 (7.27%)	N/A	N/A	N/A	3,426 [4] (46.70%)
Lesser black-backed gull (breeding)	**353**	N/A	3,600 (9.81%)	N/A	9,720 (3.63%)	44,000 (0.80%)	N/A	N/A	9,150 (3.86%)	35,616 [4] (0.99%)

Species	Two year survey peak count	Citation counts in number of individuals (site-specific surveys peak count as a percentage of citation count)								
		Liverpool Bay/Bae Lerpwl SPA (2004/2005 to 2010/2011)	Ribble and Alt Estuaries SPA (1993/1994 to 1997/1998)	Ribble and Alt Ramsar (1998/1999 to 2002/2003	Morecambe Bay and Duddon Estuary SPA (2009/2010 to 2013/2014)	Morecambe Bay Ramsar (1991/1992 to 1995/1996)	Martin Mere SPA (1984)	Martin Mere Ramsar (1985)	Bowland Fells SPA (2009 to 2012)	Latest population estimate
Lesser black-backed gull (non-breeding)	**205**	N/A	N/A	N/A	9,450 (2.17%)	N/A	N/A	N/A	N/A	N/A
Sandwich tern (breeding)	**427**	N/A	N/A	N/A	1,608 (26.55%)	580 (73.62%)	N/A	N/A	N/A	1,178 [4] (36.25%)
Common tern (breeding)	**90**	360 (25%)	364 (24.73%)	364 (24.73%)	N/A	N/A	N/A	N/A	N/A	118 [4] (76.27%)
Red-throated diver (non-breeding)	**14**	1,171 (1.20%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,800 [3] (0.78%)
Non-breeding assemblage	**25,736**	N/A	323,861 (7.95)*	N/A	N/A	N/A	N/A	N/A	N/A	329,952 [2] (7.80%)
Breeding assemblage	**2,370**	N/A	29,236 (8.11)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*% of Ribble and Alt Estuaries SPA assemblage features only. [1] Devenish *et al*., 2015. [2] 2018/2019 – 2022/2023 WeBS five-year average for the Ribble and Alt estuaries. [3] HiDef Aerial Surveying, 2023 based on counts between 2015 - 2020. [4] The most recent summed colony counts for the relevant SPAs (mean max from Woodward, *et al*. 2019)

'*Data were provided by the Seabird Monitoring Programme, a Scheme funded jointly by the British Trust for Ornithology and Joint Nature Conservation Committee, in association with the Royal Society for the Protection of Birds, with fieldwork conducted by both non-professional and professional surveyors.*

Liverpool Bay/Bae Lerpwl SPA

Site description

1.6.2.7 The Liverpool Bay/Bae Lerpwl SPA is situated in the east of the Irish Sea, bordering the north west of England and the north of Wales, and running as a broad arc from Morecambe Bay to the east coast of Anglesey. The Liverpool Bay/Bae Lerpwl SPA is located within the Transmission Assets Order Limits: Offshore (hereafter referred to as Offshore Order Limits). The seabed of Liverpool Bay/Bae Lerpwl SPA contains a wide range of mobile sediments. Sand is the most common substrate, with a concentrated area of gravelly sand located off the Mersey Estuary.

1.6.2.8 The Liverpool Bay/Bae Lerpwl SPA was designated by the UK Government to meet obligations set out in the Birds Directive (2009/147/EC) and is protected by the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).

1.6.2.9 It covers an area of approximately 2,528 km^2, designated for the protection of red-throated diver, common scoter, and little gull during the non-breeding season as well as a waterbird assemblage (including red-breasted merganser and cormorant), and foraging areas for little tern and common tern breeding within coastal SPAs.

1.6.2.10 Although the SPA is located within the Offshore Order Limits, the features of the SPA may use habitats located within the Transmission Asset Order Limits: Onshore (hereafter referred to as Onshore Order Limits) and the Intertidal Infrastructure Area. This creates the potential for impact upon the features of this designated site, the assessment of which is presented within **section 1.6.3**.

1.6.2.11 Little gull were not recorded during any of the site-specific surveys (see Volume 3, Annex 4.1: Onshore and intertidal ornithology - breeding birds technical report of the ES (document reference: F3.4.1), Volume 3, Annex 4.2: Onshore and intertidal ornithology - wintering and migratory birds technical report of the ES (document reference: F3.4.2), and Volume 3, Annex 4.3: Onshore and intertidal ornithology - intertidal birds technical report of the ES (document reference: F3.4.3) for further details) and are therefore not considered further. Little tern has been excluded from the onshore and intertidal ornithology assessment of the Transmission Assets as the closest breeding colony (at the Point of Ayr/Gronant Dunes) is not within the species maximum foraging range of 5 km (Woodward *et al*., 2019) of the Onshore Order Limits and Intertidal Infrastructure Area.

Feature accounts

Common scoter (non-breeding)

1.6.2.12 At the time of its designation in 2010, 54,675 non-breeding common scoter were thought to be present within the Liverpool Bay (Webb *et al*., 2006). Although the SPA was extended in 2017, the number of common scoter estimated to be in the Liverpool Bay/Bae Lerpwl SPA has increased to 141,801 individuals based on a four-year peak from surveys between 2015 and 2020 (HiDef Aerial Surveying, 2023).

1.6.2.13 Non-breeding common scoter are likely to be present year-round, except for June (Natural England *et al.*, 2022) where they feed on molluscs, crustaceans and worms in subtidal and intertidal habitats less than 20 m deep (Kaiser *et al*., 2006).

1.6.2.14 Although common scoter can be more flexible in their habitat use during the non-breeding season, they are considered to be very vulnerable to disturbance and displacement (Bradbury *et al*., 2014). Maximum distances that trigger disturbance responses for common scoter varied between 2,000 m as reported by Kaiser *et al*. (2006), and 3,200 m reported by Schwemmer *et al*. (2011). During the site-specific surveys a peak of 4,000 common scoter were recorded. This represents 2.82% of the current SPA population (**Table 1.67**).

Condition assessment

1.6.2.15 Natural England, NRW and the JNCC published a Liverpool Bay/Bae Lerpwl SPA Conservation Advice package in December 2022 (Natural England, 2022).

1.6.2.16 The conservation advice package sets targets (see below), all of which are to maintain attributes. The Conservation Advice Package states that '*"Maintain" is used here because existing evidence suggests the feature to be in favourable condition for each attribute with a maintain target, and the objective is for it to remain so'*.

1.6.2.17 Therefore, the wintering population of common scoter within the Liverpool Bay/Bae Lerpwl SPA is in favourable condition.

Conservation objectives

1.6.2.18 The relevant conservation targets for common scoter within the Liverpool Bay/Bae Lerpwl SPA are to:

- maintain the size of the breeding population at a level which is at or above 141,801 individuals (mean peak 2015, 2018, 2019 and 2020);
- maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors;
- minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected;

- maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population; and
- maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).

Common tern (breeding)

1.6.2.19 Common tern are listed in Annex 1 of the European Council Directive 2009/147/EC (otherwise known as the Birds Directive). The Liverpool Bay/Bae Lerpwl SPA common tern breed within the Mersey Narrows and North Wirral Foreshore SPA. The five-year mean used to classify this site, derived from Seabird Monitoring Programme (SMP) data, is 180 pairs (2011 to 2015). This represented 1.80% of the British total of 10,000 pairs. The SPA thus offers protection of foraging areas to a significant proportion of common tern breeding in Great Britain.

1.6.2.20 Within Liverpool Bay/Bae Lerpwl SPA, common tern use intertidal habitats when inundated, as well as the deeper water column for foraging. Key foraging areas within the SPA include shallow subtidal waters, generally within 18 km of breeding colonies, and especially in areas of high velocity water flow (Woodward *et al*., 2019; Eglington and Perrow, 2014; Thaxter *et al*., 2012). Woodward *et al*. (2019) reported the mean maximum foraging range for common terns to be 18.09 (± 8.9) km. The coastal waters of the SPA are also used by birds for other activities such as bathing, loafing and preening. Common tern foraging in the site are also known to use supporting habitat within the Mersey Narrows and North Wirral Foreshore SPA and the Ribble and Alt Estuaries SPA (Natural England *et al.*, 2016).

1.6.2.21 During the site-specific surveys, a maximum count of 90 birds used the intertidal area within the coastal survey area (the area where the cable will make landfall) during one survey visit. This represents 25% of the Liverpool Bay/Bae Lerpwl SPA citation, although these birds were recorded in August and may have been made up of post breeding passage birds.

Condition assessment

1.6.2.22 Natural England, NRW and the JNCC published a Liverpool Bay/Bae Lerpwl SPA Conservation Advice package in December 2022 (Natural England, 2022).

1.6.2.23 The conservation advice package sets targets (see below), all of which are to maintain attributes. The Conservation Advice Package states that *'"Maintain" is used here because existing evidence suggests the feature to be in favourable condition for each attribute with a maintain target, and the objective is for it to remain so'*.

1.6.2.24 Therefore, the population of common tern within the Liverpool Bay/Bae Lerpwl SPA is in favourable condition.

Conservation objectives

1.6.2.25 The relevant conservation targets for common tern within the Liverpool Bay/Bae Lerpwl SPA are to:

- maintain the size of the breeding population at a level which is at or above 180 pairs (2011 to 2015);
- maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors;
- minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected;
- maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population;
- maintain safe passage of birds moving between nesting and feeding areas; and
- maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).

Red-throated diver (non-breeding)

1.6.2.26 At the time of its designation in 2010 there was an estimated 922 non-breeding red-throated divers using the Liverpool Bay (Webb *et al*., 2006). This has increased to a four-year mean of 1,800 individuals (HiDef Aerial Surveying, 2023).

1.6.2.27 They are generally present between October and April (Natural England *et al*., 2022), although the core winter months between November and March are of principle importance, and they primarily feed on small fish in the water column at depths of up to 30 m (Duckworth *et al.,* 2021).

1.6.2.28 Red-throated diver are highly susceptible to displacement (Bradbury *et al*., 2014) with a mean distance at which disturbance responses were noted of 1,200 m (Laursen *et al*., 2017).During the site-specific surveys 14 red-throated diver were recorded. This represents 0.78% of the current SPA population.

Condition assessment

1.6.2.29 Natural England, NRW and the JNCC published a Liverpool Bay/Bae Lerpwl SPA Conservation Advice package in December 2022 (Natural England, et al., 2022).

1.6.2.30 The Conservation Advice Package states that the interest feature red-throated diver will be considered to be in favourable condition only when each of the following three conditions are met.

- The red-throated diver population shows only non-significant fluctuation around the mean population at the time of classification of the SPA, with due consideration to the potential for natural change.

- Red-throated diver distribution and ability to use the site does not significantly change (subject to natural fluctuations and variation).
- The extent and distribution of the supporting habitat available to the red-throated diver population within the site, including its structure, function and supporting processes, is maintained.

1.6.2.31 The Conservation Advice Package sets targets (see below), including targets to restore the distribution of red-throated divers and their suitable habitats within the SPA, due to displacement from large infrastructure, such as windfarms. This indicates that Natural England, NRW and JNCC consider the distribution of red-throated diver to be unfavourable, and therefore consider the overall condition of this interest feature to be unfavourable, even though the overall wintering red-throated diver population of the SPA (i.e., the number of birds) is favourable.

1.6.2.32 Therefore, the wintering population of red-throated divers within the Liverpool Bay/Bae Lerpwl SPA is in unfavourable condition.

Conservation objectives

1.6.2.33 The relevant conservation targets for red-throated diver within the Liverpool Bay/Bae Lerpwl SPA are:

- to maintain the size of the breeding population at a level which is at or above 1,800 individuals (mean peak 2015, 2018, 2019 and 2020);
- restore the distribution of the feature; the extent should not be reduced by anthropogenic factors;
- minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected;
- maintain the distribution, abundance and availability of key food and prey items (e.g. fish) to maintain the population; and
- restore the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).

Ribble and Alt Estuaries SPA

Site description

1.6.2.34 The Ribble and Alt Estuaries SPA is composed of extensive intertidal mud and sandflats and large areas of saltmarsh. Part of the Ribble and Alt Estuaries SPA is located within the Intertidal Infrastructure Area. The inner mud flats of the Ribble Estuary are bordered large areas of saltmarsh on the high shore. The outer flats of the Ribble Estuary are sandy. They run south as a wide sandy shore along the Sefton Coast, merging into the Alt Estuary and extending as far south as Crosby. There is a large area of developing saltmarsh at Southport extending north. The intertidal sandflats on the Sefton Coast are extensive and have the highest exposure to wave action. The

central flats of the Alt Estuary are also sandy but with a higher mud content, and a small saltmarsh on the east bank of the channel.

1.6.2.35 The large areas of intertidal sand and mudflats are submerged at high tide and exposed at low tide. They provide an important feeding habitat for specialist waterbirds. The estuary also provides extensive roosting sites for large populations of waders and wildfowl. It is of major importance during the winter for wildfowl and wader species and for supporting wader populations moving along the west coast of Britain during the spring and autumn migration periods.

Feature accounts

Pink-footed goose (winter)

1.6.2.36 Pink-footed goose are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 11,764 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt estuaries indicate an increase in population to 38,775 (five-year peak mean between 2017/2018 to 2021/2022).

1.6.2.37 Pink-footed goose within the north west of England form a “metapopulation” with high levels of interchange as the species uses the FLL between several SPAs in the region for which the species if designated (Devenish *et al*., 2015 and Bowland Ecology, 2021).

1.6.2.38 During the site specific surveys, the peak count in a single month was 8,319 birds using the agricultural land for foraging and/or loafing. The largest concentrations of pink-footed goose were found around the FLL at Lytham Moss. This represents 70.72% of the SPA citation, 21.45% of the current WeBS estimate or 14.9% of the north west England meta population from Devenish *et al*. (2015).

Whooper swan (winter)

1.6.2.39 Whooper swan are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 182 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary show an increase since the late 1990s with 711 individuals (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.40 During the site-specific surveys whooper swan were recorded using the agricultural land along the onshore export cable corridor. A two-year peak count of 132 birds was recorded. This represents approximately 72.53% of the SPA citation and 18.57% of the most recent WeBS counts.

Shelduck (winter)

1.6.2.41 Shelduck are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 4,925 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt estuaries reported a stable population of 5,050 individuals (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.42 During the site-specific surveys a peak of 374 shelduck were recorded. This represents approximately 7.59% of the SPA citation and 7.41% of the most recent WeBS count.

Wigeon (winter)

1.6.2.43 Wigeon are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 85,259 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt estuaries reported a decline in population to 51,178 individuals (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.44 During the site-specific surveys a peak count of 1,647 birds was recorded. The wigeon were found in similar locations to the teal. This represents 1.93% of the SPA citation or 3.22% of the current WeBS estimate.

Teal (winter)

1.6.2.45 Teal are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 7,157 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt Estuaries report an increase in population to 8,556 individuals (five-year peak mean between 2017/2018 to 2021/2022).

1.6.2.46 During the site-specific surveys up to 312 teal were recorded and the species showed a preference to the area of the south of Newton with Scales, Newton Marsh, and the River Ribble. This represents 4.36% of the SPA citation and 3.65% of the most recent WeBS counts.

Oystercatcher (winter)

1.6.2.47 Oystercatcher are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 18,535 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt estuaries reported a slight decline to 16,165 individuals (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.48 During the site-specific surveys the peak count of oystercatcher was 1,073 birds, this was recorded at the landfall although lower numbers were found at the River Ribble crossing. This represents approximately 5.79% of the SPA citation value and 6.64% of the most recent WeBS counts.

Ringed plover (passage)

1.6.2.49 Ringed plover are a passage feature of the Ribble and Alt Estuaries SPA with a five-year peak mean of 1,657 birds during passage (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary reported an increase in population to 4,334 individuals (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.50 During the site-specific surveys a peak of 93 ringed plover were recorded at the landfall during passage. This represents approximately 5.61% of the SPA citation and 2.15% of the most recent WeBS counts.

Golden plover (winter)

1.6.2.51 Golden plover are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 3,598 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt estuaries reported an increase to 5,038 birds (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.52 During the site-specific surveys the peak count of golden plover were 381 recorded within along the onshore export cable corridor. This represents 10.59% of the SPA citation or 7.56% of the current WeBS count.

Grey plover (winter)

1.6.2.53 Grey plover are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 9,355 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary reported a decline to 4,929 birds (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.54 During the site-specific surveys a peak count of 118 birds were recorded at the landfall. This represents approximately 1.26% of the SPA citation and 2.39% of the most recent WeBS counts.

Bar-tailed godwit (winter)

1.6.2.55 Bar-tailed godwit are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 20,086 birds (1993/1994 to 1997/1998). The latest WeBS data for the Alt Estuary and Ribble Estuary reported a decline to 5,842 birds (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.56 During the site-specific surveys bar-tailed godwit were restricted to the coastal survey area within the Ribble and Alt Estuaries SPA. A peak count of 625 was recorded. The peak count represents approximately 3.11% of the SPA citation value and 10.70% of the most recent WeBS counts.

Black-tailed godwit (winter)

1.6.2.57 Wintering black-tailed godwit are a feature of the Ribble and Alt Estuaries SPA with a five-year peak mean of 1,273 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary reported an increase to 4,522 birds (five-year peak mean between 2017/2018 to 2021/2022).

1.6.2.58 During the site-specific surveys black-tailed godwit were recorded within agricultural and pastoral land to the north and south of the Ribble. A peak count of 423 birds was recorded during the winter period.

1.6.2.59 The peak count represents approximately 33.23% of the SPA citation value and 9.35% of the most recent WeBS count.

Ruff (breeding)

1.6.2.60 Ruff are a feature of the Ribble and Alt Estuaries SPA during the breeding period with an estimated population of two birds (one pair) in the late 1980s.

1.6.2.61 During the site-specific surveys no ruff were recorded during the breeding season. This species is therefore not considered further in this assessment.

Dunlin (winter)

1.6.2.62 Dunlin are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 39,376 (1998/1999 to 2002/2003). The latest WeBS data for the Ribble and Alt estuaries reported an increase in population to 57,757 birds (five-year peak mean between 2017/2018 to 2021/2022).

1.6.2.63 During the site-specific surveys a peak count of 4,200 was recorded. This represents approximately 10.67% of the citation value and 7.27% of the most recent WeBS counts.

Sanderling (passage)

1.6.2.64 Sanderling are a feature of the Ribble and Alt Estuaries SPA during the passage period with a five-year peak mean of 6,535 (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt Estuaries reported an increase in population to 8,016 birds (five-year peak mean between 2018/2019 to 2022/2023). The WeBS site mean of peak cannot be apportioned to seasons (i.e., passage or winter).

1.6.2.65 During the site-specific surveys a peak count of 2,134 birds were recorded at the landfall during the passage period. This represents approximately 32.65% of the citation value and 26.62% of the most recent WeBS counts.

Sanderling (winter)

1.6.2.66 Sanderling are also a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 2,882 (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt Estuaries reported an increase in population to 8,016 birds (five-year peak mean between 2018/2019 to 2022/2023). The WeBS data cannot be apportioned to seasons (i.e., winter or passage).

1.6.2.67 During the site-specific surveys a peak count of 4,702 birds were recorded at the landfall during the winter period. This largely exceeds the citation value and represents 58.66% of the most recent WeBS counts.

Knot (winter)

1.6.2.68 Knot are a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 68,922 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary reported a decline in population to 49,569 birds (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.69 During the site-specific surveys a peak count of 370 birds was recorded. This represents approximately 0.54% of the SPA citation and 0.75% of the most recent WeBS counts.

Redshank (passage)

1.6.2.70 Redshank are a feature of the Ribble and Alt Estuaries SPA during the passage period with a five-year peak mean of 3,247 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary reported a decline in population to 2,470 birds (five-year peak mean between 2018/2019 to 2022/2023). Winter or passage populations are not presented in the WeBS data.

1.6.2.71 During the site-specific surveys a peak count of 14 redshank was recorded during the passage period. This represents 0.43% of the SPA citation count or 0.57% of the current WeBS estimate.

Redshank (winter)

1.6.2.72 Redshank are also a feature of the Ribble and Alt Estuaries SPA during the winter period with a five-year peak mean of 2,505 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble Estuary and the Alt Estuary reported a decline in population to 2,470 birds (five-year peak mean between 2018/2019 to 2022/2023). Winter or passage populations are not presented in the WeBS data.

1.6.2.73 During the site-specific surveys a peak of 70 redshank were recorded during the winter period. This represents approximately 2.79% of the citation value or 2.83% of the most recent WeBS counts.

Lesser black-backed gull (breeding)

1.6.2.74 Lesser black-backed gull are a feature of the Ribble and Alt Estuaries SPA during the breeding period with a citation population of 3,600 birds (1,800 pairs) in 1993. The lesser black-backed gull colony is located on Banks Marsh. The latest SMP data for the Ribble Estuary reported an increase to 2,319 nests in 2023 inferring 4,638 breeding adults.

1.6.2.75 During the site-specific surveys, a peak of 353 birds occurred in August 2022. This represents approximately 9.81% of the SPA citation value and 7.61% of the most recent SMP counts.

Common tern (breeding)

1.6.2.76 Common tern are a feature of the Ribble and Alt Estuaries SPA during the breeding period with an estimated population of 364 birds (182 pairs) in 1996. The latest SMP data indicates that the colony situated within the SPA may no longer be in use and the current population using the SPA for foraging consists of a number of small colonies situated outside of the SPA.

1.6.2.77 During the site-specific surveys, a maximum count of 90 birds used the intertidal and subtidal areas at the landfall. This represents approximately 24.73% of the Ribble and Alt Estuaries SPA citation count.

Non-breeding waterbird assemblage

1.6.2.78 The non-breeding waterbird assemblage are a feature of the Ribble and Alt Estuaries SPA with a five-year peak mean of 323,861 birds (1993/1994 to 1997/1998). The latest WeBS data for the Ribble and Alt estuaries indicate a relatively stable population of 329,952 (five-year peak mean between 2018/2019 to 2022/2023 estimated by summing the five-year mean peaks for all features and assemblage features for both the Ribble estuary and the Alt estuary WeBS sites).

1.6.2.79 During the site-specific surveys a peak count of 25,736 assemblage birds was recorded. This represents 7.95% of the citation count or 7.8% of the current WeBS estimate.

Breeding seabird assemblage

1.6.2.80 The breeding seabird assemblage are a feature of the Ribble and Alt Estuaries SPA with a five-year peak mean of 29,236 birds (1993/1994 to 1997/1998). There is no current reliable population estimate of the breeding assemblage.

1.6.2.81 During the site-specific surveys a peak count of 2,370 assemblage birds was recorded. This represents 8.11% of the citation count.

Condition assessment

1.6.2.82 There is no condition assessment available for the relevant intertidal ornithological features of the Ribble and Alt Estuaries SPA although the latest WeBS and SMP estimates (as reported) indicate if the populations are stable, increasing, or declining.

Conservation objectives

1.6.2.83 The conservation objectives for the Ribble and Alt Estuaries SPA are to:

- maintain or restore the extent and distribution of the habitats of the qualifying features;
- maintain or restore the structure and function of the habitats of the qualifying features;
- maintain or restore the supporting processes on which the habitats of the qualifying features rely;
- maintain or restore the population of each of the qualifying features; and
- maintain or restore the distribution of the qualifying features within the site.

Ribble and Alt Estuaries Ramsar site

Site Description

1.6.2.84 The Ribble and Alt Estuaries Ramsar site covers largely the same area as the SPA and is composed of extensive intertidal mud and sandflats and large

areas of saltmarsh. In addition, some of the Sefton Coast SAC sand dunes are included, although this is more for vegetation and amphibian interests rather than birds.

1.6.2.85 The large areas of intertidal sand and mudflats are submerged at high tide and exposed at low tide. They provide an important feeding habitat for birds. The estuary also provides extensive roosting sites for large populations of waterbirds. It is of major importance during the winter for wildfowl and wader species and for supporting wader populations moving along the west coast of Britain during the spring and autumn migration periods and for breeding seabird species.

1.6.2.86 Many of the features are the same as the Ribble and Alt Estuaries SPA and differences in citation counts can be found in **Table 1.67.** Only those features that differ from the SPA, either by species or by season, are discussed below.

Feature accounts

Black-tailed godwit (passage)

1.6.2.87 Black-tailed godwit are a feature of the Ribble and Alt Estuaries Ramsar site during the passage period, for the purposes of this assessment that is taken to mean the period between April and October (Stroud *et al*., 2016). The citation count is 3,323 (five year mean of peak from 1998/1999 to 2002/2003) with the current WeBS estimate indicate an increase to 4,522 birds (2018/2019 -to 2022/2023), although the WeBS online site totals do not account for seasonality.

1.6.2.88 During the site-specific surveys, a peak count of 137 black-tailed godwit were recorded on the wet grassland habitats along the onshore export cable corridor. This represents 4.12% of the citation count and 3.03% of the current SPA estimate.

Dunlin (passage)

1.6.2.89 Dunlin are a feature of the Ribble and Alt Estuaries Ramsar site during the passage period with a five-year peak mean of 38,196 (1998/1999 to 2002/2003). The latest WeBS data for the Ribble and Alt estuaries indicate an increase in population to 57,757 birds (five-year peak mean between 2017/2018 to 2021/2022). Winter or passage populations are not presented in the WeBS data.

1.6.2.90 During the site-specific surveys a peak count of 1,031 was recorded. This represents approximately 2.7% of the citation value and 1.79% of the most recent WeBS counts.

Condition assessment

1.6.2.91 There is no condition assessment available for the relevant ornithological features of the Ribble and Alt Estuaries Ramsar site although the latest WeBS and SMP estimates (as reported) indicate if the populations are stable, increasing, or declining.

Martin Mere SPA

Site description

1.6.2.92 Martin Mere is located north of Ormskirk in West Lancashire, north west England approximately 11.5 km from the Onshore Order Limits.

1.6.2.93 Currently, the site comprises open water, seasonally flooded marsh and damp, neutral hay meadows overlying deep peat. It includes a wildfowl refuge of international importance, with a large and diverse wintering, passage and breeding bird community. In particular, there are significant wintering populations of pink-footed goose. There is considerable movement of wintering birds between this site and nearby coastal and estuarine sites.

1.6.2.94 Only pink-footed goose was screened into assessment due to a lack of connectivity of other species (duck and swan). Pink-footed goose make movements between the coastal SPAs and the agricultural land within the area.

Feature accounts

Pink-footed goose winter

1.6.2.95 The Martin Mere SPA supported internationally significant numbers of pink-footed goose with 18,000 individuals at designation. In recent years the 5-year mean peak indicate a decline to 10,910 birds (2018/2019 and 2022/2023 (Woodward *et al.*, 2024)).

1.6.2.96 During the site-specific surveys, the peak count was 8,319 birds with using the agricultural land within the Onshore Order Limits for foraging and/or loafing. The largest concentrations of pink-footed goose were found around the FLL at Lytham Moss. This represents 46.22% of the citation, 76.25% of the Woodward *et al*. (2024) estimate or 14.9% of the north west England meta population (Devenish *et al.,* 2015).

Condition assessment

1.6.2.97 There is no condition assessment available for the relevant ornithological features Martin Mere SPA although the latest WeBS estimate (as reported) indicate if the populations are stable, increasing, or declining.

Conservation objectives

1.6.2.98 The conservation objectives for the Martin Mere SPA are to:

- maintain or restore the extent and distribution of the habitats of the qualifying features;
- maintain or restore the structure and function of the habitats of the qualifying features;
- maintain or restore the supporting processes on which the habitats of the qualifying features rely;
- maintain or restore the population of each of the qualifying features; and

- maintain or restore the distribution of the qualifying features within the site.

Martin Mere Ramsar site

Site description

1.6.2.99 The Martin Mere Ramsar site is designated for the same features and covers the same area as the Martin Mere SPA. Therefore, as part of the assessment these two sites will be combined and referred to as the Martin Mere SPA and Ramsar site.

Morecambe Bay and Duddon Estuary SPA

Site description

1.6.2.100 The Morecambe Bay and Duddon Estuary SPA is situated along the coast of north Lancashire and south Cumbria and includes the second largest embayment in Britain, after the Wash in Norfolk. The site is approximately 9.3 km from the Onshore Order Limits. The protected area represents the largest continuous area of intertidal mudflats and sandflats in the UK. The site includes several major estuaries where the river Wyre, Lune, Kent, Leven and Duddon enter the Irish Sea.

1.6.2.101 The SPA is a highly dynamic coastal and estuarine system which creates continually shifting channels, creeks and pools and the total extent, distribution and character of most subtidal and intertidal habitats are therefore subject to high levels of change over both short and long periods of time. High numbers of various polychaete worms, bivalve molluscs, crustaceans and other invertebrates are present and contribute significantly to the diet of many bird species in the SPA. Areas of coarse sediment, boulders and cobbles create intertidal reefs, known locally as ‘skears’, which provide a hard substrate for dense beds of mussel that can cover large areas.

1.6.2.102 The site supports over 1% of the British population of nine Annex 1 species (three during the breeding season and six during the non-breeding season) and 15 migratory species in regular numbers greater than 1% of the biogeographic region.

Feature accounts

1.6.2.103 Of the 21 qualifying features seven have been screened into this assessment due to potential connectivity with the Onshore Order Limits based on the foraging ranges of those species.

Pink-footed goose (winter)

1.6.2.104 Pink-footed goose are a feature of the Morecambe Bay and Duddon Estuary SPA during the winter period with a five-year peak mean of 15,648 birds (2009/2010 to 2013/2014). The latest WeBS data for the Morecambe Bay

and Duddon Estuary reported an increase in population to 21,058 birds (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.105 During the site-specific surveys, the peak count was 8,319 birds. The largest concentrations of pink-footed goose were found around the FLL at Lytham Moss where the species uses agricultural land for foraging and/or loafing. This represents 56.16% of the citation, 39.51% of the WeBS estimate or 14.9% of the north west England meta population (Devenish *et al*., 2015).

Golden plover (winter)

1.6.2.106 Golden plover are a feature of the Morecambe Bay and Duddon Estuary SPA during the winter period with a five-year peak mean of 1,900 birds (2009/2010 to 2013/2014). The latest WeBS data for Morecambe Bay and Duddon Estuary reported an increase in population to 5,879 individuals (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.107 During the site-specific surveys the peak count for golden plover was 381. This represents approximately 20.05% of the citation value and 7.56% of the most recent WeBS counts.

Curlew (winter)

1.6.2.108 Curlew are a feature of the Morecambe Bay and Duddon Estuary SPA during the winter period with a five-year peak mean of 12,209 (2009/2010 to 2013/2014). The latest WeBS data for the Morecambe Bay and Duddon reported a decrease in population to 10,300 birds (five-year peak mean between 2018/2019 to 2022/2023).

1.6.2.109 During the site-specific surveys a peak count of 696 was recorded with birds mostly utilising the grassland along the onshore export cable corridor. This represents approximately 5.7% of the citation value and 6.76% of the most recent WeBS counts.

Herring gull (breeding)

1.6.2.110 Herring gull are a feature of the Morecambe Bay and Duddon Estuary SPA during the breeding period with an estimated population of 20,000 birds (2009/2010 to 2013/2014). Herring gull nest in a variety of colonies around the edge of the Morecambe Bay and Duddon Estuary SPA. The SMP data for the Morecambe Bay and Duddon Estuary SPA Master site indicates that the SPA colony may have declined to 770 Apparently Occupied Nests (AON) or 1,540 individuals. Burnell (2021) found a decline of 38% herring gull nesting in coastal colonies whilst urban nesters increased between an estimated 60 to 90%.

1.6.2.111 During the site-specific surveys, a peak count of 1,600 birds was recorded during the breeding season at the landfall.

1.6.2.112 The peak count of 1,600 birds represents approximately 8% of the SPA citation during the breeding period and exceeds the current SPA SMP count.

Lesser black-backed gull (breeding)

1.6.2.113 Lesser black-backed gull are a feature of the Morecambe Bay and Duddon Estuary SPA during the breeding period with an estimated population of 9,720 birds (average between 2011 and 2015).

1.6.2.114 The SMP data for the Morecambe Bay and Duddon Estuary SPA Master indicates that the SPA colony may have declined to 862 Apparently Occupied Nests (AON) or 1,724 individuals. Burnell (2021) found a decline of 45% in lesser black-backed gull nesting at coastal colonies whilst urban nesters increased between an estimated 27 to 95%.

1.6.2.115 During the site-specific surveys, a maximum count of 353 birds occurred in August 2022. The peak count of 353 birds represents 3.63% of the citation value during the breeding period.

Lesser black-backed gull (non-breeding)

1.6.2.116 Lesser black-backed gull are also a feature during the non-breeding period with an estimated population of 9,450 birds (five-year peak mean between 2009/2010 and 2013/2014). There is no current reliable estimate of the wintering lesser black-backed gull population.

1.6.2.117 During the site-specific surveys, a maximum count of 205 birds was recorded during the non-breeding period.

1.6.2.118 The peak count of 205 birds represents 2.17% of the citation value during the breeding period.

Sandwich tern (breeding)

1.6.2.119 Sandwich tern are a feature of the Morecambe Bay and Duddon Estuary SPA during the breeding period with an estimated population of 1,608 birds (average between 1988 and 1992). The current SMP data shows a decline to 596 AONs at Hodbarrow RSPB, this equates to 1,192 individuals.

1.6.2.120 During the site-specific surveys, a maximum count of 427 birds was recorded during the breeding season. Whilst these birds may be local breeders, they are more likely to be post breeding passage birds. This represents 26.55% of the SPA citation or 35.82% of the current SMP estimate.

Condition assessment

1.6.2.121 There is no condition assessment available for the relevant intertidal ornithological features of the Morecambe Bay and Duddon Estuary SPA although the latest WeBS and SMP estimates (as reported) indicate if the populations are stable, increasing, or declining.

Conservation objectives

1.6.2.122 The conservation objectives for the Morecambe Bay and Duddon Estuary SPA are to:

- maintain or restore the extent and distribution of the habitats of the qualifying features;
- maintain or restore the structure and function of the habitats of the qualifying features;
- maintain or restore the supporting processes on which the habitats of the qualifying features rely;
- maintain or restore the population of each of the qualifying features; and
- maintain or restore the distribution of the qualifying features within the site.

Morecambe Bay Ramsar site

Site description

1.6.2.123 The Morecambe Bay Ramsar site is designated for the same features and covers a similar area as the Morecambe Bay and Duddon Estuary SPA. However, when Morecambe Bay SPA and Duddon Estuary SPA were combined in 2015, the Ramsar sites were not updated and have remained separate.

1.6.2.124 The site description of the Morecambe Bay and Duddon Estuary SPA can be read in proxy for the Morecambe Bay Ramsar site differences in citation counts can be found in **Table 1.67**.

Bowland Fells SPA

Site description

1.6.2.125 The Bowland Fells SPA consist of extensive upland fells which support the largest expanse of heather moorland in Lancashire. It is approximately 17.8 km from the Onshore Order Limits. Dry upland heath dominated by heather and bilberry is found on the steeper slopes and valleys, while the extensive peat soils are characterised by blanket bog vegetation with Sphagnum moss, cotton-grasses and heather and including rare plants such as bog rosemary. These provide habitat for a diverse upland breeding bird community, most notably scarce birds of prey such as hen harrier, merlin and peregrine, wading birds such as curlew and small upland passerine birds such as wheatear and ring ouzel. The moorlands also support one of England's largest breeding colonies of lesser black-backed gull.

1.6.2.126 The breeding population of lesser black-backed gull has potential connectivity with the onshore export cable corridor as birds might utilise the areas to forage.

Feature account

Lesser black-backed gull

1.6.2.127 At the time of designation, the population of lesser black-backed gull breeding within the Bowland Fells was 9,150 individuals (2.5% of the

biogeographic population between 2009 to 2012). The latest survey undertaken in 2023 indicated a decline to 4,644 individuals at predominately two colonies, one at Tarnbrook Fell and the other at Langden Head. Both colonies cover extensive areas (75 and 618 ha, respectively) (SMP, 2024).

1.6.2.128 During the site-specific surveys, a peak count of 353 birds was recorded during the breeding season.

1.6.2.129 The peak count of 353 individuals represents approximately 3.86% of the SPA citation and 7.6% of the latest estimate during the breeding period.

Condition assessment

1.6.2.130 There is no condition assessment available for the relevant ornithological features of the Bowland Fells SPA although the latest SMP estimate (as reported) indicate if the populations are stable, increasing, or declining.

Conservation objectives

1.6.2.131 The conservation objectives for the Bowland Fells SPA are to:

- maintain or restore the extent and distribution of the habitats of the qualifying features;
- maintain or restore the structure and function of the habitats of the qualifying features;
- maintain or restore the supporting processes on which the habitats of the qualifying features rely;
- maintain or restore the population of each of the qualifying features; and
- maintain or restore the distribution of the qualifying features within the site.

1.6.3 Assessment of adverse effects alone

Permanent loss of supporting habitats

1.6.3.1 Permanent habitat loss will occur during the construction at the onshore substations and at the above ground permanent infrastructure (e.g., Transition Joint Bay (TJB) covers). This impact has the potential to affect SPA or Ramsar sites supporting habitats through permanent loss of key foraging and roosting habitats for waterbirds. The SPA and Ramsar sites and relevant features screened in for this impact are included within **Table 1.3.** The MDS including the total area of permanent loss of supporting habitats are included within **Table 1.92**. There is not predicted to be any additional permanent habitat loss during the operation and maintenance phase and habitats will be restored during the decommissioning phase so permanent habitat loss is just assessed for the construction phase.

1.6.3.2 As permanent habitat loss will be limited to terrestrial habitats it only has the potential to impact features that rely upon these habitats. Therefore, all intertidal and coastal specialists have been screened out for this impact,

however waterbird species that rely upon pasture and/or arable for foraging or non-foraging may still be negatively impacted by habitat loss.

1.6.3.3 Permanent habitat loss would initially occur during the construction phase of the Transmission Assets within the footprint of the onshore substations and associated infrastructure and would last for the lifespan of the project. This impact has the potential to affect supporting habitats through loss of key foraging or non-foraging habitats for waterbirds. In other areas there may be small areas of habitat loss (e.g., for inspection covers), this will largely be on arable and pasture and the impacts on bird populations will be on such a small scale as to be inconsequential.

1.6.3.4 At the onshore substations, there will be a maximum permanent habitat loss of 223,500 m^2 (including the attenuation pond and landscaping). The habitat lost would be mostly pasture.

Table 1.68: Maximum design scenario considered for the assessment of potential impacts from permanent habitat loss/displacement

Phase [a]			Maximum design scenario	Justification
C	O	D		
✓	x	x	**Construction phase: substation and permanent infrastructure** • The permanent combined footprint of the onshore substations, including the attenuation pond/ditch and landscaping is 223,500 m^2; 164,000 m^2 for Morgan and 59,500 m^2 for Morecambe. • Two access roads at 15 m width (each). **Decommissioning phase** • Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction).	The MDS is represented by the largest permanent footprint for the onshore substations, which represents the largest physical impact and greatest area of habitat loss and land disturbance. Construction scenarios are not relevant to this as the impact will extend through the operation and maintenance phase. **Decommissioning phase** Decommissioning is likely to operate within the parameters identified for construction.

Information to inform the assessment

1.6.3.5 During the site-specific surveys designated ornithological features were recorded within the footprint of the permanent habitat loss at the onshore substation sites (**Table 1.69**) those features present in numbers greater than 1% of the citation counts are highlighted in yellow. Full details of the onshore site-specific surveys are provided within Volume 3, Chapter 4: Onshore and intertidal ornithology of the ES (document reference F3.4), Volume 3 Annex 4.1 Onshore and intertidal ornithology - breeding birds technical report (document reference: F3.4.1); Volume 3, Annex 4.2 Onshore and intertidal ornithology - wintering and migratory birds technical report (document reference: F3.4.2) and Volume 3, Annex 4.4: Ornithological survey methodologies (document reference: F3.4.4).

Table 1.69: Numbers of SPA features found within areas of permanent habitat loss during site specific surveys and the relative percentage of SPA citation counts

Species	Survey peak count	% of SPA citation count					
		Ribble and Alt Estuaries SPA	Ribble and Alt Estuaries Ramsar site	Martin Mere SPA	Morecambe and Duddon Bay SPA	Morecambe Bay Ramsar site	Bowland Fells SPA
Pink-footed goose	11	0.09%	0.17%	0.06%	0.07%	0.44%	N/A
Oystercatcher	2	0.01%	0.01%	N/A	N/A	N/A	N/A
Golden plover	104	**2.89%**	**2.9%**	N/A	N/A	N/A	N/A
Curlew	4	N/A	N/A	N/A	0.03%	0.03%	N/A
Lesser black-backed gull (breeding)	46	**1.23%**	N/A	N/A	0.47%	0.1%	0.5%

1.6.3.6 The area of the birds' range overlapping with the area of permanent habitat loss was quantified using the QGIS tool 'overlap analysis'. Roost and colony locations (specified in Still, *et al*. (2015) and the SMP database) had foraging ranges added (citations for the range sizes are included in the relevant species assessment sections). These ranges were clipped to land for terrestrial species such as pink-footed goose and left unclipped for species that utilise both the marine and terrestrial environment such as lesser black-backed gull. **Table 1.70** shows the proportion of habitat loss in relation to the published foraging ranges for the relevant features, these values are used for the assessment. A visualisation of the foraging ranges is available in **Appendix D**.

1.6.3.7 Only features found during survey were given detailed consideration. Even so, most features present were present in numbers below 1% of the relevant citation counts, except for wintering golden plover of the Ribble and Alt

Estuaries SPA and Ramsar site SPA and breeding lesser black-backed gull for the Ribble and Alt Estuaries SPA.

1.6.3.8 Features that were not found during the site-specific surveys are not assessed as it is assumed that there will be no adverse effects upon of the conservation objectives for these features as they do not utilise the areas to be impacted by permanent habitat loss.

1.6.3.9 There are not predicted to be any impacts upon the Liverpool Bay/Bae Lerpwl SPA which is designated for marine species and habitats, and as such there are no impact pathways.

Table 1.70: The area to be permanently lost for all of the affected features using species-specific foraging ranges. For cormorant the whole Liverpool Bay/Bae Lerpwl SPA area has been used as the foraging range

Species	Foraging range (radius in m)	Area of range (m^2)	Area of range that overlaps with the area of permanent habitat loss (m^2)	% of foraging range lost
Pink-footed goose (wintering)	20,000[1]	1,774,592,774*	223,500	0.01
Oystercatcher (wintering)	7,000[2]	411,816,628	223,500	0.05
Golden plover (wintering) Ribble and Alt Estuaries SPA	10,000[3]	542,098,640	223,500	0.04
Golden plover (wintering) Morecambe Bay and Duddon Estuaries SPA	10,000[3]	229,812,919	0	0.00
Curlew (wintering)	15,000[4]	407,579,134	223,500	0.05
Lesser black-backed gull (breeding)	236,000[5]	174,974,144,434	223,500	0.00

[1] NatureScot (2016) [2] Morton *et al*. (2022) [3] Natural England (2023) [4] Bowland Ecology (2023); Stroud *et al*. (2016) [5] Woodward *et al*. (2019) * The pink-footed goose metapopulation range has been used to quantify the foraging range as birds are likely to travel between roost sites at Martin Mere, the Ribble Estuary and Morecambe Bay (Devenish, *et al*., 2015).

Measures adopted as part of the Transmission Assets (Commitments)

1.6.3.10 Measures adopted as part of the Transmission Assets which are of relevance to the assessment of potential impacts on onshore and intertidal ornithological features from permanent loss of supporting habitats during the construction and decommissioning phases are presented in **Table 1.71.**

Table 1.71: Measures adopted as part of the project which are relevant to the assessment of adverse effect on SPA and Ramsar sites designated for onshore and intertidal ornithology from permanent loss of supporting habitats

Mitigation hierarchy step	Commitment number	Measure adopted	Further information	How the measure will be secured
Step 1: Avoidance	CoT12	The onshore export cables and the 400 kV grid connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the Transmission Assets.	Through the burial of cables, rather than the installation of overhead lines, the permanent loss of habitat is avoided. Additionally, this removes the risk of collision with overhead lines by bird species.	DCO Schedule 1, Part 1, Authorised Development
	CoT14	Joint bays will be completely buried, with the land above reinstated. An inspection cover will be provided on the surface for link boxes for access during operation and maintenance phase.	The burial of joint bays prevents the permanent loss of habitat that would otherwise be caused. The reinstating of land ensure that no habitat is permanently lost.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
Step 2: Minimise	N/A	As part of the site selection process ornithological data was analysed and taken into account when deciding upon the final location of the substations (Volume 1, Chapter 4: Site selection and consideration of alternatives (document reference F1.4)).	This avoided more ornithologically sensitive areas to the south of the Ribble (see Volume 3. Annex 4.1 and Annex 4.2 (document references F3.4.1 and F3.4.2) for further detail on bird distributions).	This was part of the project design and as such there is no requirement for it to be secured.
	N/A	As set out in the project description (Volume 1, Chapter 3: Project description of the ES - document reference F1.3), the Applicants have committed to utilising Gas Insulated Switchgear for Morgan substation.	Utilising Gas Insulated Switchgear rather than Air Insulated Switchgear equipment reduces the substation footprint, and is reflected in the Maximum Design Scenario for the assessment.	This was part of the project design and as such there is no requirement for it to be secured.

Mitigation hierarchy step	Commitment number	Measure adopted	Further information	How the measure will be secured
Step 3: Mitigate/restore	CoT120	To mitigate for potential permanent habitat loss associated with each of the Onshore Substations, mitigation areas south of Newton-with-Scales will be provided for waders and farmland birds. Measures within these areas may include measures, such as, the creation of scrapes and thickening of hedgerows. This is detailed within the Outline Ecological Management Plan. The final measures will be developed and agreed with the relevant stakeholders as a part of the detailed Ecological Management Plan(s) prior to construction.	This area has been identified to provide permanent mitigation to the benefit of breeding geese, ducks and swans, non-breeding geese, ducks and swans, and breeding waders and non-breeding waders. Enhancement measures in this area will also target farmland birds such as yellowhammer, tree sparrow and corn bunting, kestrel, and barn owl.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan)

Construction phase

Ribble and Alt Estuaries SPA

Pink-footed goose

1.6.3.11 There is potential that the permanent loss of supporting habitats could impact upon the foraging and/or loafing resources for pink-footed goose. Whilst pink-footed goose mostly feed on root and cereal crops (Devenish *et al*., 2015), with grass shoots making up a smaller proportion of their winter diet, they will often use pasture to loaf on. However, the findings from the site-specific surveys suggest that the fields to be lost to permanent infrastructure are of low importance to pink-footed goose with only 11 individuals which represented 0.09% of the SPA citation count (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 0.02% of the metapopulation (Devenish, *et al*., 2015).

1.6.3.12 The permanent habitat loss at the substations represents only 0.01% of the core foraging range of the north-west England metapopulation of pink-footed goose.

1.6.3.13 Therefore, due to the low numbers of birds and the relatively small areas/proportions of available habitat impacted, it is concluded that the permanent loss of supporting habitats would have negligible impact on pink-footed goose within the Ribble and Alt Estuaries SPA.

Oystercatcher

1.6.3.14 There is potential that the permanent loss of supporting habitats could impact upon the foraging and/or loafing resources for oystercatcher. Oystercatcher can specialise as shellfish feeders, worm feeders, or generalists (van de Pol *et al*., 2010). Morton *et al*. (2022), suggested that earthworms from terrestrial habitats were likely to be less valuable than estuarine prey items and that sub-adult birds were more likely to forage outside of the estuary also suggesting that the younger birds may be more flexible in their habitat use. They also recorded a maximum winter foraging distance of 7 km from roosting site to foraging ground.

1.6.3.15 Only two birds or 0.01% of the SPA citation count were found using the area of permanent habitat loss. Using a 7 km foraging range added to the roost sites identified in Still, *et al*. (2015) and excluding sub-tidal habitats, oystercatchers have a foraging range of up to 411,816,628 m^2. The permanent loss of habitat will affect 0.05% of this. Therefore, due to the low numbers of birds found using the area, as birds may travel up to 7 km, and as terrestrial prey is considered likely to be less valuable than estuarine prey items, it is concluded that the permanent loss of supporting habitats would have negligible impact on oystercatcher within the Ribble and Alt Estuaries SPA.

Golden plover

1.6.3.16 There is potential that the permanent loss of supporting habitats could impact upon the foraging and/or loafing/roosting resources for golden plover.

Although in late summer golden plover are found on arable land, wintering golden plover feed preferentially on permanent pasture as this contains greater densities of soil invertebrates in comparison (Gillings and Fuller, 1999; Natural England, 2016). They have also been found to take advantage of flooded fields which may yield high numbers of drowned earthworms (Kirby, 1995).

1.6.3.17 A peak count of 104 golden plover, 2.89% of the SPA citation count and 2.06% of the current WeBS estimate were found using the area of permanent habitat loss at the substation, although they were not frequent visitors (Volume 3, Annex 4.2: Wintering and migratory birds of the ES, document reference: F3.4.2). Although the winter foraging range of golden plover is not reported within the literature, they are thought to range at least 10 km based on the Natural England SSSI impact zone guidance (Natural England, 2023). The permanent habitat loss at the substations represents only 0.04% of the foraging range of golden plover.

1.6.3.18 Although relatively modest numbers of the SPA feature have been recorded using the areas affected by habitat loss, this was not regular usage, and the Applicants have committed to improving habitat in nearby areas for waders such as golden plover (**Table 1.72**). Therefore, due to the small proportion of habitat affected, the limited number of birds potentially affected and the creation of suitable habitat, it is concluded that the permanent loss of supporting habitats would have a negligible impact on golden plover within the Ribble and Alt Estuaries SPA.

Lesser black-backed gull (breeding)

1.6.3.19 There is potential that the permanent loss of supporting habitats could impact upon the foraging and/or loafing and roosting resources for breeding lesser black-backed gull. Internationally important breeding colonies of lesser black-backed gull are found from the Ribble Estuary saltmarshes, through the moorlands of the Bowland fells and up to Morecambe Bay. Lesser black-backed gull is both a short-distance and long-distance migrant with some of the British breeding birds wintering as far south as central Africa. They are communal nesters and have a breeding season foraging range of 236 km (mean max plus one SD as taken from Woodward *et al*. (2019). Recent tracking data suggests that coastal breeding colony birds (such as the Ribble Estuary colony) may forage in agricultural habitats between 40 and 50% of the time (Langley *et al*., 2023). The permanent loss of habitats represents less than 0.00% of the foraging range of lesser black-backed gull.

1.6.3.20 A peak count of 46 lesser black-backed gull was recorded within the areas that will be affected by habitat loss, and this represented 1.23% of the SPA citation count and 0.99% of the current SMP estimate (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). The peak count was recorded in March which is before the egg laying and chick rearing period and may therefore include passage birds. Only very low numbers of birds were recorded during the core breeding period (**Apx Table 1**). This may suggest that rather than a foraging resource, the substation area may be used as a roosting and/or loafing area before the egg laying and chick rearing period.

1.6.3.21 Therefore, as only low numbers of birds are using the area before the egg laying and chick rearing period, and there is only a small fraction of available habitats that will be affected for this mobile species, it is concluded that the permanent loss of supporting habitats would have negligible impact on lesser black-backed gull within the Ribble and Alt Estuaries SPA.

All other features

1.6.3.22 As no other features were present during the two years of site-specific surveys it is considered that there are no impact pathways and therefore no adverse effects on all other features for the Ribble and Alt Estuaries SPA.

Conclusions

1.6.3.23 Adverse effects on the qualifying features of the Ribble and Alt Estuaries SPA which undermine the conservation objectives of the SPA will not occur as a result of permanent loss of supporting habitat. An assessment of the potential impact of permanent loss of supporting habitat against each relevant conservation objective is presented in **Table 1.72**.

Table 1.72: Conclusions against the conservation objectives for the Ribble and Alt Estuaries SPA for permanent loss of supporting habitats

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features	Due to the low importance of this area for pink-footed goose and oystercatcher, and the large foraging range of lesser black-backed gull, the only impact upon habitats is relevant to golden plover. As the project has committed to creating and/or restoring nearby habitat that is suitable for golden plover, and the impacts will only affect 0.04% of the habitats available to 2.89% of the citation count of golden plover, there will be negligible impact on the extent and distribution, structure and function, or the supporting processes upon the habitats on which the qualifying features rely.
Maintain or restore the structure and function of the habitats of the qualifying features	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely	
Maintain or restore the population of each of the qualifying features	The numbers of pink-footed goose and oystercatcher using the area are very small and negligible impacts are predicted. The lesser black backed gull forages over a much wider area and was absent during the egg laying and chick rearing period, negligible impacts are predicted upon this feature. For the golden plover, as the impacts will only affect 0.04% of the habitats available to 2.89% of the citation count, after the measures to improve habitat have been considered there will be negligible impacts upon this feature. Therefore, there will be negligible impacts on the population or distribution of the qualifying features.
Maintain or restore the distribution of the qualifying features within the site	

Ribble and Alt Estuaries Ramsar site

1.6.3.24 No features that differ, either in species or season, from the SPA were present Therefore, the assessment for the SPA is considered to be adequate to cover the Ramsar site.

Conclusions

1.6.3.25 As no additional features relevant to the Ramsar site were recorded during site specific survey, as with the Ribble and Alt Estuaries SPA, adverse effects on the qualifying features of the Ribble and Alt Estuaries Ramsar will not occur as a result of permanent loss of supporting habitat.

Martin Mere SPA

Pink-footed goose (winter)

1.6.3.26 There is potential that the permanent loss of supporting habitats could impact upon the foraging and/or loafing resources for pink-footed goose. However, the findings from the site-specific surveys suggest that the fields to be lost to permanent infrastructure are of low importance to pink-footed goose with only 11 birds or 0.06% of the SPA citation count using the area (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 0.02% of the metapopulation (Devenish, *et al*., 2015).

1.6.3.27 The permanent habitat loss at the substations represents only 0.01% of the core foraging range of the northwest of England metapopulation of pink-footed goose.

1.6.3.28 Therefore, due to the low numbers of birds and the relatively small area impacted, it is concluded that the works would have negligible impact on pink-footed goose from the Martin Mere SPA.

Conclusions

1.6.3.29 Adverse effects on the qualifying features of the Martin Mere SPA. Impacts which undermine the conservation objectives of the SPA will not occur as a result of permanent loss of supporting habitat. An assessment of the potential impact of permanent loss of supporting habitat against each relevant conservation objective is presented in **Table 1.73.**

Table 1.73: Conclusions against the conservation objectives for pink-footed geese within the Martin Mere SPA for permanent loss of supporting habitats

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features	Due to the small area of foraging pink-footed goose habitats to be impacted, there will be negligible impact upon the extent and distribution, the structure and function, and the supporting processes on the habitats upon which the features rely.
Maintain or restore the structure and function of the habitats of the qualifying features	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely	

Conservation objective	Conclusion
Maintain or restore the population of each of the qualifying features	Due to the low numbers of birds present and the large area of foraging available to pink-footed goose there will be negligible impact upon the population or distribution of pink-footed goose from Martin Mere SPA.
Maintain or restore the distribution of the qualifying features within the site	

Martin Mere Ramsar site

Pink-footed goose (winter)

1.6.3.30 As the features that may be impacted by the loss of permanent supporting habitats are the same for Morecambe Bay Ramsar site as they are for the Martin Mere SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site. The differences in citation counts can be seen in **Table 1.67**.

Conclusions

1.6.3.31 Adverse effects on the qualifying features of the Martin Mere SPA. Impacts which undermine the conservation objectives of the SPA will not occur as a result of permanent loss of supporting habitat. An assessment of the potential impact of permanent loss of supporting habitat against each relevant conservation objective is presented in **Table 1.73.**

Morecambe Bay and Duddon Estuaries SPA

Pink-footed goose (winter)

1.6.3.32 There is potential for the permanent loss of supporting habitats could impact upon the foraging and/or loafing resources for pink-footed goose. However, the findings from the site-specific surveys suggest that the fields to be lost to permanent infrastructure are of low importance to pink-footed goose with only 11 birds or 0.07% of the SPA citation (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 0.02% of the metapopulation (Devenish, *et al*., 2015).

1.6.3.33 The permanent habitat loss at the substations represents only 0.01% of the core foraging range of the northwest of England metapopulation of pink-footed goose.

1.6.3.34 Therefore, due to the low numbers of birds and the relatively small area impacted, it is concluded that the works would have negligible impact on pink-footed goose within the Morecambe Bay and Duddon Estuaries SPA.

Golden plover (winter)

1.6.3.35 The foraging range of the Morecambe Bay golden plover does not overlap with area of permanent habitat loss. Therefore, there is no potential for permanent loss of supporting habitats to impact upon the foraging and/or loafing/roosting resources for golden plover from the Morecambe Bay and Duddon Estuaries SPA.

Curlew (winter)

1.6.3.36 There is potential for the permanent loss of supporting habitats could impact upon the foraging and/or loafing/roosting resources for curlew.

1.6.3.37 Four curlew were found using the area of permanent habitat loss at the substation and the peak count represented 0.03% of the SPA citation count. Although wintering foraging range size for curlew is poorly reported in the literature, Mander *et al*. (2022) found curlew to have a small foraging range on the outer Humber Estuary (11.13 km^2 mean plus standard deviation), however Bowland Ecology (2022) suggested a 15 km buffer for curlew at the coastal SPAs of north west England which is taken from Stroud *et al*. (2016).

1.6.3.38 Therefore, the permanent loss of habitat at the substation represents 0.05% of the total foraging range for curlew. Although there will be loss of pasture the Applicants have committed to improving nearby areas habitat for waders such as curlew (**Table 1.71**).

1.6.3.39 Because of the low number of birds and the commitment to create suitable habitats, it is concluded that the works would have negligible impact on curlew within the Morecambe Bay and Duddon Estuaries SPA.

Lesser black-backed gull (breeding)

1.6.3.40 There is potential for the permanent loss of supporting habitats could impact upon the foraging and/or loafing/roosting resources for breeding lesser black-backed gull. Recent tracking data suggests that coastal breeding colony birds forage in agricultural habitats between 40 and 50% of the time (Langley *et al*., 2022). This tracking study is based upon the Morecambe Bay SPA colony. The permanent loss of habitats represents less than 0.00% of the foraging range of lesser black-backed gull.

1.6.3.41 A peak count of 46 lesser black-backed gull was recorded within the areas that will be affected by habitat loss. This represented 0.47% of the SPA citation count (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). The peak count was recorded in March which is before the egg laying and chick rearing period and may therefore include passage birds. Only very low numbers of birds were recorded during the core breeding period (**Apx Table 1**). This may suggest that rather than a foraging resource, the substation area may be use as a roosting and/or loafing area before the egg laying and chick rearing period.

1.6.3.42 Therefore, as only low numbers of birds (that are not tied to a nest site and associated foraging range) are using the area, it is concluded that the works would have negligible impact on lesser black-backed gull within the Morecambe Bay and Duddon Estuaries SPA.

Conclusions

1.6.3.43 Adverse effects on the qualifying features of the Morecambe Bay and Duddon Estuaries SPA which undermine the conservation objectives of the SPA will not occur as a result of permanent loss of supporting habitat. An

assessment of the potential impact permanent loss of supporting habitat against each relevant conservation objective is presented in **Table 1.74**.

Table 1.74: Conclusions against the conservation objectives within the Morecambe Bay and Duddon Estuaries SPA for permanent loss of supporting habitats

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features	Due to the low importance of this area for pink-footed goose and curlew, and the large foraging range of these features, and as the foraging range of Morecambe Bay and Duddon Estuaries SPA golden plover is unaffected by permanent habitat loss there will be no impact upon the extent and distribution, the structure and function, and the supporting processes on the habitats upon which the features rely.
Maintain or restore the structure and function of the habitats of the qualifying features	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely	
Maintain or restore the population of each of the qualifying features	The numbers of pink-footed goose and oystercatcher using the area are very small and therefore negligible impacts are predicted. The lesser black backed gull forages over a much wider area and was absent during the egg laying and chick rearing period, therefore negligible impacts are predicted upon this feature. There are no impact pathways for golden plover. Therefore, there will be negligible impacts on the population or distribution of the qualifying features.
Maintain or restore the distribution of the qualifying features within the site	

Morecambe Bay Ramsar site

1.6.3.44 As the features that may be impacted by the loss of permanent supporting habitats are the same for Morecambe Bay Ramsar site as they are for the Morecambe Bay and Duddon Estuary SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site. The differences in citation counts can be seen in **Table 1.67.**

Conclusions

1.6.3.45 Adverse effects on the qualifying features of the Morecambe Bay Ramsar site will not occur as a result of permanent loss of supporting habitat.

Bowland Fells SPA

Lesser black-backed gull (breeding)

1.6.3.46 There is potential for the permanent loss of supporting habitats could impact upon the foraging and/or loafing/roosting resources for breeding lesser black-backed gull.

1.6.3.47 A peak count of 46 lesser black-backed gull, or 0.5% of the SPA citation count were recorded within the areas that will be affected by habitat loss (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). These birds were recorded in March which is before the egg laying and chick rearing period and may also represent passage birds. Only very low numbers

of birds being recorded during the core breeding period (see **Apx Table 1)**. This may suggest that rather than a foraging resource, the substation area may represent a roosting and/or loafing area that is utilised by the birds before settling to their nest site. In addition, the area to be impacted represents less than 0.00% of the lesser black-backed gull total foraging range.

1.6.3.48 Therefore, as only low numbers of birds are using the area before the egg laying and chick rearing period, it is concluded that the permanent loss of supporting habitats would have negligible impact on lesser black-backed gull within the Bowland Fells SPA.

Conclusions

1.6.3.49 Adverse effects on the qualifying features of the Bowland Fells SPA which undermine the conservation objectives of the SPA will not occur as a result of permanent loss of supporting habitat. An assessment of the potential impact of permanent loss of supporting habitat against each relevant conservation objective is presented in **Table 1.75**.

Table 1.75: Conclusions against the conservation objectives for lesser black-backed gull within the Bowland Fells SPA for permanent loss of supporting habitats

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features	Due to the low numbers of birds present and the small area to be impacted by permanent habitat loss, there will be negligible impacts upon the extent and distribution, structure and function, or the supporting processes on the habitats upon which the feature relies.
Maintain or restore the structure and function of the habitats of the qualifying features	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely	
Maintain or restore the population of each of the qualifying features	Due to the low numbers of birds present and the large area of foraging available to lesser black-backed gulls there are predicted to be negligible impacts upon the population or distribution of lesser black-backed gull.
Maintain or restore the distribution of the qualifying features within the site	

Temporary loss of supporting habitats and/or resource availability

1.6.3.50 Temporary loss of supporting habitats and/or resource availability during the construction phase will occur at the landfall, along the onshore export cable corridor, at the entry and exit pits at the River Ribble crossing, along the 400 kV grid connection corridor and within the areas of associated construction infrastructure, i.e., the compounds, access tracks and haul roads.

1.6.3.51 During operation and maintenance there is not predicted to be any additional temporary habitat loss along the Onshore Order Limits. However, within the Intertidal Infrastructure Area there may be the requirement to repair or rebury cables during the operation and maintenance phase as set out in **Table 1.76**.

These activities will be very similar to the construction phase, in terms of scale, equipment used, access requirements etc. although will affect a much smaller spatial scale (i.e. covering a cable length of 250 to 500 m for each event) and be much shorter duration (i.e. two to four weeks per event; see **Table 1.76** for further detail. Therefore, the magnitude will be of a similar or lesser scale than during construction.

1.6.3.52 During decommissioning, the scope of work is anticipated to operate within the parameters identified for construction. This impact has the potential to affect supporting habitats through loss of key foraging and loafing/roosting habitats for waterbirds.

1.6.3.53 The SPA and Ramsar sites screened in for this impact are included within **Table 1.3**. The MDS, including indication of the total area of temporary loss of supporting habitats these areas, are included within **Table 1.76**.

1.6.3.54 As outlined in **Table 1.76**, during the construction phase the installation of export cables between HAT and MLWS there is predicted to a temporary loss of supporting habitat and/or resource availability of 474,640m^2. This will include open trenching, the exit pits of the Direct Pipe, beach trenching with a cable plough, construction compounds, and working areas for vehicles and plant. Within the intertidal there could also be up to 600 cable rollers for each cable installed along the beach, to facilitate the offshore export cable pull in. Each of these cable rollers will be a single pile. The open trenching will consist of up to six trenches and will terminate at the direct pipe exit pit. The exit pit for the direct pipe could include pile driven cofferdams. There is a commitment by the project (CoT110) to avoid working during the core winter period (November to February), which will restrict the project to only one cable pull in (five weeks) during this period. Although it may take time for the benthic communities to recover, it is noted that the majority of these impacts are due to take place outside of the sensitive winter period, and that, although resources may not have fully recovered, habitats will be available for loafing or roosting birds during the winter period.

~~1.6.3.55~~ There is approximately 124,123,100 m^2 of available foraging and roosting habitats within the Ribble and Alt Estuaries SPA (as taken from the citation) so the temporary loss of habitats and/or resource availability equates to 0.38% of available tidal flat habitats within the SPA.

1.6.3.56 For the onshore export cable corridor, up to 193,413 m^2 of Natural England mapped highly FLL (Bowland Ecology, 2021) would be temporarily lost for up to 66 months. This equates to approximately 5.9% of the mapped highly FLL at Lytham Moss.

1.6.3.57 The onshore export cable will be 17 km in length with a temporary construction width of 100 m and the 400 kV grid connection cable will be up to 13 km in length and 76 m wide during construction. Within the Onshore Infrastructure Area there will also be a number of construction compounds, access tracks, etc. At the onshore substation, and in addition to the substation, there will be a temporary habitat loss of up to 122,500 m^2 for construction compounds over a period of 12 months for enabling works, a 54 month period for the main construction and 19 months for testing/commissioning. The habitat lost would be arable and/or pasture

depending on final location. There will also be numerous access tracks. There will be no habitat loss at the River Ribble crossing as the Applicants have committed to trenchless techniques which avoid the tidal estuarine habitats entirely.

1.6.3.58 The onshore infrastructure area is an area of approximately 4,655,995 m^2 above MHWS. This includes all areas of open trenching for the onshore export cable corridor and 440 kV corridor, all HDDs and direct pipes, all access tracks, construction compounds, temporary works areas at the substations, and grid connection works. The temporary loss of supporting habitats and/or resource availability is predicted to impact this area, although the whole area will not be affected (e.g., areas of HDD), and the area between MHWS and HAT will be assessed as part of the coastal survey area. Furthermore, it is not predicted that habitat loss will occur throughout the entire area at any one time, with commencement work fronts likely to be staggered along the route.

Table 1.76: Maximum design scenario considered for the assessment of potential impacts from temporary habitat loss and changes in resource availability

Phase [a]			Maximum design scenario	Justification
C	O	D		
✓	✓	✓	**Construction phase: landfall (sequential)** • Open trenching in the intertidal area (MLWS to MHWS): There will be 6 cables in total (four for Morgan and two for Morecambe). • There will be six exit pits for the direct pipe, these will be 875 m^2 each, equating to a combined area of 5,250 m^2. • From the exit pits the open trench will be 10 m wide at the top and up to 300 m long. There will be 20 m either side of the trench for vehicles and personnel to use. This equates to an area of 15,000 m^2 per cable or 90,000 m^2 in total. • The open trench will transition to a beach trencher, this will be 3 m wide and up to 1,250 m long, the trench will be contained within a working corridor with a 50 m width. This is an area of habitat disturbance of up to 62,500 m^2 per cable, or 375,000 m^2 in total. • There will be two intermediate pulling platforms per cable. The pulling platforms are 120 m^2 each which equates to a total area of 1,440 m^2. • There will be up to 600 cable roller boxes per cable pull in, or 3,600 in total. Each roller box will be installed via a single vibro-pile spaced at approximately 3 m. • One cofferdam will be required per cable, these will be up to 15 m x 15 m with a total area for six cables of 450 m^2. • There will be one storage compound on the beach which will be 50 m x 50 m. This equates to an area of 2,500 m^2. • There is another compound located at the existing sand winning plant which is 510 m^2. However, this is not located on the beach, nor will it impact intertidal birds visually as it is concealed within the sand dunes. • These areas combined equal a total area of intertidal and beach habitats and resources that may be temporarily lost, of 474,640 m^2.	**Construction phase** Open cut trenching in the intertidal area (and any short section above MHWS between the HDD exit pit and MHWS) would result in the largest compound footprint and largest total area of disturbance. Direct pipe will be used to install the landfall beneath Lytham St Annes Dunes SSSI. All major crossings, such as major roads, river and rail crossings will be undertaken using HDD or other trenchless techniques, where practicable. In terms of noise disturbance (and potentially disturbance from lighting), trenchless techniques are likely to represent the MDS, particularly if 24-hour drilling activity is required. Disturbance may also result from construction traffic using the haul road. In terms of duration, the MDS is represented by sequential construction of the Morgan Offshore Wind Project: Transmission Assets and the Morecambe Offshore Windfarm Transmission Assets (rather than concurrent construction), as this represents the longest overall period. The MDS is represented by the largest temporary footprint for Transmission Assets, which represents the greatest area of habitat loss. **Decommissioning phase** Decommissioning is likely to operate within the parameters identified for construction.

Phase a			Maximum design scenario	Justification
C	O	D		
			• In a sequential scenario, works will take place over a 66-month period. However, the duration of active construction works is expected to be shorter with up to two weeks direct pipe installation and up to six weeks per cable pull in. **Construction phase: onshore export cables (sequential)** • The maximum number of trenches will be six, with an indicative target trench depth of 1.2 m. • Construction corridor width 100 m, with a length of up to 17 km. Width will include two haul roads. There will be up to 110 joint bays and 110 link boxes. Temporary habitat loss due to joint bays construction will amount to 2,750 m^2. • For Morgan there may be up to four compounds of 150 m x 100 m each, with a further one compound of 100 m x 100 m. For Morecambe there may be up to four compounds of 115 m x 100 m and a further one compound of 100 m x 75 m. Duration of installation of up to 66 months (sequentially) for all compounds. • The maximum number of trenchless technique locations is 120. Each major trenchless technique location will have a compound, measuring up to 150 m x 100 m. Drilling mud will be stored and used at these compounds. There would be up to 720 launch pits and 720 exit pits associated with the trenchless techniques. • No construction works directly related to Transmission Assets are proposed outside of the Onshore Order Limits and Intertidal Infrastructure Area, as defined in Volume 1, Chapter 3: Project description of the ES (document reference: F1.3). • Duration of installation of up to 66 months assuming a sequential construction scenario. **Construction phase: 400 kV grid connection cable** • Open cut trenching: The maximum number of trenches will be four, with a target trench depth of 1.2 m. The width of the cable corridor is 76 m.	

Phase a			Maximum design scenario	Justification
C	O	D		
			There will be a total of 60 joint bays and 60 link boxes. Temporary habitat loss due to joint bays construction will amount to 15,000 m^2. • For Morgan there will be three compounds of 150 x 100 m and one further compound of 100 x 100 m. For Morecambe there will be three compounds of 115 x 100 m and one further compound of 100 x 75 m. • The working area will include a construction corridor width of 50 m (which includes two haul roads), with a length of up to 13 km. Duration of installation of up to 66 months (sequential construction). • There will be a maximum of 46 trenchless techniques crossings (excluding the Ribble Estuary crossing) and the trenchless techniques compound locations will be 76 m x 50 m. Onshore survey areas at each crossing will require 46 launch pits and 46 exit pits. • The River Ribble direct pipe crossing: There will be a maximum corridor width of 150 m and a maximum length of the crossing of 650 m. A maximum of four launch pits and four reception pits will be required, with a depth of up to 45 m each. The maximum permanent area of start pits will be 450 m^2 per circuit and finish pits will be 750 m^2 per circuit. The approximate maximum duration of works will be 24 months. • In a concurrent direct pipe scenario there are up to two compounds to the north and one to the south with a total area of 10,500 m^2 to the north and 60,000 m^2 to the south. • Duration of installation is up to 66 months (sequential construction). • No excavation or intrusive works associated with the construction of the electrical infrastructure will occur within the biodiversity benefit/mitigation areas. **Construction phase: onshore substations (sequential)** • Two access roads at 15 m width (each). • The area of temporary compounds (combined) includes working and laydown areas (excludes permanent substation footprint) is 122,500 m^2 (additional to permanent footprint).	

Phase[a]			Maximum design scenario	Justification
C	O	D		
			• Duration: 12 months for enabling works, 54 months for main construction. **Operation and maintenance phase: landfall (concurrent)** • Morecambe have envisaged that a precautionary 2.4 km of intertidal cable may be subject to repair and reburial and predict one event every 10 years. • Morecambe also predict that there may be reburial events of approximately 500 m every five years. • Morgan have envisaged that up to 1 km of intertidal cable may be subject to repair and reburial and also predict one event every 10 years. • Morgan also predict reburial events of approximately 1 km every five years. • This equates to a lifetime (assuming 35 years for Morecambe and 35 years for Morgan) reburial of 10.5 km for Morgan and 11.9 km for Morecambe, or 22.4 km for both combined. • Repair and reburial events are expected to be similar in scale, activities and equipment as the construction phase at the landfall described above, although these are predicted to be limited to sections of between 250 and 500 m at a time, rather than the entire landfall (i.e. up to 25,000 m^2 of temporary habitat loss per event assuming a maximum 50 m working corridor). • Repair and reburial events are expected to be shorter duration than those of construction with and will take between two and four weeks per event. **Decommissioning phase** • Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction).	

Information to inform assessment

1.6.3.59 It is important to note that the counts of the species in **Table 1.67** were taken over a larger area than is due to be impacted by temporary loss of supporting habitat and/or resource availability as survey buffers were used to account for disturbance (which will be assessed under the assessment of Disturbance and displacement from construction, decommissioning, and operation and maintenance activities). Therefore, the number of individuals that are predicted to be affected by temporary loss of habitats and resources is highly precautionary. See maps in Annex 4.1: Breeding birds of the ES (document reference: F3.4.1), Annex 4.2: Wintering and migratory birds of the ES (document reference: F3.4.2), and Annex 4.3 Intertidal birds of the ES (document reference: F3.4.3) for further details of the survey boundaries.

1.6.3.60 The areas of habitat lost are quantified on a species-by-species basis in **Table 1.77.** These figures are used as the basis of the assessment of temporary loss of supporting habitat and/or resource availability.

1.6.3.61 The area of the birds' range overlapping with the area of temporary habitat loss was quantified using the QGIS tool 'overlap analysis'. Roost and colony locations (specified in Still, *et al*. (2015) and the SMP database) had foraging ranges added (citations for the range sizes are included in the relevant species assessment sections). These ranges were clipped either to:

- land at MHWS, for terrestrial species such as pink-footed goose;
- sea at MHWS for marine foraging species such as common tern; or
- left unclipped for species that utilise both the marine and terrestrial environment such as lesser black-backed gull.
- For specialist intertidal birds their range was taken as the entire area of the SPA and assumes that all tidal flat, salt marsh and upper beach habitats are available for foraging and roosting activities.
- For the Liverpool Bay/Bae Lerpwl SPA feature red-throated diver, the range was taken as the amount of the SPA available for the species and was taken from the CAP document (Natural England, 2023). In the absence of any CAP advice for common scoter the range was assumed to be the entire SPA.

1.6.3.62 Once the ranges had been quantified, the relevant infrastructure areas were used in the analysis (Onshore Order Limits minus mitigation areas for terrestrial species, Intertidal Infrastructure Area for intertidal and marine species, and both for species that exploit both areas). The figures in **Appendix D** show the roost and colony sites used, plus how the foraging ranges overlap with the Onshore Order Limits and Intertidal Infrastructure Area.

Table 1.77: The area to temporarily lost for all of the affected features using species-specific foraging ranges from the literature. Where no foraging ranges were reported, the whole of the relevant SPAs were used as the foraging range. Area of overlap determined via GIS

Species	Area of impact	Foraging range (radius in m)	Area of foraging range (m^2)	Temporary habitat loss that overlaps with foraging range (m2)	% of foraging range lost
Pink-footed goose (wintering)	Terrestrial – Onshore infrastructure area	20,000*	1,774,744,451	4,655,995[1]	0.26
Whooper swan (wintering)		5,000*	48,786,286	0[2]	0.00
Shelduck (wintering)		20,000*	1,284,379,791	4,655,995[2]	0.36
Wigeon (wintering)		2,000*	31,509,866	0[2]	0.00
Teal (wintering)		2,000*	19,461,802	0[2]	0.00
Common scoter (non-breeding)	Intertidal – Intertidal infrastructure area	N/A	2,527,600,000[5]	474,640[3]	0.02
Oystercatcher (wintering)	Intertidal – Intertidal infrastructure area	N/A	124,123,100[7]	474,640[3]	0.38
Ringed plover (passage)		N/A	124,123,100[7]	474,640[3]	0.38
Golden plover (wintering) – Ribble and Alt Estuaries SPA	Terrestrial – Onshore infrastructure area	10,000*	542,098,640	3,351,833[2]	0.62
Golden plover (wintering) – Morecambe Bay and Duddon Estuary SPA		10,000*	229,812,919	1,063[2]	0.00
Grey plover (wintering)	Intertidal – Intertidal infrastructure area	N/A	124,123,100[7]	474,640[3]	0.38
Curlew (wintering)	Terrestrial – Onshore infrastructure area	15,000*	407,579,134	3,088,634[2]	0.76

Species	Area of impact	Foraging range (radius in m)	Area of foraging range (m^2)	Temporary habitat loss that overlaps with foraging range (m2)	% of foraging range lost
Bar-tailed godwit (wintering)	Intertidal – Intertidal infrastructure area	N/A	124,123,100[7]	474,640[3]	0.38
Black-tailed godwit (wintering and passage)	Terrestrial – Onshore infrastructure area	10,000*	2,003,199,405	534,436[2]	0.26
Dunlin (wintering and passage)	Intertidal – Intertidal infrastructure area	N/A	124,123,100[7]	474,640[3]	0.38
Sanderling (wintering and passage)		N/A	124,123,100[7]	474,640[3]	0.38
Knot (wintering and passage)		N/A	124,123,100[7]	474,640[3]	0.38
Redshank (wintering)		N/A	124,123,100[7]	474,640[3]	0.38
Redshank (passage)	Terrestrial – Onshore infrastructure area	N/A	36,002,662	0[3]	0.00
Herring gull (breeding)	Terrestrial and intertidal – Onshore infrastructure area and intertidal infrastructure area	85,600*	23,019,580,346	5,130,635[4]	0.02
Lesser black-backed gull (breeding and non-breeding)		236,000*	174,974,144,434	5,130,635[4]	0.00
Common tern (breeding)	Intertidal – Intertidal infrastructure area	26,900*	248,635,126	0[3]	0.00
Sandwich tern (breeding)		57,500*	3,422,458,382	474,640[3]	0.01
Red-throated diver (non-breeding)		N/A	1,702,900,000[6]	474,640[3]	0.03

[1] The north-west of England metapopulation combined range. [2] The overlapping area of the Onshore Order Limits where works will take place. [3] The overlapping area of habitats that will be disturbed between HAT and MLWS. [4] The overlapping area of the landfall works plus the onshore works area. [5] The area of the Liverpool Bay/Bae Lerpwl SPA (taken from the CAP). [6] The area of the Liverpool Bay available to red-throated diver (taken from the CAP). [7] The area of the Ribble and Alt Estuaries SPA as taken from the citation. * Citations for the range sizes are included in the relevant assessment sections.

Measures adopted as part of the Transmission Assets (Commitments)

1.6.3.63 Measures adopted as part of the Transmission Assets which are of relevance to the assessment of potential impacts on onshore and intertidal ornithological features from temporary loss of habitats and/or resource availability during the construction and decommissioning phases are presented in **Table 1.78**.

Table 1.78: Measures adopted as part of the project which are relevant to the assessment of adverse effect on SPA and Ramsar sites designated for onshore and intertidal ornithology from temporarily habitat loss/disturbance and change in resource availability

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
Step 1: Avoidance	CoT90	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the 400kV Grid Connection Cable Corridor beneath the River Ribble will be undertaken by direct pipe or micro tunnel trenchless installation techniques.	The use of trenchless techniques aims to avoid creating an impact on ornithological receptors from the proposed works.	DCO Schedules 2A & 2B, Requirement 5(3) (Detailed design parameters onshore); and Requirement 8 (Code of Construction Practice).
	CoT110	Construction activities associated with the offshore cable pull in for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited will be undertaken in accordance with the Outline Offshore Cable Specification and Installation Plan (CSIP). This will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e. during the months of November – February, inclusive), unless otherwise agreed with the MMO, in consultation with Natural England. Detailed CSIP(s) will be developed in accordance with the Outline CSIP.	The intertidal area is of high value to over-wintering birds, with the core wintering period of November to February (inclusive) of particular importance. During these months birds are under increased energetic pressure as temperatures are colder and inclement weather likely, potentially impeding foraging activity. Additionally, available benthic prey abundance is generally reduced as these invertebrates bury deeper into the benthos during colder periods. Therefore, the impacts on birds using the intertidal are considered to be higher during the core wintering period.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation).

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
Step 2: Minimise	CoT110	Construction activities associated with the offshore cable pull in for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited will be undertaken in accordance with the Outline Offshore Cable Specification and Installation Plan (CSIP). This will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e. during the months of November – February, inclusive), unless otherwise agreed with the MMO, in consultation with Natural England. Detailed CSIP(s) will be developed in accordance with the Outline CSIP.	While this has the potential cause disturbance, both the spatial extent and the duration of the impact on the intertidal will be minimal.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation).
	CoT125	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the siting and number of compounds associated with the construction activities at the landfall have been sited, where practicable, to avoid key constraints, including the Ribble and Alt Estuaries SPA and the Lytham St. Annes Dunes SSSI, to reduce disturbance upon roosting waders.	Two of the three construction compounds required for works on the upper beach and in the Intertidal Infrastructure Area have been situated away from supratidal and intertidal habitats therefore reducing temporary habitat loss and disturbance to SPA features.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice); DCO Schedule 1 (Authorised Development).

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
	CoT44	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the offshore export cables under Lytham St Annes SSSI and the St Annes Old Links Golf Course will be undertaken by direct pipe trenchless installation technique. The exit pits associated with the direct pipe installation will be at least 100 m seaward of the western boundary of the SSSI.	By going further underground this will reduce the amount of temporary habitat loss on birds that may use the upper shore to roost or loaf	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice).
Step 3: Mitigate/restore	CoT27	All temporary compounds will be removed and sites will be reinstated when construction has been completed.	The removal of this temporary infrastructure will allow bird species to use the habitat at the intertidal in the same way as prior to works commencing.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice) DCO Schedules 2A & 2B, Requirement 16 (Restoration of land used temporarily for construction)

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
	CoT107	Where construction activities are undertaken along the onshore export cable corridor within areas of Functionally Linked Land (Lytham Moss Biological Heritage Site) in proximity to Higher Ballam and Lower Ballam, a mitigation area will be provided for supplementary feeding of pink-footed goose and whooper swan during the core wintering bird period (November to March, inclusive). The feeding may comprise retention of spoiled crop and/or the import of additional feed, as appropriate. In addition, scrapes will be provided for terrestrial wader features. This is detailed within the Outline Ecological Management Plan.	A patch of arable farmland contained within Lytham Moss and adjacent to the Farmland Conservation Area has been identified as the location for mitigation. Supplementary feeding for these species has been successfully implemented within the area. The measures aim to provide similar habitats to those that will be temporarily lost and move sensitive species to an area that avoids disturbance for the duration of works. The scrapes will provide better quality habitat than that to be temporarily lost for loafing geese, ducks, and swans, and foraging, loafing or roosting waders.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan).

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
	CoT113	Where construction activities are undertaken within the Intertidal Infrastructure Area, mitigation measures will be provided at Fairhaven saltmarsh to reduce disturbance upon roosting wader features of Ribble and Alt Estuary SPA. This may comprise a combination of the employment of a warden, educational signage, and soft fencing. This is detailed within the Outline Ecological Management Plan.	Although temporarily lost habitat and/or resource availability at the intertidal cannot be recreated during the duration of works, the Applicants have committed to undertake these mitigation measures at the high tide roost site at Fairhaven saltmarsh. These measures have been designed to reduce the daily energy requirements of the SPA features that have been identified as being potential receptors to the temporary loss of supporting habitats and/or resource availability.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan).
	CoT120	To mitigate for potential permanent habitat loss associated with each of the Onshore Substations, mitigation areas south of Newton-with-Scales will be provided for waders and farmland birds. Measures within these areas may include measures, such as, the creation of scrapes and thickening of hedgerows. This is detailed within the Outline Ecological Management Plan. The final measures will be developed and agreed with the relevant stakeholders as a part of the detailed Ecological Management Plan(s) prior to construction.	Although primarily designed to mitigate the potential for permanent habitat loss, this measure will provide benefit for those species potentially impacted from temporary habitat loss and/or resource availability. This enhanced area will provide a roosting and foraging site for these species away from areas of proposed works.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan)

Construction and decommissioning phase

Liverpool Bay/Bae Lerpwl SPA

1.6.3.64 **Table 1.79** highlights the relevant features, peak counts and areas where impacts are predicted to occur for the Liverpool Bay/Bae Lerpwl SPA.

Table 1.79: Features of the Liverpool Bay/Bae Lerpwl SPA occurring within each area of impact

Area of impact	Features of the Liverpool Bay/Bae Lerpwl SPA	Peak count in area of impact	Peak count as a % of the citation value	Peak count as a % of the latest population estimate
The intertidal and supratidal habitats at the landfall	Common scoter (wintering)	4,000	7.06%	2.82%
	Common tern (passage)	90	25%	25%
	Red-throated diver (wintering)	14	1.2%	0.78%

Common scoter (non-breeding)

1.6.3.65 There is potential for the temporary loss of supporting habitats and/or resource availability to impact upon the foraging and/or loafing/roosting resources for common scoter. The nearshore habitats available at the landfall support at least 4,000 common scoter, which represents 7.06% of the Liverpool Bay/Bae Lerpwl SPA citation population or 2.82% of the current SPA population (HiDef Aerial Surveying Ltd, 2023). Common scoter were present in large numbers during both years of site-specific surveys in the nearshore waters and the inundated intertidal area, especially to the north of the survey area.

1.6.3.66 Common scoter feed mostly on benthic bivalve molluscs within shallow waters between two and 20 m (Kaiser *at al.,* 2006). A total of 474,640m^2 of habitats below HAT will be temporarily lost to common scoter. This equates to 0.02% of the Liverpool Bay/Bae Lerpwl SPA. Although it is acknowledged this may not all be usable habitat for common scoter, due to known distributions of common scoter within the Liverpool Bay (HiDef Aerial Surveying Ltd, 2023) this will still likely represent a small fraction of available habitats. Impacts on common scoter from activities within the Offshore Order Limits are considered in section 3A of this ISAA.

1.6.3.67 Additionally, the Applicants have committed to avoiding intertidal works during the core wintering period, where possible (see **Table 1.78**). Five weeks of construction works are anticipated on the beach within the period of November to February (inclusive), associated with one cable pull-in. This will further reduce impacts during the most sensitive period when energy requirements are high and resource availability low. This period may be extended by up to one week per circuit if cofferdams are not needed for duct install or if cofferdams are removed after tunnel boring machinery is recovered. Therefore, as only a small percentage of available habitats are to be temporarily lost, and the core wintering period avoided, it is concluded that

the temporary loss of supporting habitats and/or resource availability would have negligible impact on common scoter within the Liverpool Bay/Bae Lerpwl SPA.

Common tern (breeding)

1.6.3.68 There is potential that works undertaken at the landfall could temporarily disturb resource availability of common tern, a feature of the Liverpool Bay/Bae Lerpwl SPA. The Liverpool Bay/Bae Lerpwl SPA common tern breed within the Mersey Narrows and North Wirral Foreshore SPA colonies (Natural England *et al*., 2022). These colonies are approximately 30 km from the Onshore Order Limits and Intertidal Infrastructure Area and are therefore beyond the 26.9 km foraging range of common tern (mean max plus one standard deviation as reported by Woodward *et al*. (2019)).

1.6.3.69 Therefore, as there is no connectivity, it is concluded that the temporary loss of supporting habitats and/or resource availability would have negligible impact on common tern within the Liverpool Bay/ Bae Lerpwl SPA.

Red-throated diver (non-breeding)

1.6.3.70 There is potential for the temporary loss of supporting habitats and/or resource availability to impact upon the foraging and/or loafing/roosting resources for red-throated diver. The nearshore waters and intertidal habitats at the landfall support at least 14 red-throated diver representing 1.2% of the SPA citation count or 0.78% of the current SPA estimate (HiDef Aerial Surveying Ltd, 2023).

1.6.3.71 Red-throated diver primarily feed on small fish within the water column (Duckworth *et al.,* 2021) and will normally forage in waters up to 20 m deep but can also be found in deeper water (Natural England *et al*., 2022). Although there is plenty of supporting habitat available for red-throated diver, the displacement effects from OWFs such as the Burbo Bank Extension mean that the amount of functional habitat has decreased. Disturbance and displacement effects are assessed in **paragraph 1.6.3.192** so only the direct temporary loss of supporting habitats and/or resource availability is addressed here. This equates to 474,640 m^2 or 0.03% of the available area for red-throated diver reported in Natural England *et al*. (2022). It is however acknowledged this may not all be usable habitat for red-throated diver.

1.6.3.72 The Applicants have committed to limit duration of construction activities associated with the offshore export cable (including works in the intertidal) during the core wintering period between November and February (CoT110). The Landfall methodology has been refined to be direct pipe trenchless installation rather than HDD (or other trenchless techniques) (CoT44). Direct pipe results in a shorter installation duration and less interaction with the beach (up to two weeks of beach works per cable) which minimises environmental impacts upon designated features of the Ribble and Alt Estuary Special Protection Area (SPA), Ribble and Alt Estuary Ramsar site, Ribble Estuary SSSI, and Lytham St Annes Dunes SSSI. The Applicants commitment to restricting cable pull (i.e. when offshore export cables are brought onshore to the TJBs) during the winter period (CoT110) to minimise

environmental impacts upon designated features of the Ribble and Alt Estuary Special Protection Area (SPA), Ribble and Alt Estuary Ramsar site, Ribble Estuary SSSI, and Lytham St Annes Dunes SSSI.

1.6.3.73 This will further reduce impacts during the most sensitive period when energy requirements are high and resource availability low. This period may be extended by up to one week per circuit if cofferdams are not needed for duct install or if cofferdams are removed after tunnel boring machinery is recovered.

1.6.3.74 Impacts on red-throated diver from activities within the Offshore Order Limits are considered in section 3A of this ISAA.

1.6.3.75 Therefore, as only a small percentage of available habitats are to be temporarily lost, and the core wintering period avoided, it is concluded that the works would have negligible impact on red-throated diver within the Liverpool Bay/Bae Lerpwl SPA.

Conclusions

1.6.3.76 Adverse effects on the Liverpool Bay/Bae Lerpwl SPA which undermine the conservation objectives of the SPA will not occur as a result of temporary loss of supporting habitat and/or resource availability.

Table 1.80: Conclusions against the conservation objectives for the Liverpool Bay/Bae Lerpwl SPA for temporary loss of supporting habitats and/or resource availability

Conservation objective	Conclusion
Maintain the size of the non-breeding population at a level which is at or above 141,801 for common scoter and 1,800 individuals for red-throated diver (mean peak, 2015, 2018, 2019 and 2020).	Due to the small (up to 0.02% and 0.03% respectively) proportion of the Liverpool Bay/Bae Lerpwl SPA and functionally linked habitats (i.e., the intertidal) that is to be affected by the temporary loss of habitat, it is predicted that there will be negligible impacts on the size or the distribution of common scoter and red-throated diver.
Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	
Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	Disturbance is assessed under Disturbance and displacement from construction, decommissioning, and operation and maintenance activities below.
Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	Due to the small (up to 0.02% and 0.03% respectively) proportion of the Liverpool Bay/Bae Lerpwl SPA that is to be affected by the temporary loss of habitat, it is predicted that there will be negligible impacts on the distribution and availability of prey or supporting habitats.
Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	

1.6.3.77 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA as a result of temporary

loss of supporting habitats and/or resource availability with respect to the construction and decommissioning phases of the Transmission Assets alone.

Ribble and Alt Estuaries SPA

1.6.3.78 The qualifying features of the Ribble and Alt Estuaries SPA have different habitat requirements and therefore are not found equally throughout the Onshore Order Limits and Intertidal Infrastructure Area and similarly the scale of impact is also not equal across the area. The specific areas of impact are:

- the intertidal and supratidal environment at the landfall; and
- the terrestrial environment along the onshore export and 400 kV cable grid connection cable corridors. This is mostly composed of arable and pastoral land.

1.6.3.79 Due to the large numbers of features that are to be assessed, the non-breeding and breeding waterbird assemblages will be assessed separately as shown in **Table 1.81**.

1.6.3.80 Only the features that were present during the two years of site-specific survey are assessed as it is assumed that the area is not suitable for the features that were not present, and therefore no adverse effects are predicted for the temporary loss of habitats and/or resources for these features.

Table 1.81: Features of the Ribble and Alt Estuaries SPA occurring within each area of impact

Area of impact	Features of the Ribble and Alt Estuaries SPA	Peak count in area of impact	Peak count as a % of the citation value	Peak count as a % of the latest population estimate
The intertidal and supratidal habitats at the landfall	Oystercatcher (wintering)	1,073	5.79%	6.64%
	Ringed plover (passage)	93	5.61%	2.15%
	Grey plover (wintering)	118	1.26%	2.39%
	Bar-tailed godwit (wintering)	625	3.11%	10.7%
	Dunlin (wintering)	4,200	10.67%	7.27%
	Sanderling (passage)	2,134	32.65%	26.62%
	Sanderling (wintering)	4,702	163.15%	58.66%
	Knot (wintering)	370	0.54%	0.75%
	Redshank (wintering)	70	2.79%	2.83%
	Lesser black-backed gull (breeding)	353	9.81%	7.61%*
	Common tern (breeding)	90	24.73%	No breeding common tern recorded

Area of impact	Features of the Ribble and Alt Estuaries SPA	Peak count in area of impact	Peak count as a % of the citation value	Peak count as a % of the latest population estimate
The terrestrial habitats along the onshore export cable and 400 kV grid connection cable.	Pink-footed goose (wintering)	8,319	70.72%	21.45%
	Whooper swan (wintering)	132	72.53%	18.57%
	Shelduck (wintering)	374	7.59%	7.41%
	Wigeon (wintering)	1,647	1.93%	3.22%
	Teal (wintering)	312	4.36%	3.65%
	Golden plover (wintering)	381	10.59%	7.56%
	Black-tailed godwit (wintering)	423	33.23%	9.35%
	Redshank (passage)	14	0.43%	0.57%

* Taken from the latest SMP count for the RiBBle and Alt Estuaries

Intertidal features

1.6.3.81 Eleven Ribble and Alt Estuaries SPA ornithological features were present within the intertidal environment at the landfall including sanderling which were present as both passage and wintering features. Redshank were also present during passage but in low numbers (**Apx Table 2**) so the higher terrestrial peak count is being used to assess that feature.

1.6.3.82 Up to 474,640 m^2 of intertidal and beach habitat would be temporarily lost during construction. This loss of habitat represents approximately 0.38% of habitats that are available within the SPA for foraging, loafing or roosting.

1.6.3.83 The Applicants have committed to limit duration of construction activities associated with the offshore export cable (including works in the intertidal) during the core wintering period between November and February (CoT110). The Landfall methodology has been refined to be direct pipe trenchless installation rather than HDD (or other trenchless techniques) (CoT44). Direct pipe results in a shorter installation duration and less interaction with the beach (up to two weeks of beach works per cable) which minimises environmental impacts upon designated features of the Ribble and Alt Estuary Special Protection Area (SPA), Ribble and Alt Estuary Ramsar site, Ribble Estuary SSSI, and Lytham St Annes Dunes SSSI. The Applicants committment to restricting cable pull (i.e. when offshore export cables are brought onshore to the TJBs) during the winter period (CoT110) minimises environmental impacts upon designated features of the Ribble and Alt Estuary Special Protection Area (SPA), Ribble and Alt Estuary Ramsar site, Ribble Estuary SSSI, and Lytham St Annes Dunes SSSI.

1.6.3.84 Additionally, the Applicants have committed to mitigation measures to be provided at Fairhaven saltmarsh to reduce disturbance impacts upon roosting wader features of the Ribble and Alt Estuary SPA. Further detail on these measures is provided within **Table 1.78**.

1.6.3.85 Seven wintering features were found to be using the intertidal habitats at the landfall, two passage features and two breeding features.

Wintering

1.6.3.86 Oystercatcher, grey plover, bar-tailed godwit, dunlin, sanderling, knot and redshank were the wintering features that could be impacted by the temporary loss of supporting habitats and/or resource availability. Of these, knot were recorded in relatively low and infrequent numbers (<1% of the citation count and the current SPA estimate, see **Table 1.81**) (see Volume 3, Annex 4.3: Intertidal birds of the ES, document reference: F3.4.3). Therefore, due to the low numbers of birds affected, it is concluded that the works would have negligible impact on knot within the Ribble and Alt Estuaries SPA.

1.6.3.87 Oystercatcher can specialise as shellfish feeders, worm feeders, or generalists (van de Pol *et al*., 2010). Morton *et al*. (2022), suggested that estuarine prey items were more valuable to oystercatcher, and that birds foraging on tidal flats were usually adult birds which are more likely to be site faithful and less flexible in their habitat use than younger birds. They also recorded a maximum winter forging range of 7 km from roosting site to foraging ground. Still *et al*. (2015) mapped regionally important roosts (**Apx Figure 7**). A peak count of 1,073 oystercatcher was recorded within the intertidal habitats at the landfall and this represented 5.79% of the SPA and 6.64% of the recent WeBS estimates. 0.38% of available habitat and/or resources within the SPA will be temporarily lost to oystercatcher.

1.6.3.88 Grey plover are visual foragers and are as adept at foraging at night as they are during the day. The highest densities of wintering grey plover are mostly found further south towards the Alt estuary (Still *et al*., 2015). A peak count of 118 grey plover were recorded during the site-specific surveys equating to 1.26% of the citation count or 2.39% of the current WeBS estimate. In the absence of foraging range data from the literature, 0.38% of available habitat and/or resources within the SPA will be temporarily lost to grey plover.

1.6.3.89 Bar-tailed godwit favour extensive sand and mudflats. The five-year density maps presented in Still *et al*. (2015) show that the main foraging areas for bar-tailed godwit are located further south between the Alt estuary and Southport with only low densities recorded using the landfall. However, there are two known nationally important roost locations approximately 3 to 4 km south of the Onshore Order Limits and Intertidal Infrastructure Area at Fairhaven saltmarsh. Little is reported within the literature regarding bar-tailed godwit winter ranges although it is likely that the birds present at the landfall likely originated from these roosts.

1.6.3.90 At least 625 bar-tailed godwit were present at the landfall, this represents 3.11% of the citation counts and 10.7% of the current SPA population (using the latest WeBS estimate). In the absence of foraging range data from the literature, 0.38% of available habitat and/or resources within the SPA will be temporarily lost to bar-tailed godwit.

1.6.3.91 Dunlin also favour extensive tidal flats and muddy environments, with Still *et al*. (2015) finding higher concentrations of foraging dunlin on the southern side of the Ribble out on the mudflats. This species also roosts at Fairhaven

although this roost site is of lower relative importance than for bar-tailed godwit. Although dunlin were recorded in very high numbers on one occasion in February 2022, they were usually present in the hundreds to one thousand (see Volume 3, Annex 4.3: Intertidal birds of the ES, document reference: F3.4.3, and **Appendix B**) and this one-off higher count may have coincided with disturbance at their roost site, flushing birds further north. The 4,200 peak count represents 10.67% of the SPA citation counts and 7.27% of the current SPA population (using the latest WeBS estimate). In the absence of foraging range data in the literature, 0.38% of available habitat and/or resources within the SPA will be temporarily lost to dunlin.

1.6.3.92 Sanderling are birds of the tide line and forage by dashing in and out of the surf to collect small crustaceans such as brown shrimp *Crangon crangon* (Penning *et al*., 2022) that are washed ashore. Razor clams (*Ensis* spp.) washed ashore after winter storms can also form an important but unpredictable part of their diet (Reneerkens, *et al*., 2009) and many birds can appear to take advantage of this bounty (Kelly, 2008). Still *et al*., (2015) found high densities of foraging sanderling on St Annes beach at the landfall; there are also two nationally important roost locations located close by at Fairhaven saltmarsh.

1.6.3.93 Although sanderling were only present in numbers exceeding 4,000 on one occasion, they were recorded in internationally important numbers in four months of the 24 surveyed, and in nationally important numbers in a further 11 months. They were frequently present at the landfall with June the only month when the species was not recorded. The annual trends for sanderling have increased since the 1980s as has the SPA population with the 2018/2019 to 2022/2023 mean of peak at 8,016 birds. The 4,702 recorded at the landfall represents 58.66% of this and 163.15% of the original citation count taken from 1993/1994 to 1997/1998.

1.6.3.94 The landfall area is of importance for foraging sanderling, however they are mobile foragers and their reported movements out of the Wash to forage on razor clam wrecks (Kelly, 2008) show that they may cover large areas and are flexible in their food choice. In the absence of data on foraging range from the literature, 0.38% of available habitat and/or resources within the SPA will be temporarily lost to sanderling.

1.6.3.95 Redshank favour mud flats and muddy creeks where they forage on polychaete worms and molluscs. Still *et al*. (2015) found higher densities of foraging redshank within the inner estuary. Although small numbers of redshank were observed foraging at the landfall, the peak counts relate to a regular high tide roost located within the concrete sea defences at Starr Gate. The 70 redshank represented 2.79% of the SPA citation count and 2.83% of the latest WeBS count. The habitat loss will not affect the roost, and therefore, it is concluded that the works would have negligible impact on redshank within the Ribble and Alt Estuaries SPA.

1.6.3.96 Although there a high numbers of SPA features present, the fact that temporary loss of supporting habitats and/or resource availability will only affect 0.38% of available habitat and/or resources within the SPA, coupled with the commitment to work outside of the core wintering months (November to February) where possible (barring contingency for bad weather), it is

concluded that the temporary loss of supporting habitats and/or resource availability would have a negligible impact upon the features and conservation objectives for wintering intertidal features.

Passage

1.6.3.97 Ringed plover and sanderling are the passage features that could be impacted by the temporary loss of supporting habitats and/or resource availability.

1.6.3.98 Ringed plover use the Ribble and Alt Estuaries SPA as a stop-off during their post-breeding migration route southwards to Spain and Africa, although small numbers continue to use the site throughout the winter period and some birds may be sedentary. Still *et al*. (2015) found moderate numbers of ringed plover on St Annes Beach. The peak count of 93 ringed plover recorded in August represented 5.61% of the SPA citation count and 2.15% of the latest WeBS estimate. In the absence of data on foraging range in the literature, 0.38% of habitats and/or resources will be temporarily lost to ringed plover.

1.6.3.99 Sanderling are also a passage feature with the citation count of 6,535 (in comparison to the winter citation count of 2,882). Although the WeBS data is not in a format to distinguish between the seasons, the peak count for the Ribble estuary was in July, and August for the Alt estuary, which also indicates that this species is present in higher numbers during the return passage period. However, the passage peak recorded at the landfall was 2,134 which is lower than the number recorded over winter. Nonetheless, this represents 32.65% of the citation count and 26.62% of the current WeBS estimate.

1.6.3.100 As a result of greater benthic prey availability and lower energy requirements than during the wintering period, passage birds are less vulnerable to impacts than wintering birds. Therefore, as temporary loss of supporting habitats and/or resource availability will only impact 0.38% of available habitats, it is concluded that this will have a negligible impact upon the features and conservation objectives for passage intertidal features.

Breeding

1.6.3.101 Lesser black-backed gull and common tern are the breeding features that could be impacted by the temporary loss of supporting habitats and/or resource availability at the landfall.

1.6.3.102 The mean max foraging range (± one standard deviation) of lesser black-backed gull during the breeding season is 236 km (Woodward *et al*., 2019). As they forage over terrestrial and coastal/marine habitats, the loss represents less than 0.00% of available habitats. Recent tracking data suggests that for coastal colony birds, foraging in coastal habitats is more important than might otherwise be predicted, and that coastal habitats are of more importance for coastal breeders than they are for urban breeding lesser black-backed gulls (Langley *et al*., 2022). Therefore, as only a small percentage of available habitats are to be temporarily lost, it is concluded that the works would have negligible impact on lesser black-backed gull within the Ribble and Alt Estuaries SPA.

1.6.3.103 The latest SMP data suggests that the Ribble and Alt Estuaries SPA colony of common tern is not currently in use, with birds foraging within the SPA likely to have come from Preston Dock, Martin Mere, and Brockholes. All of which are within the 26.9 km foraging range of common tern.

1.6.3.104 It is unclear whether or not the decline of the Ribble and Alt Estuaries SPA common tern was caused through a lack of suitable foraging or through predation, disturbance, or change of habitat at the colony site. However, temporary loss of supporting habitats and/or resource availability is still assessed against the ability of restoring the feature. Using a foraging range of 26.9 km (Woodward *et al*., 2019) and excluding all terrestrial habitats leaves a foraging range of 729,204,215 m^2, based upon the former colony location. The area of intertidal habitats that may be temporarily lost to a renewed common tern presence would equate to 0.07% of the available foraging for SPA common tern. Therefore, as only a small percentage of available habitats are to be temporarily lost, it is concluded that the works would have negligible impact on restoring common tern within the Ribble and Alt Estuaries SPA.

1.6.3.105 As there are currently no SPA common tern, and as the quantity of temporarily lost habitat will be minimal for both common tern and lesser black-backed gull, it is concluded that the temporary loss of supporting habitats and/or resource availability would have a negligible impact upon the features and conservation objectives for breeding intertidal features.

Conclusions

1.6.3.106 Adverse effects on the qualifying intertidal features of the Ribble and Alt Estuaries SPA which undermine the conservation objectives of the SPA will not occur as a result of temporary habitat loss/disturbance and changes in prey availability at the landfall. An assessment of the potential impact temporary habitat loss/disturbance and changes in prey availability against each relevant conservation objective is presented in **Table 1.82**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.82: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for temporary loss of supporting habitats and/or resource availability for the features that utilise intertidal habitats

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	All habitats within the SPA will be restored to the previous extent and distribution after the temporary loss. The temporary loss within the SPA would be up to 12 months over a 36 month period and would affect up to 0.38% of available habitats within the SPA. The Applicants have also committed to carrying out most of that work outside of the core wintering period to reduce the impacts at the most sensitive time of the year. Therefore, there will be negligible impacts upon the supporting habitats and their extent and distribution, structure and function, and supporting processes.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely. Maintain or restore the population of each of the qualifying features.	

Conservation objective	Conclusion
	The population or distribution of each feature is not predicted to be impacted as a result of temporary loss of habitat and/or resource availability. The nationally important populations that use the coastal survey area will not be significantly impacted as the works will be undertaken over a relatively limited period of time, the area due to be impacted is small in comparison with locally available habitats (0.38%) and the majority of work is timed to take place outside of the core wintering period (November to February). Although works may temporarily impact the distribution of passage and breeding features these are more mobile and able to exploit resources in other nearby areas. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.
Maintain or restore the distribution of each of the qualifying features within the site.	

Terrestrial features

1.6.3.107 Out of the 20 features of the Ribble and Alt Estuaries SPA and Ramsar site, eight were present within the onshore export cable corridor. This area of temporary habitat loss is outside of the SPA site boundaries but is Functionally linked to the designated sites and therefore classed as 'FLL' (Bowland Ecology, 2021). Species will forage within the arable (goose and swans) and pastoral (waders) fields outside of the SPA boundary. Within a Natural England commissioned report (Chapman and Tyldesley, 2016), it was concluded that land which is functionally linked to an SPA needs to be considered as part of a HRA and assessed against the conservation objectives of the site, even though the impact is outside of the site.

1.6.3.108 The eight features which were present with the onshore export cable corridor during the site-specific surveys were pink-footed goose, whooper swan, shelduck, wigeon, teal, golden plover, black-tailed godwit and redshank (**Table 1.81**).

1.6.3.109 The total terrestrial habitats that will be temporarily lost cover an area of up to 4,655,995 m^2 and are mostly composed of pastoral and arable land.

1.6.3.110 There will be no habitat loss at the Ribble crossing as the Applicants have committed to trenchless techniques which avoid the tidal estuarine habitats entirely.

1.6.3.111 Whilst pink-footed goose mostly feed on root and cereal crops (Devenish *et al.*, 2017) with grass shoots only making up a small proportion of their winter diet, they will often use pasture to loaf on. The site-specific surveys recorded 8,319 pink-footed goose on the terrestrial habitats either directly within or within 500 m of the Onshore Order Limits. This equates to 70.72% of the SPA citation count or, due to increases in the pink-footed goose population, 21.45% of the current WeBS SPA count (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 14.9% of the metapopulation (Devenish, *et al.*, 2015).

1.6.3.112 Pink-footed goose can travel up to 20 km to forage but will travel much further than that on occasion. Using the 20 km distance, and assuming that the geese travel between the north-west SPA roosts (Devenish *et al*., 2015) the area of land to be affected by temporary loss of supporting habitats and/or resource availability represents 0.26% of habitats available to the species.

1.6.3.113 As FLL is to be lost at Lytham Moss, and as it is recognised that high numbers of pink-footed goose use this land, the Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to offset the calorific losses from temporary habitat loss. It is therefore concluded that the works would have negligible impact on pink-footed goose within the Ribble and Alt Estuaries SPA.

1.6.3.114 Whooper swan also have similar feeding requirements to pink-footed goose, although their core foraging range is only 5 km (NatureScot, 2016). Whooper swan have also been recorded using the fields at Lytham Moss to feed.

1.6.3.115 The site-specific surveys recorded a peak of 132 whooper swan. This equates to 72.53% of the citation count and, as whooper swan populations in the Ribble and Alt Estuaries SPA have increased, 18.57% of the current WeBS estimate. Using the roost locations provided in Still *et al*. (2015), the 5 km foraging range of whooper swan is unaffected by habitat loss. Although it is accepted that either the roost location is wrong, or the foraging range is greater, as there is a lack of evidence surrounding these it is not possible to quantify the area of the whooper swan foraging range that will be impacted by habitat loss.

1.6.3.116 As FLL is to be lost at Lytham Moss, and as it is recognised that high numbers of whooper swan use this land, the Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to offset the calorific losses from temporary habitat loss. It is therefore concluded that the works would have negligible impact on whopper swan within the Ribble and Alt Estuaries SPA.

1.6.3.117 Shelduck were recorded using fields throughout the Onshore Order Limits. Shelduck mostly forage on marine molluscs such as *Hydrobia ulvae* that are found in intertidal muds (Viain *et al*., 2011), although they will also exploit freshwater sources of food.

1.6.3.118 The peak count of 374 birds was recorded in February 2024 with consistently higher numbers of birds recorded within this January to March period than at other times. This coincided with a period of extensive flooding of agricultural land with rainfall 60% above the 10-year average (Defra, 2024) and they may have been exploiting the abundance of drowned terrestrial invertebrates. This peak of 374 birds equates to 7.59% of the citation count and 7.41% of the current WeBS estimate. Little is known about the foraging ranges of shelduck although Cimiotti *et al*. (2022) found an interquartile range of 20 to 31 km. Using the lower and more precautionary limit, 0.36% of this will be affected by the temporary loss of supporting habitats and/or resource availability.

1.6.3.119 Therefore, as terrestrial foraging is of low importance to shelduck, and as the area to be temporarily lost is relatively small in comparison with the distance which the species may travel, it is concluded that the works would have negligible impact on shelduck within the Ribble and Alt Estuaries SPA.

1.6.3.120 Overwintering wigeon roost on saltmarsh and coastal marshes and feed on grassland, including both arable and pasture. Wigeon are thought to have a foraging range of 2 km (Bowland Ecology, 2023; Stroud *et al*., 2016) and have a nationally important roost site at Hesketh Out Marsh on the south of the Ribble (Still *et al*., 2015). They are also present in nationally important numbers at Newton Marsh SSSI and were recorded using an area of flooded fields between Newton Marsh and Newton with Scales. A peak count of 1,647 wigeon were recorded within the survey area representing 1.93% of the citation count or 3.22% of the current WeBS estimate.

1.6.3.121 Using the roost locations provided in Still *et al*. (2015), the 2 km foraging range of wigeon is unaffected by habitat loss. Although it is accepted that either the roost location is wrong, or the foraging range is greater, as there is a lack of evidence surrounding these it is not possible to quantify the area of the wigeon foraging range that will be impacted by habitat loss. In addition, the presence of the large Newton Marsh SSSI population within connectivity of the routes adds uncertainty as to whether these are SPA birds or whether they belong to the SSSI population.

1.6.3.122 'One of the key conservation requirements for this species is to maintain open, mixed pastoral/arable landscape close to roost areas' (Stroud *et al.,* 2016), and there is a commitment by the Applicants to permanently enlarge and improve the area south of Newton with Scales for wintering wildfowl and waders (CoT120) including measures such as the creation of scrapes and the blocking of ditches to flood the fields (**Table 1.71**)

1.6.3.123 Therefore, as those resources that are to be temporarily lost will be enlarged and improved in the long term, it is concluded that the works would have negligible impact on wigeon within the Ribble and Alt Estuaries SPA.

1.6.3.124 Teal are a small dabbling duck that forage on plant material and invertebrates (Only, 2009) near to the waters' surface, hence they are often found in shallow water. The foraging range of teal is not reported within the literature and there are two mapped roosts with potential connectivity. These are a nationally important roost site at Marshside near Southport and a roost of lesser importance at Hesketh Out Marsh. There are also nationally important numbers of teal at Newton Marsh SSSI and teal were recorded using an area of flooded fields between Newton Marsh and Newton with Scales. A peak count of 312 teal were recorded equating to 4.36% of the citation count or 3.65% of the current WeBS estimate. Legagneux *et al*. (2009) found foraging ranges up to 2 km for teal.

1.6.3.125 Using the roost locations provided in Still *et al*. (2015), the 2 km foraging range of teal is unaffected by habitat loss. Although it is accepted that either the roost location is wrong, or the foraging range is greater, as there is a lack of evidence surrounding these it is not possible to quantify the area of the teal foraging range that will be impacted by habitat loss. In addition, the presence of the large Newton Marsh SSSI population within connectivity of

the routes adds uncertainty as to whether these are SPA birds or whether they belong to the SSSI population.

1.6.3.126 Over-wintered stubbles, autumn-sown cereal, waste root crops, and especially flooded fields are of importance to this species (Stroud *et al*., 2016). There is a commitment by the Applicants to enlarge and improve the area south of Newton with Scales for wintering wildfowl and waders including measures such as scrapes and the blocking of ditches to flood the fields**.** Therefore, as those resources that are to be temporarily lost will be enlarged and improved in the long term, it is concluded that the works would have negligible impact on teal within the Ribble and Alt Estuaries SPA

1.6.3.127 Wintering golden plover feed preferentially on permanent pasture as this contains greater densities of soil invertebrates in comparison to, for example, winter stubbles (Gillings and Fuller, 1999; Natural England, 2016). They have also been found to take advantage of flooded fields which may yield high numbers of drowned earthworms (Kirby, 1995).

1.6.3.128 A peak count of 381 golden plover was recorded which equates to 10.59% of the citation count and 7.56% of the current WeBS estimate (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). Golden plover are thought to range at least 10 km based on the Natural England SSSI impact zone guidance (Natural England, 2023). The temporary loss of supporting habitats and/or resource availability will affect 0.62% of the 10 km range of golden plover (taken from the SSSI impact zone layer from Natural England, 2023).

1.6.3.129 Although modest numbers of the SPA feature have been recorded using the areas affected by temporary habitat loss, the Applicants have committed to improving nearby areas of habitat for waders such as golden plover (CoT107) as detailed in **paragraphs 1.6.3.126** and **1.6.3.127).** Therefore, as other suitable habitat is to be created locally, it is concluded that the works would have negligible impact on golden plover within the Ribble and Alt Estuaries SPA.

1.6.3.130 Black-tailed godwit favour the freshwater marshy grassland areas of the Ribble and Alt Estuaries SPA (Natural England, 2017). A peak count of 423 black-tailed godwit was recorded, this equates to 33.23% of the SPA citation count. However, the UK non-breeding population of black-tailed godwit has increased 870% since 1974/75 (Woodward *et al*., 2024), as the breeding *limosa* sub-species is only present in small numbers this increase is thought to be *islandica* birds.

1.6.3.131 Jourdan *et al*. (2022) reported a tendency for black-tailed godwit to move towards inland feeding pre-migration. The peak counts within the survey area were recorded in February 2023 and March 2024, therefore aligning with the findings of Jourdan *et al.* (2022). Much lower numbers were recorded at other times of year. Jourdan *et al*. (2022) also reported a mean foraging range of between 10 and 31 km (the mean of 10 birds was 17.3 km). This would mean that the internationally important roosts at Marshside, near Southport would have connectivity. Using the lower (and therefore more precautionary) limit of this foraging range, 0.26% of the black-tailed godwit could be affected by temporary loss of supporting habitats and/or resource

availability. The Applicants have committed to providing both temporary and permanent habitat requirements to counter these potential impacts (CoT107 and CoT120 as detailed in **Table 1.78)**. These measures will also provide additional foraging benefits. Therefore, it is concluded that the works would have negligible impact on black-tailed godwit within the Ribble and Alt Estuaries SPA.

1.6.3.132 Passage redshank were present in very low numbers, only 14 birds or 0.43% of the citation count and 0.57% of the current WeBS estimate. It is therefore concluded that the works would have negligible impact on passage redshank within the Ribble and Alt Estuaries SPA.

1.6.3.133 Although modest numbers of the SPA feature have been recorded using the areas affected by temporary habitat loss, the Applicants have committed to providing both temporary and permanent habitat and food requirements to counter these impacts, as detailed in **Table 1.78**. This, coupled with the low proportions of available habitat to be affected, means that there will be negligible impacts upon terrestrial features.

Conclusions

1.6.3.134 Adverse effects on the qualifying features of the Ribble and Alt Estuaries SPA, which undermine the conservation objectives of the SPA, will not occur as a result of temporary loss of supporting habitats and/or resource availability for terrestrial features. An assessment of the potential impact temporary habitat loss/disturbance and changes in prey availability against each relevant conservation objective is presented in **Table 1.83.** Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.83: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for temporary loss of supporting habitats and/or resource availability for the features that utilise terrestrial habitats

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The temporary loss of habitats and/or resources would be over a maximum 66 month period and would affect approximately 4,655,995 m^2 of terrestrial habitats of which 261,799 m^2 are thought to be highly functionally linked to the Ribble and Alt Estuaries SPA. The Applicants have committed to temporarily creating habitat and supplementary feeding of affected features. Therefore, there will negligible impacts upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	

Conservation objective	Conclusion
Maintain or restore the distribution of each of the qualifying features within the site.	The population or distribution of each feature is not predicted to be impacted as a result of temporary loss of habitat and/or resource availability. There is predicted negligible impacts as the works will be temporary, not affect all areas at the same time, and the area due to be impacted is small in comparison with available habitats within the species foraging range. The Applicants have committed to creating habitat and/or supplementary feeding of affected features. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.

Non-breeding waterbird assemblage

1.6.3.135 The onshore and intertidal survey supported a non-breeding waterbird assemblage of 25,736 birds (as calculated by summing the peaks of all features and assemblage features). This is 7.95% of the SPA citation count and 7.8% of the current WeBS estimate (calculated by summing the 2018/2019 to 2022/2023 mean of peak for all features and assemblage features from both the Ribble estuary and the Alt estuary WeBS site counts (Woodward *et al*., 2024)).

1.6.3.136 As all features have been assessed independently there is not predicted to be any additional impact upon the assemblage. Therefore, it is concluded that the works would have negligible impact on the non-breeding waterbird assemblage within the Ribble and Alt Estuaries SPA.

Breeding waterbird assemblage

1.6.3.137 The onshore and intertidal survey area supported a breeding assemblage of 2,370 birds (as calculated by summing the peaks of all features and assemblage features). This is 8.11% of the SPA citation count. As the WeBS methodology does not systematically count gulls and terns there is no current reliable estimate of the breeding assemblage.

1.6.3.138 As all features have been assessed independently there is not predicted to be any additional impact upon the assemblage. Therefore, it is concluded that the works would have negligible impact on the breeding waterbird assemblage within the Ribble and Alt Estuaries SPA.

Conclusions

1.6.3.139 Adverse effects on the qualifying features of the Ribble and Alt Estuaries SPA which undermine the conservation objectives of the SPA will not occur as a result of temporary habitat loss/disturbance and changes in prey availability. An assessment of the potential impact temporary habitat loss/disturbance and changes in prey availability against each relevant conservation objective (as presented in **paragraph 1.6.2.83**) is presented in **Table 1.84**.

Table 1.84: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for temporary loss of supporting habitats and/or resource availability for the assemblage features

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	All habitats within the SPA will be restored to the previous extent and distribution after the temporary loss. The temporary loss within the SPA would be up to 12 months within the SPA, and up to 66 months of FLL. The connectivity of habitats that support features of the SPA will be maintained throughout the construction period with large areas of similar habitat not impacted (e.g. Newton Marsh SSSI). The Transmission Assets would not prevent the extent, distribution or support processes of the habitats from being maintained.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	Due to winter working practices and mitigation areas there are not predicted to be any impacts at population level, or that impact the distribution of features. Therefore, there are not predicted to be any additional impacts upon the population and distribution of the assemblage features.
Maintain or restore the distribution of each of the qualifying features within the site.	

1.6.3.140 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of temporary habitat loss/disturbance and changes in resource availability with respect to the construction and decommissioning phases of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

1.6.3.141 As per the Ribble and Alt Estuaries SPA the features were split between the impacts on the intertidal and terrestrial habitats (**Table 1.85**). Many of these features have already been assessed for the Ribble and Alt Estuaries SPA. Consequently, only those features not previously assessed and highlighted in yellow will be assessed in this section. The citation counts differ between the SPA and Ramsar so the Ramsar counts are included in **Table 1.85** for completeness.

Table 1.85: Features of the Ribble and Alt Estuaries Ramsar site occurring within each area of impact

Area of impact	Features of the Ribble and Alt Estuaries Ramsar site	Peak count in area of impact	Peak count as a% of the citation value	Peak count as a% of the latest population estimate
The intertidal habitats at the landfall	Oystercatcher (wintering)	1,073	5.67%	6.64%
	Ringed plover (passage)	93	2.47%	2.15%
	Grey plover (wintering)	118	1.07%	2.39%

Area of impact	Features of the Ribble and Alt Estuaries Ramsar site	Peak count in area of impact	Peak count as a% of the citation value	Peak count as a% of the latest population estimate
	Bar-tailed godwit (wintering)	625	4.49%	10.7%
	Dunlin (passage)	1,031	2.7%	1.79%
	Sanderling (passage)	2,134	28.83%	26.62%
	Knot (wintering)	370	0.87%	0.75%
	Common tern (breeding)	90	24.73%	No breeding common tern recorded within the SPA
The terrestrial habitats along the onshore export cables and 400 kV grid connection	Pink-footed goose (wintering)	8,319	126.97%	21.45%
	Whooper swan (wintering)	132	62.56%	18.57%
	Wigeon (wintering)	1,647	2.36%	3.22%
	Teal (wintering)	312	6.11%	3.65%
	Golden plover (wintering)	381	10.62%	7.56%
	Black-tailed godwit (passage)	137	4.12%	3.03%
	Redshank (passage)	14	0.31%	0.57%

Landfall features

1.6.3.142 Passage dunlin are the only intertidal feature that differs from the SPA citation. 1,031 dunlin were recorded during the passage period. This equates to 2.7% of the Ramsar citation count or 1.79% of the current WeBS estimate. As the area of intertidal flats to be impacted by temporary loss of supporting habitats and/or resource availability is only 0.38% of available habitats within the Ramsar site, it is therefore concluded that the works would have negligible impact on dunlin within the Ribble and Alt Estuaries Ramsar site.

Conclusions

1.6.3.143 Adverse effects on the qualifying intertidal features of the Ribble and Alt Estuaries Ramsar site will not occur as a result of temporary loss of supporting habitats and/or resource availability.

Terrestrial features

1.6.3.144 A peak count of 137 black-tailed godwit were recorded during passage or 4.12% of the SPA citation count and 3.03% of the current WeBS estimate. The impact will affect 0.26% of the potential habitat available to black-tailed godwit.

1.6.3.145 As the Applicants have committed to creating permanent habitat that will benefit shoveler, curlew and black-tailed godwit to the south of Newton with Scales, and as these species have already been recorded as using this area it is therefore likely that they will use the mitigation area. Therefore, it is concluded that there will be negligible impacts for these features within the Ribble and Alt Estuaries Ramsar site.

Conclusions

1.6.3.146 Adverse effects on the qualifying terrestrial features of the Ribble and Alt Estuaries Ramsar site will not occur as a result of temporary loss of supporting habitats and/or resource availability.

Martin Mere SPA

1.6.3.147 **Table 1.86** below highlights the relevant species counts and the area where impacts are predicted to occur.

Table 1.86: Features of the Martin Mere SPA occurring within each area of impact

Area of impact	Features of the Martin Mere SPA	Peak count in area of impact	Peak count as a % of the citation value	Peak count as a % of the latest population estimate
The terrestrial habitats along the onshore export cables and 400 kV grid connection	Pink-footed goose (wintering)	8,319	46.22%	21.45%

Pink-footed goose

1.6.3.148 The designated site is situated 11.5 km from the Onshore Order Limits which is within home range of pink-footed goose. As previously mentioned, pink-footed goose can forage over a large area, with a core range of 20 km from the roosting location.

1.6.3.149 As pink-footed goose can forage over a large area there is potential that the birds foraging within the cable corridors are not from the Martin Mere population. However, the north west of England population is formed of birds which travel between the SPAs.

1.6.3.150 The site-specific surveys recorded 8,319 pink-footed goose on the terrestrial habitats within or adjacent to the Onshore Order Limits. This equates to 46.22% of the SPA citation count, 21.45% of the current WeBS estimate (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 14.9% of the north west England metapopulation (Devenish *et al*., 2015).

1.6.3.151 Pink-footed goose can travel up to 20 km to forage but will travel much further than that on occasion. Using the 20 km distance, and assuming that the geese travel between the north-west SPA roosts (Devenish *et al*., 2015) the area of land to be affected by temporary loss of supporting habitats and/or resource availability represents 0.26% of habitats available to the species.

1.6.3.152 The Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as construction takes place and will aim to offset the calorific losses from temporary habitat loss. Therefore, as those resources that are to be temporarily lost will be compensated, it is concluded that the works would have negligible impact on pink-footed goose within the Martin Mere SPA.

Conclusions

1.6.3.153 Adverse effects on the qualifying features of the Martin Mere SPA which undermine the conservation objectives of the SPA will not occur as a result of temporary loss of supporting habitats and/or resource availability. An assessment of the potential impact against each relevant conservation objective (as presented in **paragraph 1.6.2.98**) is presented in **Table 1.87**.

Table 1.87: Conclusions against the conservation objectives of the Martin Mere SPA for temporary loss of supporting habitats and/or resource availability

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	As only 0.26% of available habitats within the core foraging range will be impacted, and none within the SPA, there will be negligible effects on the extent and distribution, structure and function, and the supporting process upon which pink-footed goose rely.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	As temporary food provision will be provided, the temporary loss of 0.26% of habitats is not predicted to impact upon the population or distribution of the qualifying features.
Maintain or restore the distribution of the qualifying features within the site.	

1.6.3.154 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Martin Mere SPA and Ramsar site as a result of temporary loss of supporting habitats and/or resource availability with respect to the construction and decommissioning phases of the Transmission Assets alone.

Martin Mere Ramsar Site

Pink-footed goose

1.6.3.155 As the features that may be impacted by the temporary loss of supporting habitats and/or resource availability are the same for Martin Mere Ramsar site as for Marton Mere SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site. The differences in citation counts can be seen in **Table 1.67**.

Conclusions

1.6.3.156 Adverse effects on the qualifying features of the Martin Mere Ramsar site which undermine the conservation objectives of the Ramsar site will not occur as a result of temporary loss of supporting habitats and/or resource

availability. An assessment of the potential impact against each relevant conservation objective (as presented in **paragraph 1.6.2.98**) is presented in **Table 1.87**.

Morecambe Bay and Duddon Estuary SPA

1.6.3.157 **Table 1.88** below highlights the relevant species counts and the area where impacts are predicted to occur.

Table 1.88: Features of the Morecambe Bay and Duddon Estuary SPA occurring within each area of impact

Area of impact	Features of the Ribble and Alt Estuaries Ramsar site	Peak count in area of impact	Peak count as a% of the citation value	Peak count as a% of the latest population estimate
The intertidal habitats at the landfall	Sandwich tern (breeding)	427	56.16%	36.25%
The terrestrial habitats along the onshore export cables and 400 kV grid connection	Pink-footed goose (wintering)	8,319	126.97%	14.9%*
	Golden plover (wintering)	381	20.05%	6.48%
	Curlew (wintering)	696	5.7%	6.56%
Both areas	Herring gull (breeding)	1,543	8%	N/A
	Lesser black-backed gull (breeding)	353	3.63%	N/A
	Lesser black-backed gull (non-breeding)	205	2.17%	N/A

* The northwest of England metapopulation (Devenish *et al*., 2015)

Pink-footed goose

1.6.3.158 As previously described for both the Ribble and Alt Estuaries SPA and Ramsar site and Martin Mere SPA and Ramsar site, pink-footed goose form part of a metapopulation within the north west of England.

1.6.3.159 A peak count of 8,319 pink-footed goose was recorded on the terrestrial habitats within or adjacent to the Onshore Order Limits. This represented 56.16% of the SPA citation count and 39.01% of the current WeBS estimate for the Morecambe Bay and Duddon estuary WeBS sites (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 14.9% of the metapopulation (Devenish, *et al*., 2015).

1.6.3.160 Pink-footed goose can travel up to 20 km to forage but will travel much further than that on occasion. Using the 20 km distance, and assuming that the geese travel between the north-west SPA roosts (Devenish *et al*., 2015) the area of land to be affected by temporary loss of supporting habitats and/or resource availability represents 0.26% of habitats available to the species.

1.6.3.161 The Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to offset the calorific losses from temporary habitat loss. Therefore, as those resources that are to be temporarily lost will be compensated, it is concluded that the works would have negligible impact on pink-footed goose within the Morecambe Bay and Duddon Estuary SPA.

Golden plover

1.6.3.162 Golden plover can range up to 10 km from a designated site during the winter period (Natural England, 2023) and therefore as the Morecambe Bay and Duddon Estuary SPA is approximately 9.3 km from the Onshore Order Limits there is potential that birds using the pastoral and arable land for foraging could be connected to the SPA. Up to 381 golden plover were recorded during the site-specific surveys. This represented 20.05% of the SPA citation count or 6.48% of the current WeBS estimate for the Morecambe Bay and Duddon estuary WeBS sites (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). Using the 10 km buffer from the Morecambe Bay golden plover roost site less than 0.00% of the range will be affected by temporary loss of supporting habitats and/or resource availability.

1.6.3.163 Due to the distance from the SPA and the small proportion of the species foraging range that will be impacted, it is concluded that there will be negligible impacts for golden plover within the Morecambe Bay and Duddon Estuary SPA.

Curlew

1.6.3.164 A peak count of 696 curlew were recorded during the site-specific surveys and this represented 5.7% of the SPA citation count or 6.56% of the current WeBS estimate for the Morecambe Bay and Duddon estuary WeBS sites. Using the Morecambe Bay roost site 0.76% of the foraging range will be affected by temporary loss of supporting habitats and/or resource availability assuming a 15 km foraging range for this species.

1.6.3.165 Due to the distance from the SPA and the small percentage of the foraging range that will be impacted, it is concluded that there will be negligible impacts for curlew within the Morecambe Bay and Duddon Estuary SPA.

Herring gull (breeding)

1.6.3.166 A peak count of 1,600 herring gull were recorded at the landfall. This equates to 8% of the citation count however numbers nesting in the SPA are now much lower due to the change towards urban nesting (Burnell, 2021). As herring gull use both coastal and terrestrial habitats for foraging they will be impacted by works in both locations. Herring gull have a foraging range of 85.6 km (Woodward *et al*., 2019), this means that the supporting habitats and/or resource availability that will be temporarily lost will be 0.02%. It is therefore concluded that there will be negligible impacts for the feature within the Morecambe Bay and Duddon Estuary SPA.

Lesser black-backed gull (breeding)

1.6.3.167 A peak count of 353 breeding season lesser black-backed gull were recorded during the site-specific surveys. This equates to 3.63% of the SPA citation (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**) count however numbers nesting in the SPA are now much lower due to the change towards urban nesting (Burnell, 2021). As lesser black-backed gull use both coastal and terrestrial habitats for foraging (Langley *et al*., 2023) they will be impacted by works in both locations. Lesser black-backed gull have a foraging range of 236 km (Woodward *et al*., 2019), which means that the habitats that will be lost temporarily will be less than 0.00% of their total range. It is therefore concluded that there will be negligible impacts for the feature within the Morecambe Bay and Duddon Estuary SPA.

Lesser black-backed gull (non-breeding)

1.6.3.168 During the non-breeding season 205 lesser black-backed gull were recorded. This equates to 2.17% of the citation (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), however there is no reliable current wintering population estimate to compare it against. During the non-breeding season gulls are very flexible in their habitat use and are not tied to nest sites. The wintering range for lesser black-backed gull is likely to be higher than during the breeding season and as they are non-specialist foragers it is concluded that there will be negligible impacts for lesser black-backed gull within the Morecambe Bay and Duddon Estuaries SPA.

Sandwich tern (breeding)

1.6.3.169 A peak count of 427 sandwich tern were recorded loafing on the intertidal habitats at the landfall in August 2023. This represented 26.55% of the citation count for breeding birds and 36.25% of the current SMP estimate. However, as this species was not recorded during the core egg laying and chick rearing period (see Volume 3. Annex 4.3: Intertidal birds of the ES, document reference: F3.4.3), it is likely that this loafing flock of terns represented post breeding passage birds. The area of habitats and/or resources to be temporarily lost represents 0.01% of their available foraging range (mean max plus one SD as taken from Woodward *et al*, (2019)). Therefore, it is concluded that there will be negligible impacts for lesser black-backed gull within the Morecambe Bay and Duddon Estuaries SPA.

Conclusions

1.6.3.170 Adverse effects on the qualifying waterbird features of the Morecambe Bay and Duddon Estuary SPA which undermine the conservation objectives of the SPA will not occur as a result of temporary loss of supporting habitats and/or resource availability. An assessment of the potential impact against each relevant conservation objective is presented in **Table 1.89**.

Table 1.89: Conclusions against the conservation objectives for Morecambe Bay and Duddon Estuary SPA for temporary loss of supporting habitats and/or resource availability

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	It is concluded that there will be negligible impact on the extent and distribution, structure and function, and the supporting process upon which features rely. This is due to the distance from the SPA, the very low proportions of available foraging ranges that are to be temporarily lost, and owing to the commitment the Applicants have made to support the calorific needs of pink-footed goose by creating habitat suitable for waders.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	As temporary food provision and habitat will be provided for wintering features, the temporary loss of habitats is predicted to have a negligible impact upon the population or distribution of the qualifying features.
Maintain or restore the distribution of the qualifying features within the site.	

1.6.3.171 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Estuary SPA as a result of temporary loss of supporting habitats and/or resource availability with respect to the construction and decommissioning phases of the Transmission Assets alone.

Morecambe Bay Ramsar site

1.6.3.172 As the features that may be impacted by the temporary loss of supporting habitats and/or resource availability are the same for Morecambe Bay Ramsar site as for the Morecambe Bay and Duddon Estuary SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site. The differences in citation counts can be seen in **Table 1.67**.

Bowland Fells SPA

1.6.3.173 **Table 1.90** below highlights the relevant species counts and the area where impacts are predicted to occur.

Table 1.90: Features of the Bowland Fells SPA occurring within each area of impact

Area of impact	Features of the Martin Mere SPA	Peak count in area of impact	Peak count as a % of the citation value	Peak count as a % of the latest population estimate
Both areas	Lesser black-backed gull (wintering)	353	3.86%	1.2%

1.6.3.174 A peak count of 353 breeding season lesser black-backed gull were recorded. This represents 3.86% of the SPA citation count and 1.2% of the latest SMP estimate (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). As lesser black-backed gull use both coastal and terrestrial habitats for foraging (Langley *et al*., 2023) they will be impacted by

works in both locations. Lesser black-backed gull have a foraging range of 236 km (Woodward *et al*., 2019), this means that the habitats that will be lost temporarily will be less than 0.00% of their total range. It is therefore concluded that there will be negligible impacts for the feature within the Bowland Fells SPA.

Conclusions

1.6.3.175 Adverse effects on the qualifying features of the Bowland Fells SPA which undermine the conservation objectives of the SPA will not occur as a result of temporary loss of supporting habitats and/or resource availability. An assessment against each relevant conservation objective is presented in **Table 1.91**.

Table 1.91: Conclusions against the conservation objectives of the Bowland Fells SPA for temporary loss of supporting habitats and/or resource availability.

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	It is concluded that there will be negligible impact on the extent and distribution, structure and function, and the supporting process upon which features rely. This is due to the distance from the SPA, the very low proportions of available foraging ranges that are to be temporarily lost, and owing to the commitment the Applicants have made to support the calorific needs of pink-footed goose by creating habitat suitable for waders.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	The temporary loss of habitats is predicted to have a negligible impact upon the population or distribution of the qualifying features.
Maintain or restore the distribution of the qualifying features within the site.	

1.6.3.176 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Bowland Fells SPA as a result of temporary loss of supporting habitats and/or resource availability with respect to the construction and decommissioning phases of the Transmission Assets alone.

Operation and maintenance phase

1.6.3.177 Within the Intertidal Infrastructure Area there may be the requirement to rebury up to one km of cable every five years for Morgan, additionally there may be the requirement to repair and subsequently rebury up to one km every 10 years. Morecambe have envisaged that a precautionary 2.4 km of intertidal cable may be subject to repair and reburial and predict one event every 10 years, additionally it is predicted that there may be reburial events of approximately 500 m every five years. This equates to a lifetime (assuming 35 years for Morecambe and 35 years for Morgan) reburial of 10.5 km for Morgan and 11.9 km for Morecambe, a combined total of up to 22.4 km. However, these maintenance works to rebury/replace and carry out repair works are likely to require on average between 250 to 500 m of cable repair and/or reburial per event with each event generally taking approximately two to four weeks. Although there is potential for works to be similar in scope as

during the construction phase, these works are likely to concentrate on small areas at a time. Therefore, the magnitude will be of a similar or lesser scale than during construction.

1.6.3.178 There will be no additional temporary habitat loss within the Onshore Order Limits and therefore no operation and maintenance impacts upon terrestrial features.

Liverpool Bay/Bae Lerpwl SPA

Common scoter

1.6.3.179 At any one time during operation and maintenance, there will be a maximum of 500 x 50 m (working corridor) of habitat loss. This equates to 25,000 m^2 which is less than 0.0% of the available habitats in the Liverpool Bay/ Bae Lerpwl SPA. Therefore, it is concluded that the temporary loss of supporting habitats and/or resource availability would have a negligible impact on common scoter within the Liverpool Bay/ Bae Lerpwl SPA.

Common tern

1.6.3.180 As discussed, there is no connectivity with the Intertidal Infrastructure Area for the Liverpool Bay/ Bae Lerpwl SPA common tern, it is concluded that the temporary loss of supporting habitats and/or resource availability would have negligible impact on common tern within the Liverpool Bay/ Bae Lerpwl SPA.

Red-throated diver

1.6.3.181 At any one time during operation and maintenance, there will be a maximum of 500 x 50 m (working corridor) of habitat loss. This equates to 25,000 m^2 which is less than 0.0% of the available habitats in the Liverpool Bay/ Bae Lerpwl SPA. Therefore, it is concluded that the temporary loss of supporting habitats and/or resource availability would have a negligible impact on red-throated diver within the Liverpool Bay/Bae Lerpwl SPA.

Ribble and Alt Estuaries SPA

Intertidal features

1.6.3.182 At any one time during operation and maintenance, there will be a maximum of 500 x 50 m (working corridor) of habitat loss. This equates to 25,000 m^2 which is less than 0.0% of the available habitats in the Liverpool Bay/ Bae Lerpwl SPA. Therefore, it is concluded that the temporary loss of supporting habitats and/or resource availability over a five year period would have a negligible impact on the intertidal features within the Ribble and Alt Estuaries SPA.

Terrestrial features

1.6.3.183 There are not predicted to be any operational and maintenance loss of habitat and/or resources that impact the terrestrial features of the Ribble and Alt Estuaries SPA.

Ribble and Alt Estuaries Ramsar

1.6.3.184 As the features that may be impacted by the temporary loss of supporting habitats and/or resource availability are the same for Ribble and Alt Estuaries Ramsar site as for the Ribble and Alt Estuaries SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site.

Martin Mere SPA

1.6.3.185 Temporary habitat loss is not predicted to impact the terrestrial feature. Therefore, there will be no adverse effects on site integrity for either Martin Mere SPA.

Martin Mere Ramsar

1.6.3.186 As the features that may be impacted by the temporary loss of supporting habitats and/or resource availability are the same for Martin Mere Ramsar site as for the Martin Mere SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site

Morecambe Bay and Duddon Estuaries SPA

Terrestrial features

1.6.3.187 There will be no operational and maintenance loss of habitat and/or resources that affect the terrestrial features of the Morecambe Bay and Duddon Estuaries SPA.

Intertidal features

1.6.3.188 The additional impacts upon the gull and tern features of the Morecambe Bay and Duddon Estuaries are all predicted to affect less than 0.02% of available habitats for these features. Therefore, there will be no adverse effects on site integrity for the gull and tern features of the Morecambe Bay and Duddon Estuaries SPA.

Morecambe Bay Ramsar

1.6.3.189 As the features that may be impacted by the temporary loss of supporting habitats and/or resource availability are the same for Morecambe Bay Ramsar site as for the Morecambe Bay and Duddon Estuary SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site.

Bowland Fells SPA

Lesser black-backed gull

1.6.3.190 The additional impacts upon the lesser black-backed gull of the Bowland Fells SPA are all predicted to affect less than 0.00% of available habitats for

this feature. Therefore, there will be no adverse effects on site integrity for the Bowland Fells SPA.

Decommissioning phase

1.6.3.191 The extent of temporary habitat disturbance to intertidal habitats that may occur as a result of decommissioning activities (i.e. removal of the export cables in the intertidal) is predicted to be of an equal or lesser magnitude than for the construction phase.

Disturbance and displacement from construction, decommissioning, and operation and maintenance activities

1.6.3.192 Disturbance and displacement arising from activities associated with the construction and decommissioning of the Transmission Assets has the potential to temporarily impact SPAs or Ramsar sites. The SPA sites and Ramsar sites screened in for this impact are included within **Table 1.3**. The MDS is included within **Table 1.92**

1.6.3.193 The activities associated with construction, operation and maintenance and decommissioning may disturb waterbirds from the terrestrial and intertidal habitats in the short term. This may cause changes 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, this in turn can have a detrimental impact on bird survival and productivity.

1.6.3.194 Each species has differing levels of sensitivity to disturbance and therefore the area affected (and consequently lost to displacement) will be different for each species. This has been quantified in **Table 1.93** with the buffer areas used for assessment shown in **Apx Figure 1** to **Apx Figure 26**. No published sensitivity data is available for gull species. However, as gull species regularly use urban areas it is assumed that they have a high tolerance to disturbance. Nevertheless, as a precautionary measure a minimum disturbance distance of 100 m has been assumed for gulls.

1.6.3.195 During the construction phase the installation of export cables at the landfall will take two weeks per cable with only one installed at any one time. The cable trench between MHWS and HAT will be up to 300 m long and 10 m wide, the trench will be dug by a backhoe digger or similar. There will be a total working area of 50 m encompassing the trench. The trench below MHWS will be 3 m wide within a 50 m working corridor and 1,250 m in length. It will be installed by a beach trencher. In addition, there will be cofferdams surrounding the exit pits of the direct pipe on the upper beach, these will be 200 m^2, constructed one at a time and will be within the trenching corridor. The cofferdams may be retained for the recovery of the tunnel boring machinery and cable pull-in. There will also be a temporary beach compound at 50 m x 50 m whilst works are taking place. Only one cable is to be laid at any one time, therefore this equates to a working area at any one time of 80,000 m^2 plus the appropriate buffer for each species (**Table 1.92**).

1.6.3.196 For the onshore works the MDS assumes that all works are taking place at the same time, in reality this is unlikely to happen and thus the disturbance/displacement zones quantified in **Table 1.92** are very precautionary in nature. It is more likely that disturbance will move along the corridor as the works progress. The 66 months given as the duration is also the time from start to finish and does not reflect the time for which the entire area will be subject to disturbance. However, in lieu of further details this timeframe has been applied to the assessment on a precautionary basis.

1.6.3.197 During operation and maintenance there is not predicted to be any additional disturbance along the Onshore Order Limits. However, within the Intertidal Infrastructure Area there may be the requirement to rebury up to one km of cable every five years for Morgan, additionally there may be the requirement to repair and subsequently rebury up to one km every 10 years. Morecambe have envisaged that a precautionary 2.4 km of intertidal cable may be subject to repair and reburial and predict one event every 10 years, additionally it is predicted that there may be reburial events of approximately 500 m every five years. This equates to a lifetime (assuming 35 years for Morecambe and 35 years for Morgan) reburial of 10.5 km for Morgan and 11.9 km for Morecambe, a combined total of up to 22.4 km. However, these maintenance works to rebury/replace and carry out repair works are likely to require on average between 250 to 500 m of cable repair and/or reburial per event with each event generally taking approximately two to four weeks. Although there is potential for works to be similar in scope as during the construction phase, these works are likely to concentrate on small areas at a time. Therefore, the magnitude will be of a similar or lesser scale than during construction.

Table 1.92: Maximum design scenario considered for the assessment of potential impacts from disturbance and displacement from activities associated with construction, decommissioning, and operation and maintenance activities.

Phase [a]			Maximum design scenario	Justification
C	O	D		
✓	✓	✓	**Construction phase: landfall (sequential)** • The cable will be floated in as far as possible with the dry section of the beach needing up to 600 pile driven cable rollers to be installed. • Open trenching in the intertidal area (MLWS to MHWS): There will be 6 cables in total (four for Morgan and two for Morecambe). The maximum number of cables to be laid at any one time will be one. • From the exit pits the open trench will be 10 m wide at the top and up to 300 m long. There will be 20 m either side of the trench for vehicles and personnel to use. • The open trench will transition to a beach trencher, this will be 3 m wide and up to 1,250 m long, the trench will be contained within a working corridor with a 50 m width. • There will be two intermediate pulling platforms per cable. • There will be up to 600 cable roller boxes per cable pull in, or 3,600 in total. Each roller box will be installed via a single vibro-pile spaced at approximately 3 m. • One cofferdam will be required per cable. • There will be one storage compounds on the beach, this will be 50 m x 50 m. • The loudest activities on the beach will be piling. This has an at source volume of 115 dB, this decays to 72 dB at 50 m from source. • In a sequential scenario, works will take place over a 66-month period. However, the duration of active construction works is expected to be shorter with up to two weeks direct pipe installation and up to six weeks per cable pull in. **Construction phase: onshore export cables (sequential)** • The maximum number of trenches will be six, with an indicative target trench depth of 1.2 m. • Construction corridor width 100 m, with a length of up to 17 km. Width will include two haul roads. There will be up to 110 joint bays and 110 link boxes. Temporary habitat	**Construction phase** Open cut trenching in the intertidal area (and any short section above MHWS between the HDD exit pit and MHWS) would result in the largest compound footprint and largest total area of disturbance. Direct pipe will be used to install the landfall beneath Lytham St Annes Dunes SSSI. All major crossings, such as major roads, river and rail crossings will be undertaken using HDD or other trenchless techniques, where practicable. In terms of noise disturbance (and potentially disturbance from lighting), trenchless techniques are likely to represent the MDS, particularly if 24-hour drilling activity is required. Disturbance may also result from construction traffic using the haul road. In terms of duration, the MDS is represented by sequential construction of the Morgan Offshore Wind Project: Transmission Assets and the Morecambe Offshore Windfarm: Transmission Assets (rather than concurrent construction), as this represents the longest overall period. The MDS is represented by the largest permanent footprint for the onshore substations, which represents the largest physical impact and greatest area of habitat loss, land disturbance and the greatest risk of spreading INNS.

Phase [a]			Maximum design scenario	Justification
C	O	D		
			loss due to joint bays construction will amount to 2,750 m^2. Area of permanent habitat loss due to link boxes will amount to 440 m^2. • For Morgan there may be up to four compounds of 150 m x 100 m each, with a further one compound of 100 m x 100 m. For Morecambe there may be up to four compounds of 115 m x 100 m and a further one compound of 100 m x 75 m. Duration of installation of up to 66 months (sequentially) for all compounds. • The maximum number of trenchless technique locations is 120. Each major trenchless technique location will have a compound, measuring up to 150 m x 100 m. Drilling mud will be stored and used at these compounds. There would be up to 720 launch pits and 720 exit pits associated with the trenchless techniques, totalling 144,000 m^2 of interim habitat loss. • No construction works directly related to Transmission Assets are proposed outside of the Onshore Order Limits and Intertidal Infrastructure Area, as defined in Volume 1, Chapter 3: Project description of the ES (document reference: F1.3). • Duration of installation of up to 66 months assuming a sequential construction scenario. **Construction phase: 400 kV grid connection cable (sequential)** • Open cut trenching: The maximum number of trenches will be four, with a target trench depth of 1.2 m. The width of the cable corridor is 76 m. There will be a total of 60 joint bays and 60 link boxes. Temporary habitat loss due to joint bays construction will amount to 15,000 m^2. Area of permanent habitat loss due to link boxes will amount to 240 m^2. • For Morgan there will be three compounds of 150 x 100 m and one further compound of 100 x 100 m. For Morecambe there will be three compounds of 115 x 100 m and one further compound of 100 x 75 m. • The working area will include a construction corridor width of 50 m (which includes two haul roads), with a length of up to 13 km. Duration of installation of up to 66 months (sequential construction). • There will be a maximum of 46 trenchless techniques crossings (excluding the Ribble Estuary crossing) and the trenchless techniques compound locations will be 76 m x 50 m. Onshore survey areas at each crossing will require 46 launch pits and 46 exit pits.	**Decommissioning phase** Decommissioning is expected to operate within the parameters identified for construction.

Phase [a]			Maximum design scenario	Justification
C	O	D		
			• The River Ribble direct pipe crossing: There will be a maximum corridor width of 150 m and a maximum length of the crossing of 650 m. A maximum of four launch pits and four reception pits will be required, with a depth of up to 45 m each. The maximum permanent area of start pits will be 450 m^2 per circuit and finish pits will be 750 m^2 per circuit. The approximate maximum duration of works will be 24 months. • In a concurrent direct pipe scenario there are up to two compounds to the north and one to the south with a total area of 10,500 m^2 to the north and 60,000 m^2 to the south. • Duration of installation is up to 66 months (sequential construction). • No excavation or intrusive works associated with the construction of the electrical infrastructure will occur within the biodiversity benefit/mitigation areas. **Construction phase: onshore substations (sequential)** • Two access roads at 15 m width (each). • The area of temporary compounds (combined) includes working and laydown areas (excludes permanent substation footprint) is 122,500 m^2 (additional to permanent footprint). • Duration: 12 months for enabling works, 54 months for main construction and 19 months for testing/commissioning. **Operation and maintenance phase (concurrent)** • Morecambe have envisaged that a precautionary 2.4 km of intertidal cable may be subject to repair and reburial every 10 years. • Morecambe also predict that there may be reburial events of approximately 500 m every five years. • Morgan have envisaged that up to 1 km of intertidal cable may be subject to repair and reburial and also predict one event every 10 years. • Morgan also predict up to four reburial events of approximately 1 km every five years. • This equates to a lifetime (assuming 35 years for Morecambe and 35 years for Morgan) reburial of 10.5 km for Morgan and 11.9 km for Morecambe, or 22.4 km for both combined. • Repair and reburial events are expected to be similar in scale, activities and equipment as the construction phase at the landfall described above, although these are predicted to be limited to sections of between 250 and 500 m at a time, rather than the entire	

Phase [a]			Maximum design scenario	Justification
C	O	D		
			landfall (i.e. up to 25,000 m^2 of temporary habitat loss per event assuming a maximum 50 m working corridor). • Repair and reburial events are expected to be shorter duration than those of construction with and will take between two and four weeks per event. **Decommissioning phase** • Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction).	

Information to inform the assessment

1.6.3.198 The area of the birds' range overlapping with the area of disturbance and displacement was quantified using the QGIS tool 'overlap analysis'. Roost and colony locations (specified in Still *et al*. (2015) and the SMP database) had foraging ranges added (citations for the range sizes are included in the relevant species assessment sections). These ranges were clipped either to:

- Land at MHWS, for terrestrial species such as pink-footed goose,
- Sea at MHWS for marine foraging species such as common tern or;
- Left unclipped for species that utilise both the marine and terrestrial environment such as lesser black-backed gull.
- For specialist intertidal birds their range was taken as the entire area of the SPA and assumes that all tidal flat, salt marsh and upper beach habitats are available for foraging and roosting activities.
- For the Liverpool Bay/Bae Lerpwl SPA feature red-throated diver, the range was taken as the amount of the SPA available for the species and was taken from the CAP document (Natural England, 2023). In the absence of any CAP advice for common scoter the range was assumed to be the entire SPA.

1.6.3.199 Once the ranges had been quantified, the relevant infrastructure areas were used in the analysis (Onshore Order Limits minus mitigation areas for terrestrial species, Intertidal Infrastructure Area for intertidal and marine species, and both for species that exploit both areas). These were then buffered according to the various disturbance distances reported in Goodship and Furness (2022) and Cutts *et al*. (2013). The resulting overlap is reported as a percentage of the possible foraging range in **Table 1.93.**

1.6.3.200 **Apx Figure 1** to **Apx Figure 26** show the roost and colony sites used, plus how the foraging ranges overlap with the relevant Onshore Order Limits and Intertidal Infrastructure Area plus the species-specific buffers.

Table 1.93: Disturbance distances for affected features and proportions of their potential range that could potentially be affected by disturbance and displacement from construction, decommissioning, and operation and maintenance activities

Species	Area subject to disturbance	Sensitivity to disturbance	Disturbance distance (metres)*	Area subject to potential disturbance (m^2)	Foraging range (radius in m)	Area of range (m^2)	% of range displaced from
Pink-footed goose (wintering)	Terrestrial	High	500	37,142,258	20,000*	1,774,744,451	2.09

Species	Area subject to disturbance	Sensitivity to disturbance	Disturbance distance (metres)*	Area subject to potential disturbance (m^2)	Foraging range (radius in m)	Area of range (m^2)	% of range displaced from
Whooper swan (wintering)	Terrestrial	Medium	200-600	0	5,000*	48,786,286	0.00
Shelduck (wintering)	Terrestrial	High	100-400	13,580,990 – 31,760,350	20,000*	1,774,744,451	1.06 – 2.47
Wigeon (wintering)	Terrestrial	High	200-500	0	2,000*	31,509,866	0.00
Teal (wintering)	Terrestrial	High	200-500	0	2,000*	19,461,802	0.00
Common scoter (non-breeding)	Intertidal	High	2,000	14,670,834	N/A	25,276,000,004	0.58
Oystercatcher (wintering)	Intertidal	Medium	150-300	648,367 – 1,352,160	N/A	124,123,100	0.52 – 1.09
Ringed plover (passage)	Intertidal	High	100-300	444,698 – 1,352,160	N/A	124,123,100	0.36 – 1.09
Golden plover (wintering) – Ribble and Alt Estuaries	Terrestrial	Medium	200-500	17,305,772 – 32,051,370	10,000*	542,098,640	3.19 – 5.91
Golden plover (wintering) – Morecambe Bay	Terrestrial	Medium	200-500	144,602 – 1,104,974	10,000*	229,812,919	0.06 – 0.48
Grey plover (wintering)	Intertidal	Medium	150-300	648,367 – 1,352,160	N/A	124,123,100	0.52 – 1.09

Species	Area subject to disturbance	Sensitivity to disturbance	Disturbance distance (metres)*	Area subject to potential disturbance (m^2)	Foraging range (radius in m)	Area of range (m^2)	% of range displaced from
Curlew (wintering)	Terrestrial	High	200-600	14,496,917 – 30,303,800	15,000*	407,579,134	3.56 – 7.44
Bar-tailed godwit (wintering)	Intertidal	Medium	200-300	867,501 – 1,352,160	N/A	124,123,100	0.70 – 1.09
Black-tailed godwit (wintering and passage)	Terrestrial	Medium	100-200	2,029,326 – 3,180,611	10,000*	203,199,405	1.00 – 1.57
Dunlin (wintering and passage)	Intertidal	Medium	150-300	648,367 – 1,352,160	N/A	124,123,100	0.52 – 1.09
Sanderling (wintering and passage)	Intertidal	Low	50	256,493	N/A	124,123,100	0.21
Knot (wintering and passage)	Intertidal	Medium	100-300	444,698 – 1,352,160	N/A	124,123,100	0.36 – 1.09
Redshank (wintering)	Intertidal	Medium	200-300	867,501 – 1,352,160	N/A	124,123,100	0.70 – 1.09
Redshank (passage)	Terrestrial	Medium	200-300	10,039 – 54,041	2,200	36,002,662	00.03 – 0.15
Herring gull (breeding)	Terrestrial plus intertidal	Low	100 minimum	14,075,336	85,600*	23,019,580,346	0.06

Species	Area subject to disturbance	Sensitivity to disturbance	Disturbance distance (metres)*	Area subject to potential disturbance (m^2)	Foraging range (radius in m)	Area of range (m^2)	% of range displaced from
Lesser black-backed gull (breeding)	Terrestrial plus intertidal	Low	100 minimum	14,075,336	236,000*	174,974,144,434	0.01
Lesser black-backed gull (non-breeding)	Terrestrial plus intertidal	Low	100 minimum	14,075,336	236,000*	174,974,144,434	0.01
Common tern (breeding)	Intertidal	Medium/high	100 minimum	465,823	26,900*	248,635,126	0.19
Sandwich tern (breeding)	Intertidal	High	100 minimum	465,823	57,500*	3,422,458,382	0.01
Red-throated diver (non-breeding)	Intertidal	High	2,000	14,670,834	N/A	1,702,900,000	0.86

*Taken from Goodship and Furness (2022) where data were available. Sanderling taken from Cutts et al (2013) and foraging gulls, terns and cormorant set at a precautionary 100 m based upon available literature and professional judgement.

Measures adopted as part of the Transmission Assets (Commitments)

1.6.3.201 Measures adopted as part of the Transmission Assets which are of relevance to the assessment of potential impacts on onshore and intertidal ornithological features from disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning are presented in **Table 1.94**.

Table 1.94: Measures adopted as part of the project which are relevant to the assessment of adverse effect on SPA and Ramsar sites designated for onshore and intertidal ornithology from disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
Step 1: Avoidance	CoT90	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the 400kV Grid Connection Cable Corridor beneath the River Ribble will be undertaken by direct pipe or micro tunnel trenchless installation techniques.		DCO Schedules 2A & 2B, Requirement 5(3) (Detailed design parameters onshore); and Requirement 8 (Code of Construction Practice).
	CoT110	Construction activities associated with the offshore cable pull in for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited will be undertaken in accordance with the Outline Offshore Cable Specification and Installation Plan (CSIP). This will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e. during the months of November – February, inclusive), unless otherwise agreed with the MMO, in consultation with Natural England. Detailed CSIP(s) will be developed in accordance with the Outline CSIP.	The intertidal area is of high value to over-wintering birds, with the core wintering period of November to February (inclusive) of particular importance. During these months birds are under increased energetic pressure as temperatures are colder and inclement weather likely, potentially impeding foraging activity. Additionally, available benthic prey abundance is generally reduced as these invertebrates bury deeper into the benthos during colder periods. Therefore, the impacts on birds using the intertidal are considered to be higher during the core wintering period.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation).

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
Step 2: Minimise	CoT110	Construction activities associated with the offshore cable pull in for the Morgan Offshore Wind Project and Morecambe Offshore Windfarm Limited will be undertaken in accordance with the Outline Offshore Cable Specification and Installation Plan (CSIP). This will restrict the Applicants to completing one cable pull in (a maximum of five weeks) per wintering season (i.e. during the months of November – February, inclusive), unless otherwise agreed with the MMO, in consultation with Natural England. Detailed CSIP(s) will be developed in accordance with the Outline CSIP.	While this has the potential cause disturbance, both the spatial extent and the duration of the impact on the intertidal will be minimal.	DCO Schedule 14 (Marine Licence 1: Morgan Offshore Wind Project Transmission Assets) Part 2 - Condition18(1)(e) (Pre-construction plans and documentation) and DCO Schedule 15 (Marine Licence 2: Morecambe Offshore Wind Farm Transmission Assets), Part 2 - Condition18(1)(e) (Pre-construction plans and documentation).
	CoT125	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the siting and number of compounds associated with the construction activities at the landfall have been sited, where practicable, to avoid key constraints, including the Ribble and Alt Estuaries SPA and the Lytham St. Annes Dunes SSSI, to reduce disturbance upon roosting waders.	Two of the three construction compounds required for works on the upper beach and in the Intertidal Infrastructure Area have been situated away from supratidal and intertidal habitats therefore reducing temporary habitat loss and disturbance to SPA features.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice); DCO Schedule 1 (Authorised Development).

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
	CoT44	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the offshore export cables under Lytham St Annes SSSI and the St Annes Old Links Golf Course will be undertaken by direct pipe trenchless installation technique. The exit pits associated with the direct pipe installation will be at least 100 m seaward of the western boundary of the SSSI.	By going further underground this will reduce the amount of disturbance to birds that may use the upper shore to roost or loaf	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice).
Step 3: Mitigate/restore	CoT27	All temporary compounds will be removed and sites will be reinstated when construction has been completed.	The removal of this temporary infrastructure will allow bird species to use the habitat at the intertidal in the same way as prior to works commencing.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice) DCO Schedules 2A & 2B, Requirement 16 (Restoration of land used temporarily for construction)

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
	CoT107	Where construction activities are undertaken along the onshore export cable corridor within areas of Functionally Linked Land (Lytham Moss Biological Heritage Site) in proximity to Higher Ballam and Lower Ballam, a mitigation area will be provided for supplementary feeding of pink-footed goose and whooper swan during the core wintering bird period (November to March, inclusive). The feeding may comprise retention of spoiled crop and/or the import of additional feed, as appropriate. In addition, scrapes will be provided for terrestrial wader features. This is detailed within the Outline Ecological Management Plan.	A patch of arable farmland contained within Lytham Moss and adjacent to the Farmland Conservation Area has been identified as the location for mitigation. Supplementary feeding for these species has been successfully implemented within the area. The measures aim to provide similar habitats to those that will be temporarily lost and move sensitive species to an area that avoids disturbance for the duration of works. The scrapes will provide better quality habitat than that to be temporarily lost for loafing geese, ducks, and swans, and foraging, loafing or roosting waders.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan)
	CoT113	Where construction activities are undertaken within the Intertidal Infrastructure Area, mitigation measures will be provided at Fairhaven saltmarsh to reduce disturbance upon roosting wader features of Ribble and Alt Estuary SPA. This may comprise a combination of the employment of a warden, educational signage, and soft fencing. This is detailed within the Outline Ecological Management Plan.	Although temporarily lost habitat and/or resource availability at the intertidal cannot be recreated during the duration of works, the Applicants have committed to undertake these mitigation measures at the high tide roost site at Fairhaven saltmarsh. These measures have been designed to reduce the daily energy requirements of the SPA features that have been identified as being potential receptors to the temporary loss of supporting habitats and/or resource availability.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan)

Mitigation hierarchy	Commitment number	Measure adopted	Further information	How the measure will be secured
	CoT120	To mitigate for potential permanent habitat loss associated with each of the Onshore Substations, mitigation areas south of Newton-with-Scales will be provided for waders and farmland birds. Measures within these areas may include measures, such as, the creation of scrapes and thickening of hedgerows. This is detailed within the Outline Ecological Management Plan. The final measures will be developed and agreed with the relevant stakeholders as a part of the detailed Ecological Management Plan(s) prior to construction.	Although primarily designed to mitigate the potential for permanent habitat loss, this measure will provide benefit for those species potentially impacted from temporary habitat loss and/or resource availability. This enhanced area will provide a roosting and foraging site for these species away from areas of proposed works.	DCO Schedules 2A & 2B, Requirement 12 (Ecological management plan)

Construction and decommissioning phases

Liverpool Bay/Bae Lerpwl SPA

Common scoter

1.6.3.202 There is potential for disturbance and displacement from construction, decommissioning, and operation and maintenance activities to impact upon the foraging and/or loafing/roosting resources for common scoter. The nearshore habitats available at the landfall support at least 4,000 common scoter, equating to 7.06% of the Liverpool Bay/Bae Lerpwl SPA citation population or 2.82% of the current SPA population (HiDef Aerial Surveying Ltd, 2023). Common scoter were present in significant numbers during both years of site-specific surveys in the nearshore waters and the inundated intertidal area.

1.6.3.203 Common scoter are highly susceptible to disturbance and responses are triggered up to 2,000 m away (Kaiser *et al*., 2006). As only one cable is to be laid at any one time, the habitats temporarily lost to displaced common scoter will be the area of cable installation and working area plus a 2,000 m buffer, this equates to 0.58% of available habitats within the Liverpool Bay/Bae Lerpwl SPA that may be subject to temporary disturbance effects (only 6 weeks maximum over the winter period) with the impact being immediately reversible after construction activities cease. There may also be impacts on common scoter within the Offshore Order Limits, however this section of the ISAA only covers impacts from the onshore and intertidal works and further details of the offshore assessment can be found in the offshore ornithology section of this ISAA.

1.6.3.204 The CSIP will restrict the Applicants to complete one cable pull in per wintering season (including in the intertidal) unless otherwise agreed with the MMO in consultation with Natural England (CoT110). This will further reduce impacts during the most sensitive period when energy requirements are highest, and food is harder to find due to inclement weather.

1.6.3.205 Therefore, as only a small percentage of available habitats are to be temporarily impacted by disturbance and displacement from construction, decommissioning, and operation and maintenance activities, and the core wintering period largely avoided, it is concluded that temporary disturbance and displacement from construction, decommissioning, and operation and maintenance activities would have negligible impact on common scoter within the Liverpool Bay/Bae Lerpwl SPA.

Common tern

1.6.3.206 There is potential that works undertaken at the landfall could temporarily disturb or displace common tern, a feature of the Liverpool Bay/Bae Lerpwl SPA. The Liverpool Bay/Bae Lerpwl SPA common terns breed within the Mersey Narrows and North Wirral Foreshore SPA colonies (Natural England *et al*., 2022). These are approximately 30 km from the Intertidal Infrastructure Area and are therefore beyond the 26.9 km (mean max plus one standard deviation as reported by Woodward *et al*. (2019) foraging range of common

tern. As such, there is no connectivity with the Liverpool Bay/Bae Lerpwl SPA. It is concluded therefore that temporary disturbance and displacement from construction, decommissioning, and operation and maintenance activities would have no impact on common tern within the Liverpool Bay/Bae Lerpwl SPA.

Red-throated diver

1.6.3.207 There is potential for disturbance and displacement from construction, decommissioning, and operation and maintenance activities to impact upon the foraging and/or loafing/roosting resources for red-throated diver. The nearshore waters and intertidal habitats at the landfall support up to 14 red-throated diver, this equates to 1.2% of the SPA citation count or 0.78% of the current SPA estimate (HiDef Aerial Surveying Ltd, 2023).

1.6.3.208 Red-throated diver are highly susceptible to displacement (Bradbury *et al*., 2014) with a mean distance at which disturbance responses were noted of 1,200 m (Laursen *et al*., 2017). For this assessment a precautionary disturbance distance of 2,000 m is used. Although there is supporting habitat available for red-throated diver, the displacement effects from OWFs such as the Burbo Bank extension mean that the amount of functional habitat has decreased (Natural England, NRW, JNCC, 2022). As only one cable is to be laid at any one time, the habitats subject to disturbance will equate to 0.86% of available habitats.

1.6.3.209 The Applicants have committed to avoiding intertidal works during the core wintering period, where possible (details of this commitment, and where this will not be possible are outlined in **Table 1.94**.

1.6.3.210 This will further reduce impacts during the most sensitive period when energy requirements are high and food resources low.

1.6.3.211 There may also be impacts on red-throated diver within the Offshore Order Limits, however this section of the ISAA only covers impacts from the onshore and intertidal works and further details of the offshore assessment can be found in the offshore ornithology section of this ISAA (**section 1.5.3**).

1.6.3.212 Therefore, as only a small percentage of available habitats are to be temporarily lost to disturbance and displacement from construction, decommissioning, and operation and maintenance activities, and the core wintering period avoided, it is concluded that the works would have negligible impact on red-throated diver within the Liverpool Bay/Bae Lerpwl SPA.

Conclusion

1.6.3.213 Adverse effects on the Liverpool Bay/Bae Lerpwl SPA which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

Table 1.95: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA for disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning

Conservation objective for common scoter	Conclusion
Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals for common scoter and 1,800 for red-throated diver (mean peak 2015, 2018, 2019 and 2020).	Due to the small proportion of the Liverpool Bay/Bae Lerpwl SPA that is to be affected by temporary disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning, and that Transmission Assets has committed to avoiding the core wintering period where possible (with only six weeks of construction works is anticipated on the beach within the period of November to February, or only one cable pull-in), it is predicted that there will be negligible impacts on the size or the distribution of common scoter.
Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	The disturbance will only be temporary in nature and will be timed to avoid the sensitive winter period where possible (only 6 weeks maximum), it is predicted that there will be negligible impacts on the distribution and use of habitat by the features.
Maintain the distribution, abundance and availability of key food and prey items to maintain the population.	The impacts of habitat loss and resource availability have been assessed in the previous two sections.
Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	

Ribble and Alt Estuaries SPA

1.6.3.214 The qualifying features of the Ribble and Alt Estuaries SPA have different habitat requirements and therefore are not found equally distributed throughout the Onshore Order Limits and Intertidal Infrastructure Area. Similarly, the scale of the impact is also not equal across the Onshore Order Limits and Intertidal Infrastructure Area.

1.6.3.215 Specific areas of impact have been defined:

- the intertidal and supratidal habitats at the landfall; and
- the terrestrial habitats above HAT along the onshore export cables and 400 kV grid connection cable. This is mostly composed of arable and pastoral land. The specific works undertaken at each area of impact are described in **Table 1.92**.

1.6.3.216 Information to inform the assessment

1.6.3.217 The area of the birds' range overlapping with the area of disturbance and displacement was quantified using the QGIS tool 'overlap analysis'. Roost and colony locations (specified in Still *et al*. (2015) and the SMP database) had foraging ranges added (citations for the range sizes are included in the relevant species assessment sections). These ranges were clipped either to:

- Land at MHWS, for terrestrial species such as pink-footed goose,
- Sea at MHWS for marine foraging species such as common tern or;
- Left unclipped for species that utilise both the marine and terrestrial environment such as lesser black-backed gull.
- For specialist intertidal birds their range was taken as the entire area of the SPA and assumes that all tidal flat, salt marsh and upper beach habitats are available for foraging and roosting activities.
- For the Liverpool Bay/Bae Lerpwl SPA feature red-throated diver, the range was taken as the amount of the SPA available for the species and was taken from the CAP document (Natural England, 2023). In the absence of any CAP advice for common scoter the range was assumed to be the entire SPA.

1.6.3.218 Once the ranges had been quantified, the relevant infrastructure areas were used in the analysis (Onshore Order Limits minus mitigation areas for terrestrial species, Intertidal Infrastructure Area for intertidal and marine species, and both for species that exploit both areas). These were then buffered according to the various disturbance distances reported in Goodship and Furness (2022) and Cutts *et al*. (2013). The resulting overlap is reported as a percentage of the possible foraging range in **Table 1.93.**

1.6.3.219 **Apx Figure 1** to **Apx Figure 26** show the roost and colony sites used, plus how the foraging ranges overlap with the relevant Onshore Order Limits and Intertidal Infrastructure Area plus the species-specific buffers.

1.6.3.220 The features that are to be impacted are found within **Table 1.96**.

1.6.3.221 Only the features that were present during the two years of site-specific survey are assessed as it is assumed that the area is not suitable for the features that were not present, and therefore no adverse effects are predicted for these species due to disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

Table 1.96: Features of the Ribble and Alt Estuaries SPA occurring within each area of impact

Area of impact	Features of the Ribble and Alt Estuaries SPA	Peak count in area of impact	Peak count as a percentage of the citation value	Peak count as a percentage of the latest population estimate
The intertidal and supratidal habitats at the landfall	Oystercatcher (wintering)	1,073	5.79%	6.64%
	Ringed plover (passage)	93	5.61%	2.15%
	Grey plover (wintering)	118	1.26%	2.39%
	Bar-tailed godwit (wintering)	625	3.11%	10.7%
	Dunlin (wintering)	4,200	10.67%	7.27%

Area of impact	Features of the Ribble and Alt Estuaries SPA	Peak count in area of impact	Peak count as a percentage of the citation value	Peak count as a percentage of the latest population estimate
	Sanderling (passage)	2,134	32.65%	26.62%
	Sanderling (wintering)	4,702	163.15%	58.66%
	Knot (wintering)	370	0.54%	0.75%
	Redshank (wintering)	70	2.79%	2.83%
	Lesser black-backed gull (breeding)	353	9.81%	7.61%
	Common tern (breeding)	90	24.73%	No breeding common tern recorded
The terrestrial habitats above HAT along the onshore export cables and 400 kV grid connection cable	Pink-footed goose (wintering)	8,319	70.72%	21.45%
	Whooper swan (wintering)	132	72.53%	18.57%
	Shelduck (wintering)	374	7.59%	7.41%
	Wigeon (wintering)	1,647	1.93%	3.22%
	Teal (wintering)	312	4.36%	3.65%
	Golden plover (wintering)	381	10.59%	7.56%
	Black-tailed godwit (wintering)	423	33.23%	9.35%
	Redshank (passage)	15	0.43%	0.57%

Features of the intertidal and supratidal habitats at the landfall

1.6.3.222 A total of 11 Ribble and Alt Estuaries SPA features were present within the intertidal and supratidal habitats at the landfall including sanderling which were present as both passage and wintering features. Redshank were also present during passage but in very low numbers.

1.6.3.223 Responses to disturbance differ between species with sanderling being tolerant and unlikely to be disturbed visually beyond 50 m (Cutts *et al*., 2013) whilst other species are less tolerant and will flush from further distances, e.g., oystercatcher at 300 m (Goodship and Furness, 2022). It must be noted that birds are quick to return once the disturbance event has finished. The area that is potentially affected by disturbance includes the area of the cable trench, working area, and construction compound plus the relevant species-specific disturbance buffer. See **Apx Figure 1** to **Apx Figure 26**

1.6.3.224 The Applicants have committed to carry out as much work as possible outside of the core wintering period (November to February), with this period only being used as a contingency for one cable pull-in This will mean that a

maximum period of six weeks that may be subject to disturbance impacts during the sensitive winter period from works related to cable pull-in.

1.6.3.225 During the core wintering period energy requirements may be higher due to cold weather, foraging time may be shorter due to periods of bad weather and amount of daylight available, and food may be harder to source due to benthic invertebrates burrowing deeper into the substrate. Therefore, although birds may be present during the passage period, daily survival rates during this period are higher and this period is seen as less sensitive for overall mortality.

1.6.3.226 The threshold for noise disturbance for intertidal waders varies slightly but is generally assumed to occur at around 72 dB (Cutts *et al*. 2013). The noisiest of construction activities upon the intertidal and beach habitats will be vibro-piling from the cofferdams and piles for pulling platforms with a source volume of 115 dB. This will decay to 72 dB at 50 m from source so for most features the visual disturbance will elicit the greatest impact.

1.6.3.227 Seven wintering features were found to be using the intertidal and supratidal habitats at the landfall, two passage features and two breeding features.

Wintering

1.6.3.228 Oystercatcher, grey plover, bar-tailed godwit, dunlin, sanderling, knot and redshank were the wintering features that could be impacted by disturbance and displacement from construction, decommissioning, and operation and maintenance activities. Of these, knot were recorded in relatively low and infrequent numbers (Volume 3, Annex 4.3: Intertidal birds of the ES, document reference: F3.4.3) with <1% of the SPA citation count and the current SPA estimate (**Table 1.85**). Therefore, due to the low numbers of birds affected, it is concluded that the works would have a negligible impact on knot within the Ribble and Alt Estuaries SPA.

1.6.3.229 Oystercatcher are moderately sensitive to disturbance and show disturbance responses from between 150 m to 300 m (Goodship and Furness, 2022). A peak count of 1,073 oystercatcher were recorded within the intertidal habitats at the landfall. The count represented 5.79% of the SPA citation counts and 6.64% of the current WeBS estimate. Assuming 100% displacement from within the 150 to 300 m buffer, 0.52 to 1.09% of the habitats available within the SPA will be subject to disturbance.

1.6.3.230 Grey plover are moderately sensitive to disturbance and show disturbance responses from between 150 to 300 m (Goodship and Furness, 2022). A peak of 118 grey plover were recorded within the intertidal and supratidal habitats at the landfall during the site-specific surveys. This represented 1.26% of the SPA citation count or 2.39% of the current WeBS estimate. In the absence of data on foraging range in the literature, and assuming a 100% displacement from within the 150 to 300 m buffer, grey plover will be subject to disturbance in 0.52 to 1.09% of habitats available within the SPA.

1.6.3.231 Bar-tailed godwit are of moderate sensitivity to disturbance and show disturbance responses from between 200 to 300 m (Goodship and Furness, 2022). A peak count of 625 bar-tailed godwit were recorded at the landfall, this represented 3.11% of the SPA citation count and 10.7% of the current

WeBS count of the SPA population. In the absence of data on foraging range in the literature and assuming a 100% displacement from within the 200 to 300 m buffer, bar-tailed godwit will be temporarily displaced from 0.70 to 1.09% of habitats available within the SPA.

1.6.3.232 Dunlin are moderately sensitive to disturbance and show disturbance responses from between 150 to 300 m (Goodship and Furness, 2022). The 4,200 peak count represents 10.67% of the citation counts and, as dunlin populations at the Ribble estuary have increased in recent years, 7.27% of the current SPA population. In the absence of range data and assuming a 100% displacement from within the 150 to 300 m buffer, dunlin will be temporarily displaced from 0.52 to 1.09% of habitats available within the SPA.

1.6.3.233 Sanderling were recorded with a peak count of 4,702 individuals and were recorded in internationally important numbers in four months of the 24 surveyed, and in nationally important numbers in a further 11 months. The 4,702 recorded at the landfall represented 58.66% of the current SPA population and 163.15% of the SPA citation count. Sanderling are of low sensitivity to disturbance and exhibit disturbance responses from 50 m (Goodship and Furness, 2022). In the absence of data on foraging range in the literature, and assuming a 100% displacement from within the 50 m buffer, sanderling will be temporarily displaced from 0.21% of habitats available within the SPA.

1.6.3.234 Redshank were recorded with a peak count of 70 individuals at the landfall. This count represented 2.79% of the SPA citation count and 2.83% of the latest WeBS count. Although it was concluded that habitat loss will not affect the roost at Starr Gate the birds may be impacted by displacement due to disturbance. Redshank are moderately sensitive to disturbance and exhibit disturbance responses at 200 to 300 m (Goodship and Furness, 2022). In the absence of data on foraging range in the literature and assuming a 100% displacement from within the 200 to 300 m buffer, redshank will be temporarily displaced from 0.70 to 1.09% of habitats available within the SPA.

Passage

1.6.3.235 Ringed plover and sanderling are the passage features that could be impacted by disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

1.6.3.236 Ringed plover were recorded with a peak count of 93 individuals. This represented 5.61% of the SPA citation count and 2.15% of the current WeBS count. Ringed plover are highly sensitive to disturbance and display avoidance behaviours at 100 to 300 m (Goodship and Furness, 2022). In the absence of data on foraging range in the literature, and assuming a 100% displacement from within the 100 to 300 m buffer, ringed plover will be temporarily displaced from 0.36 to 1.09% of habitats available within the SPA.

1.6.3.237 As a passage feature sanderling were also recorded with a peak count of 2,134 during this period. This represented 32.65% of the citation count and

26.62% of the current WeBS estimate. Disturbance behaviour during passage periods is likely to be similar to that during the wintering period with sanderling displaying a low sensitivity to disturbance. Therefore, the wintering estimate displacement of 0.21% of habitats available within the SPA is anticipated to be the same during passage.

Breeding

1.6.3.238 Lesser black-backed gull and common tern are the breeding features of the Ribble and Alt Estuaries SPA that have the potential to be impacted by disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

1.6.3.239 As noted in **paragraph 1.6.3.193** a precautionary disturbance distance of 100 m has been applied to gull species as no published sensitivity data is available. A peak count of 353 individuals was reported for lesser black-backed gull, equating to 9.81% of the SPA citation value and 7.61% of the most recent SPA count data (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). As gulls utilise both terrestrial and intertidal habitats, assuming a displacement rate of 100% from the area potentially subject to disturbance, lesser black-backed gull may be displaced from 0.01% of the habitats available within the SPA.

1.6.3.240 As previously highlighted in **paragraph 1.6.3.103**, the latest SMP data suggests that the Ribble and Alt Estuaries SPA colony of common tern is not currently in use. Birds foraging within the SPA are therefore likely to have come from Preston Dock, Martin Mere, and Brockholes, all within the 26.9 km foraging range of common tern, as stated by Woodward *et al.* (2019).

1.6.3.241 The reasons behind the decline of the Ribble and Alt Estuaries SPA colony is unclear however, disturbance and displacement from construction, decommissioning, and operation and maintenance activities is still assessed against the ability of the species to recover at the site. Based upon the former colony location and a foraging range of 26.9 km (removing all terrestrial habitats) gives a foraging range of 248,635,126 m^2. Common tern have a moderate to high sensitivity to disturbance at breeding colonies but this is expected to be lower away from the nest site (Goodship and Furness, 2022). Burger (1998) suggested a disturbance buffer of 100 m between motorised watercraft and common tern colonies. On a precautionary basis this 100 m buffer has been used to calculate the potential area of disturbance for this species foraging at the landfall. Assuming a displacement rate of 100% from the area potentially subject to disturbance, common tern may be displaced from 0.19% of their potential breeding season home range.

Conclusions

1.6.3.242 The wintering features of the Ribble and Alt Estuaries SPA that have the potential to be impacted by activities associated with construction, operation and maintenance and decommissioning are oystercatcher, grey plover, bar-tailed godwit, dunlin, sanderling, knot and redshank. As shown in **paragraphs 1.6.3.228** to **1.6.3.234** the area for which each of these species may be displaced from in the intertidal area is negligible. It can therefore be

concluded that any disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning would have a negligible impact upon the features and conservation objectives for wintering intertidal features.

1.6.3.243 Two passage features (ringed plover and sanderling) of the Ribble and Alt Estuaries SPA have the potential to be impacted by activities associated with construction, operation and maintenance and decommissioning. As indicated in **paragraphs 1.6.3.86** and **1.6.3.87** the area from which these two species may be displaced from is negligible. It can therefore be concluded that any disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning would have a negligible impact upon the features and conservation objectives for passage intertidal features.

1.6.3.244 As there are currently no common tern breeding common tern within the SPA, and as the quantity of habitats from which they could be displaced will be negligible for both common tern and lesser black-backed gull, it is concluded that any disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning would have a negligible impact upon the features and conservation objectives for breeding intertidal features.

Table 1.97: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA intertidal features for disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning.

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	There are negligible impacts on the population or distribution of each feature as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities. There will be negligible impacts on the nationally important populations that use the habitats at the landfall as the works will be undertaken outside of the sensitive winter season where possible, and the area due to be impacted is small in comparison with locally available habitats. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.
Maintain or restore the distribution of each of the qualifying features within the site.	

1.6.3.245 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA because of disturbance and

displacement from activities associated with construction, operation and maintenance and decommissioning phases of the Transmission Assets alone.

Terrestrial features

1.6.3.246 Eight Ribble and Alt Estuaries SPA features were present within the terrestrial habitats along the onshore export cable and the 400 kV grid connection cable, including the area of substation footprint.

1.6.3.247 The eight species recorded all show at least a moderate response to disturbance while pink-footed goose, shelduck and wigeon all display a high sensitivity (Goodship and Furness, 2022), for example, pink-footed goose may flush from 500 m. However, birds may return quickly once the disturbance event has finished.

1.6.3.248 For the onshore works the MDS assumes that all works are taking place at the same time and the areas from which birds are likely to be displaced have been modelled around this to provide precautionary disturbance/displacement zones as quantified in **Table 1.92**. The 66 months given as the duration is also the time from start to finish and does not reflect the time for which the entire cable corridor area will be subject to disturbance. However, in lieu of further details this timeframe has been applied to the assessment on a precautionary basis, however this disturbance will not apply throughout the corridor at the same time. A visualisation of the works area and disturbance buffers applied can be seen in **Apx Figure 3**. How this overlaps with species' foraging ranges has been generated in GIS using roost and colony sites as reported by Still *et al*. (2015) and the SMP (2024).

1.6.3.249 The Applicants have committed to an alternative site for the supplementary feeding of pink-footed goose during the core wintering period. Additional measures to take place within the arable land at Lytham Moss include the creation of scrape to mitigate for impacts upon waders and wildfowl features.

1.6.3.250 Seven wintering features and one passage feature were found to be using the terrestrial habitats along the cable routes.

Wintering

1.6.3.251 Pink-footed goose, whooper swan, shelduck, wigeon, teal, golden plover and black-tailed godwit were the wintering features that could be impacted by disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

1.6.3.252 Pink-footed goose are highly sensitive to disturbance and will show disturbance responses from 500 m (Goodship and Furness, 2022). A peak count of 8,319 individuals was made within the terrestrial habitats, equating to 70.72% of the SPA citation count and 21.45% of the latest population estimates (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 14.9% of the metapopulation (Devenish, *et al*., 2015). Assuming a foraging range of 20 km and 100% disturbance, pink-footed goose may be displaced from 2.09% of the terrestrial habitats available within the SPA.

1.6.3.253 The Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to offset the potential calorific losses from disturbance/displacement. Therefore, it is concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on pink-footed goose within the Ribble and Alt Estuaries SPA.

1.6.3.254 Whooper swan have a moderate sensitivity to disturbance but may show disturbance behaviours from between 200 to 600 m (Goodship and Furness, 2022). Whooper swan were recorded within the area of potential disturbance with a peak count of 132 individuals. This equates to 72.53% of the SPA citation value and 18.57% of the latest population estimate. Whooper swan have a foraging range of 5 km, and if the roost site reported by Still *et al*. (2015) is used, the species' range does not overlap with any disturbance buffer. Although it is accepted that either the roost location is wrong, or the foraging range is greater, as there is a lack of evidence surrounding these it is not possible to quantify the area of the whooper swan foraging range that will be impacted by terrestrial habitat loss.

1.6.3.255 The Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to offset the potential calorific losses from disturbance/displacement. It is therefore concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on whooper swan within the Ribble and Alt Estuaries SPA.

1.6.3.256 Shelduck were recorded in the terrestrial habitats with a peak count of 374, equating to 7.59% of the SPA citation value, although they were usually present in numbers less than 100 (**Apx Table 1**). This compares to 7.41% of the most recent population estimates. Shelduck have a high sensitivity to disturbance, they may show disturbance behaviours at 100 to 400 m (Goodship and Furness, 2022). Assuming disturbance of 100% and a foraging range of 20 km, shelduck may be displaced from 1.06 to 2.47% of terrestrial habitats available. Because of the low numbers of birds using the terrestrial habitats (**Apx Table 1**) and shelduck's preference for marine invertebrates (Viain *et al*., 2011), it is concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on shelduck within the Ribble and Alt Estuaries SPA.

1.6.3.257 Wigeon are highly sensitive to disturbance and may exhibit disturbance related behaviour at 200 to 500 m (Goodship and Furness, 2022). The species was recorded within the terrestrial areas with a peak count of 1,647 individuals, equating to 3.22% of the most recent population estimate and 1.93% of the SPA citation value. Wigeon have a foraging range of 2 km. However, all of the SPA roosts mapped by Still *et al*. (2015) are outside of the 2 km foraging range for wigeon and it is likely that the birds present during survey belong to the Newton Marsh SSSI population which is situated to the south of the A584 dual carriageway.

1.6.3.258 As land to the south of Newton with Scales is to be permanently improved for wintering waders and wildfowl with the creation of scrapes and the blocking

of ditches to rewet grassland, it is concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on wigeon within the Ribble and Alt Estuaries SPA.

1.6.3.259 In the absence of quantified disturbance data for teal, data for wigeon was used as proxy as species with similar habitat usage and it was assumed that they too have a 2 km foraging range. A peak count of 312 individuals was recorded for teal, equating to 4.36% of the SPA citation value and 3.65% of the most recent population estimate. However, all of the SPA roosts mapped by Still *et al*. (2015) are outside of the 2 km foraging range for teal and it is likely that the birds present during survey belong to the Newton Marsh SSSI population which is situated to the south of the A584 dual carriageway.

1.6.3.260 As land to the south of Newton with Scales is to be permanently improved for wintering waders and wildfowl with the creation of scrapes and the blocking of ditches to rewet grassland, it is concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on teal within the Ribble and Alt Estuaries SPA.

1.6.3.261 Golden plover were recorded with a peak count 381 individuals equating to 10.59% of the citation value and 7.56% of the most recent population estimate (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). Golden plover show a moderate sensitivity to disturbance, displaying disturbance related behaviour at a range of 200 to 500 m (Goodship and Furness, 2022). With a foraging range of 10 km and with an assumed disturbance of 100% this will lead to the species being displaced from 3.19 to 5.91% of terrestrial habitats available with the foraging range.

1.6.3.262 As FLL is to be lost to displacement at Lytham Moss, the Applicants have committed to the creation of temporary scrapes and improving grassland for waders such as golden plover (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place. It is therefore concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on golden plover within the Ribble and Alt Estuaries SPA.

1.6.3.263 A peak count 423 individuals black-tailed godwit were recorded equating to 33.23% of the SPA citation value and 9.35% of the most recent population estimate. Black-tailed godwit are moderately sensitive to disturbance and will display avoidance behaviours at 100 to 200 m (Goodship and Furness, 2022). With a foraging range of 10 km and with an assumed disturbance of 100% this will lead to the species being displaced from 1.00 to 1.57% of available terrestrial habitats within the foraging range.

1.6.3.264 The Applicants have committed to the creation of temporary scrapes and improving grassland for waders such as black-tailed godwit (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place. It is therefore concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on black-tailed godwit within the Ribble and Alt Estuaries SPA.

Passage

1.6.3.265 Redshank were the only passage feature recorded during this period. The peak count of 14 individuals represents 0.43% of the SPA citation value and 0.57% of the most recent population estimate. As the species was recorded in such low numbers it is concluded that the works would have a negligible impact on redshank within the Ribble and Alt Estuaries SPA.

Conclusions

1.6.3.266 For the goose and swan features supplementary feeding will be provided to mitigate against the effects of displacement caused by disturbance from construction activities. The Applicants have committed to this measure for the duration of construction in areas where these features are present.

1.6.3.267 For shelduck and the wader features, the Applicants have committed to the temporary creation of scrapes, etc, at the arable fields at Lytham Moss. The aim of this mitigation is to entice birds away from areas that will be subject to disturbance effects from construction activities.

1.6.3.268 The wigeon and teal are unlikely to be SPA features and are more likely to belong to the Newton Marsh SSSI roost. Nonetheless, the Applicants have committed to permanent mitigation to improve land south of Newton with Scales for wintering waders and wildfowl with possible measures including creation of scrapes, rewetting grassland, etc. As many of the wigeon and teal recorded during survey were in this area it is highly likely that they will colonise the mitigation area.

Table 1.98: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA terrestrial features for disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not cause any additional impacts to the terrestrial habitats than have already been assessed under the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	Due to the mitigation measures that are to be put in place (either seasonal working practices or temporary feeding and/or habitat creation/improvement), there are predicted negligible impacts on the population or distribution of each feature as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.
Maintain or restore the distribution of each of the qualifying features within the site.	

1.6.3.269 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA and Ramsar site as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities with respect to the construction and decommissioning phases of the Transmission Assets alone.

Assemblage features

Non-breeding waterbird assemblage

1.6.3.270 The non-breeding waterbird assemblage consisted of a minimum of 25,736 birds (as calculated by summing the peak of all features and assemblage features). This is 7.95% of the SPA citation count and 7.8% of the current WeBS estimate (calculated by summing the 2018/2019 to 2022/2023 mean of peak for all features and assemblage features from both the Ribble estuary and the Alt estuary WeBS site counts (Woodward *et al*., 2024)).

1.6.3.271 As all features have been assessed independently there is not predicted to be any additional impact upon the assemblage. Therefore, it is concluded that the works would have negligible impact on the non-breeding waterbird assemblage within the Ribble and Alt Estuaries SPA.

Breeding waterbird assemblage

1.6.3.272 The breeding waterbird assemblage consisted of a minimum of 2,370 birds (as calculated by summing the peaks of all features and assemblage features). This is 8.11% of the SPA citation count. As the WeBS methodology does not systematically count gulls and terns there is no current reliable estimate of the breeding assemblage. As all features have been assessed independently there is not predicted to be any additional impact upon the assemblage. Therefore, it is concluded that the works would have negligible impact on the breeding waterbird assemblage within the Ribble and Alt Estuaries SPA.

Conclusions

1.6.3.273 Adverse effects on the qualifying features of the Ribble and Alt Estuaries SPA site which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from vehicles and/or heavy machinery. An assessment of the potential impact against each relevant conservation objective (as presented in **paragraph 1.6.2.83**) is presented in **Table 1.99**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.99: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA for disturbance and displacement from construction and decommissioning activities

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not cause any additional impacts to the habitats than have already

Conservation objective	Conclusion
Maintain or restore the structure and function of the habitats of the qualifying features.	been assessed under the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	Due to the mitigation measures that are to be put in place (either seasonal working practices or temporary feeding and/or habitat creation/improvement), there are predicted negligible impacts on the population or distribution of each feature as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.
Maintain or restore the distribution of each of the qualifying features within the site.	

1.6.3.274 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA as a result of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning of the Transmission Assets alone.

Ribble and Alt Estuaries Ramsar site

1.6.3.275 As per the Ribble and Alt Estuaries SPA the features were split between the intertidal habitats and impacts, and the terrestrial habitats and impacts. See **Table 1.85** for full information on those species to be assessed and for the Ramsar site citation counts which differ from the SPA citation counts.

Intertidal features

1.6.3.276 Passage dunlin are the only intertidal feature that differs from the SPA citation. 1,031 dunlin were recorded during the passage period. This equates to 2.7% of the Ramsar citation count or 1.79% of the current WeBS estimate. As the area of intertidal flats to be impacted by disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning is only between 0.52 and 1.09% of available habitats within the Ramsar site, it is therefore concluded that the works would have negligible impact on dunlin within the Ribble and Alt Estuaries Ramsar site.

Conclusions

1.6.3.277 Adverse effects on the qualifying intertidal features of the Ribble and Alt Estuaries Ramsar site will not occur as a result of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning.

Terrestrial features

1.6.3.278 A peak count of 137 black-tailed godwit were recorded during passage or 4.12% of the SPA citation count and 3.03% of the current WeBS estimate.

The impact will affect between 1.00 and 1.57% of the potential terrestrial habitat available to black-tailed godwit.

1.6.3.279 As the Applicants have committed to creating permanent habitat that will benefit black-tailed godwit to the south of Newton with Scales, and as these species have already been recorded as using this area it is therefore likely that they will use the mitigation area. Therefore, it is concluded that there will be negligible impacts for these features within the Ribble and Alt Estuaries Ramsar site.

Conclusions

1.6.3.280 Adverse effects on the qualifying terrestrial features of the Ribble and Alt Estuaries Ramsar site will not occur as a result of temporary loss of supporting habitats and/or resource availability.

Martin Mere SPA

Pink-footed goose

1.6.3.281 Pink-footed goose are highly sensitive to disturbance and will show disturbance responses from 500 m (Goodship and Furness, 2022). A peak count of 8,319 individuals was made within the terrestrial habitats, equating to 70.72% of the citation count and 21.45% of the latest population estimates (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), or 14.9% of the metapopulation (Devenish, *et al*., 2015). Assuming a foraging range of 20 km and 100% disturbance from within the 500 m buffer, pink-footed goose may be displaced from 2.09% of available habitat within their core foraging range.

1.6.3.282 As FLL is to be lost to displacement at Lytham Moss, and as it is recognised that high numbers of pink-footed goose use this land, the Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to match the calorific losses created through displacement. Therefore, as those resources that are to be temporarily lost will be compensated, it is concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on pink-footed goose within Martin Mere SPA.

Conclusions

1.6.3.283 Adverse effects on the qualifying features of the Martin Mere SPA which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning. An assessment of the potential impact ‘disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning against each relevant conservation objective (as presented in **paragraph 1.6.2.98**) is presented in **Table 1.100**.

Table 1.100: Conclusions against the conservation objectives of the Martin Mere Estuaries SPA for disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	As temporary food provision will be provided, the temporary loss of up to 2.4% of habitats is predicted to have a negligible impact upon the population or distribution of the qualifying features.
Maintain or restore the distribution of the qualifying features within the site.	

1.6.3.284 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Martin Mere SPA as a result of disturbance and displacement activities associated with construction, operation and maintenance and decommissioning of the Transmission Assets alone.

Martin Mere Ramsar site

Pink-footed goose

1.6.3.285 As the features that may be impacted by the loss of permanent supporting habitats are the same for Martin Mere Ramsar site as for the Martin Mere SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site. The differences in citation counts can be seen in **Table 1.67**.

Conclusions

1.6.3.286 Adverse effects on the qualifying features of the Martin Mere Ramsar site which undermine the conservation objectives of the Ramsar site will not occur as a result of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning against each relevant conservation objective (as presented in **paragraph 1.6.2.98**) is presented in **Table 1.100.**

Morecambe Bay and Duddon Estuary SPA

Pink-footed goose

1.6.3.287 Pink-footed goose are highly sensitive to disturbance and will show disturbance responses from 500 m (Goodship and Furness, 2022). A peak count of 8,319 individuals was made within the terrestrial habitats, equating to 70.72% of the SPA citation count and 21.45% of the latest population estimates (noting that this is a precautionary estimate as set out in

paragraph 1.6.2.5), or 14.9% of the metapopulation (Devenish, *et al*., 2015). Assuming a foraging range of 20 km and 100% disturbance from within the 500 m buffer, pink-footed goose may be displaced from 2.09% of available habitat within their core foraging range.

1.6.3.288 The Applicants have committed to supplementary feeding of geese and swans on arable fields within the FLL (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place and will aim to offset the potential calorific losses from displacement. Therefore, it is concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on pink-footed goose within the Morecambe Bay and Duddon Estuary SPA.

Golden plover

1.6.3.289 Golden plover were recorded with a peak count 381 individuals equating to 10.59% of the citation value and 7.56% of the most recent population estimate (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). Golden plover show a moderate sensitivity to disturbance, displaying disturbance related behaviour at a range of 200 to 500 m (Goodship and Furness, 2022). With a foraging range of 10 km and with an assumed disturbance of 100% this will lead to the species being displaced from 0.06 to 0.48% of available habitat.

1.6.3.290 The Applicants have committed to the creation of temporary scrapes and improving grassland for waders such as golden plover (CoT107; **Table 1.78**). This measure will continue for as long as the construction takes place. It is therefore concluded that temporary displacement caused by construction of Transmission Assets would have negligible impact on golden plover within the Morecambe Bay and Duddon Estuary SPA.

Curlew

1.6.3.291 Curlew are highly sensitive to disturbance and will display disturbance behaviour at 200 to 600 m (Goodship and Furness). Curlew were recorded in the terrestrial habitats with a peak count of 696, equating to 27.82% of the citation population and 26.32% of the latest population estimate. Assuming 100% displacement from the impacted areas with a buffer of 200 to 600 m and with a foraging range of up to 15 km, curlew may be displaced from 3.56 to 7.44% of available wintering habitat.

1.6.3.292 As the majority of curlew were recorded in the fields at Lytham Moss (**Appendix 4.2: Wintering and migratory birds of the ES**) and temporary measures are to be put in place to improve habitat for waders, it is concluded that there will be negligible adverse effects on this feature in the Morecambe Bay and Duddon Estuary SPA.

Herring gull (breeding)

1.6.3.293 Foraging herring gull are not thought to be sensitive to disturbance. It must be noted that no nesting herring gull were found during the site-specific surveys. However, a precautionary 100 m minimum disturbance buffer has

been applied to all gull species. A peak count of 1,543 herring gull was recorded at the landfall. This equates to 8% of the SPA citation count however numbers nesting in the SPA are now much lower due to the change towards urban nesting (Burnell, 2021).

1.6.3.294 As herring gull use both the coastal and terrestrial habitats for foraging they will be impacted by works in both locations. Herring gull have a foraging range of 85.6 km (Woodward *et al*., 2019), using the 100 m disturbance buffer 0.06% of herring gulls available coastal and terrestrial habitats will be subject to displacement. Therefore, due to the limited part of their range that will be subject to disturbance/displacement, it is concluded that there will be negligible impacts for herring gull within the Morecambe Bay and Duddon Estuary SPA.

Lesser black-backed gull (breeding)

1.6.3.295 A peak count of 353 lesser black-backed gull was recorded during the breeding season. This equates to 3.63% of the SPA citation count (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**). As lesser black-backed gull use both the coastal and terrestrial habitats for foraging (Langley, *et a*l., 2023) they will be impacted by works in both locations. Lesser black-backed gull have a foraging range of 236 km (Woodward *et al.,* 2019). Assuming the precautionary 100 m disturbance buffer this means that the habitats that will be lost to disturbance and displacement will be 0.01% of habitats available for lesser black-backed gulls. Therefore, due to the limited part of their range that will be subject to displacement/disturbance, it is concluded that there will be negligible impacts for lesser black-backed gull within the Morecambe Bay and Duddon Estuary SPA.

Lesser black-backed gull (non-breeding)

1.6.3.296 During the non-breeding season 205 lesser black-backed gull were recorded. This equates to 2.17% of the citation (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**), however there is no reliable current wintering population estimate to compare it against. During the non-breeding season gulls are very flexible in their habitat use. The wintering range for lesser black-backed gull is likely to be higher than during the breeding season and as they are non-specialist foragers it is concluded that there will be negligible impacts for lesser black-backed gull within the Morecambe Bay and Duddon Estuary SPA.

Sandwich tern (breeding)

1.6.3.297 A peak count of 427 sandwich tern was recorded loafing on the intertidal areas at the landfall in August 2023. This represented 26.55% of the SPA citation count for breeding birds and 36.25% of the current SMP estimate. However, as this species was not recorded during the core egg laying and chick rearing period (see Volume 3. Annex 4.3: Intertidal birds of the ES, document reference: F3.4.3), it is likely that this loafing flock of terns represented post breeding passage birds. In addition, the disturbance will

only affect 0.01% of the sandwich terns foraging range. Therefore, it is concluded that there will be negligible impacts for sandwich tern within the Morecambe Bay and Duddon Estuary SPA.

Conclusions

1.6.3.298 Adverse effects on the qualifying waterbird features of the Morecambe Bay and Duddon Estuary SPA which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities. An assessment of the potential impact against each relevant conservation objective is presented in **Table 1.101**.

Table 1.101: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Estuary SPA for disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	The population of each feature is highly unlikely and not predicted to be impacted as a result of disturbance and displacement. The population of the features which use the cable corridors will be able to use identical foraging habitat within the vicinity of the areas that will be temporary disturbed. The habitat use was not habitual and therefore a level of plasticity already exists within the population. This ability to move between foraging areas and fields increase the features resilience to any impact. For species at the coast (gulls), the temporary displacement represents a small fraction (<1%) of their foraging range and therefore there is plenty of other available areas of move to. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.
Maintain or restore the distribution of the qualifying features within the site.	

1.6.3.299 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Estuary SPA as a result of disturbance and displacement from construction, decommissioning, and operation and maintenance activities with respect to the construction and decommissioning phases of the Transmission Assets alone.

Morecambe Bay Ramsar site

1.6.3.300 As the features that may be impacted by the loss of permanent supporting habitats are the same for Morecambe Bay Ramsar site as for the Morecambe Bay and Duddon Estuary SPA, the SPA has been used as a proxy and no additional impacts are predicted to occur for the Ramsar site. The differences in citation counts can be seen in **Table 1.67**.

Bowland Fells SPA

Lesser black-backed gull

1.6.3.301 A peak count of 353 breeding season lesser black-backed gull were recorded. This equates to 3.63% of the citation count (noting that this is a precautionary estimate as set out in **paragraph 1.6.2.5**) however numbers nesting in the SPA are now much lower due to the change towards urban nesting (Burnell, 2021). As lesser black-backed gull use both the coastal and terrestrial habitats for foraging (Langley *et al.,* 2023) they will be impacted by works in both locations. Lesser black-backed gull have a foraging range of 236 km (Woodward *et al.,* 2019). Assuming the precautionary 100 m disturbance buffer this means that the habitats that will be lost to disturbance and displacement will be 0.01% of the lesser black-backed gull total foraging range. Therefore, it is concluded that there will be negligible impacts for lesser black-backed gull within the Bowland Fells SPA.

Conclusions

1.6.3.302 Adverse effects on the qualifying features of the Bowland Fells SPA which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning. An assessment of the potential impact of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning against each conservation objective (as presented in **paragraph 1.6.2.131**) is presented in **Table 1.102**.

Table 1.102: Conclusions against the conservation objectives of the Bowland Fells SPA for disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	

Conservation objective	Conclusion
Maintain or restore the distribution of the qualifying features within the site.	The population of the feature is not predicted to be impacted as a result of disturbance and displacement. The population of the features which use the cable corridors will be able to use identical foraging habitat within the vicinity of the areas that will be temporary disturbed. The habitat use was not habitual and therefore a level of plasticity already exists within the population. This ability to move between foraging areas and fields increase the features resilience to any impact. For species at the coast (gulls), the temporary displacement represents a small fraction (<1%) of their foraging range and therefore there is plenty of other available areas of move to. The Transmission Assets would not prevent the population size or distribution of the features from being maintained.

1.6.3.303 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Bowland Fells SPA because of disturbance and displacement from activities associated with construction, operation and maintenance and decommissioning of the Transmission Assets alone.

Operation and maintenance phase

1.6.3.304 Within the Intertidal Infrastructure Area there may be the requirement to rebury up to one km of cable every five years for Morgan, additionally there may be the requirement to repair and subsequently rebury up to one km every 10 years. Morecambe have envisaged that a precautionary 2.4 km of intertidal cable may be subject to repair and reburial and predict one event every 10 years, additionally it is predicted that there may be reburial events of approximately 500 m every five years. This equates to a lifetime (assuming 35 years for Morecambe and 35 years for Morgan) reburial of 10.5 km for Morgan and 11.9 km for Morecambe, a combined total of up to 22.4 km. However, these maintenance works to rebury/replace and carry out repair works are likely to require on average between 250 to 500 m of cable repair and/or reburial per event with each event generally taking approximately two to four weeks. Although there is potential for works to be similar in scope as during the construction phase, these works are likely to concentrate on small areas at a time. Therefore, the magnitude will be of a similar or lesser scale than during construction.

1.6.3.305 This reburial activity will not impact on the terrestrial features of SPA and Ramsar sites as it will be confined to the intertidal area.

Liverpool Bay/Bae Lerpwl SPA

Intertidal features

1.6.3.306 As stated in **paragraph 1.6.3.177**, it is anticipated that operation and maintenance activities are likely to result in disturbance levels equivalent to

that during the construction phase. This creates the potential for disturbance and displacement of designated features of the Liverpool Bay/Bae Lerwpl SPA using the intertidal habitats.

1.6.3.307 The potential for impact on each of the intertidal features is discussed in **paragraph 1.6.3.203** for common scoter, **paragraph 1.6.3.206** for common tern and **paragraph 1.6.3.208** for red throated diver. However, the potential impacts would be of a lesser magnitude at any one time during operation and maintenance than they are during construction.

1.6.3.308 Due to the infrequency of this potential disturbance, small percentage of available habitats that will be temporarily disturbed and lack of connectivity it is concluded that the works would have a negligible impact on the intertidal features of the Liverpool Bay/Bae Lerpwl SPA.

Conclusion

1.6.3.309 Adverse effects on the Liverpool Bay/Bae Lepwl SPA which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from operation and maintenance activities.

Table 1.103: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerwpl SPA for disturbance and displacement from operation and maintenance activities

Conservation objectives	Conclusion
Maintain the size of the non-breeding population at a level which is at or above 141,801 individuals for common scoter and 1,800 for red-throated diver (mean peak 2015, 2018, 2019 and 2020).	Due to the small proportion of the Liverpool Bay/Bae Lerpwl SPA that is to be affected by temporary disturbance and displacement from operation and maintenance activities, it is predicted that there will be negligible impact on the size or distribution of the intertidal features of the SPA.
Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	The disturbance will be temporary in nature and impact a very small portion of available habitats. It is therefore predicted that there will be a negligible impact on the distribution and habitat usage of the intertidal features.
Maintain the distribution, abundance and availability of key food and prey items to maintain the population.	
Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	

Ribble and Alt Estuaries SPA

Intertidal features

1.6.3.310 As identified in **paragraph 1.6.3.222**, 11 features of the Ribble and Alt Estuaries SPA were present within the intertidal and supratidal habitats. The response of these features to disturbance varies between species and between seasons.

1.6.3.311 The wintering features with the potential to be impacted by the operation and maintenance activities are oystercatcher, grey plover, bar-tailed godwit, dunlin, sanderling, knot and redshank. The area that these species may be displaced from is discussed in **paragraphs 1.6.3.228** to **1.6.3.234**.

1.6.3.312 Ringed plover and sanderling are the two passage features with the potential to be impacted by operation and maintenance activities in the intertidal area. **Paragraphs 1.6.3.86** and **1.6.3.87** identify the area from which these two species may be displaced.

1.6.3.313 There is no currently active common tern breeding colony within the SPA, as stated in **paragraph 1.6.3.240**, and the area of potential disturbance for breeding lesser black-backed gull is identified in **paragraph 1.6.3.239**.

1.6.3.314 However, it must be noted that the impacts would be of a lesser magnitude at any one time during operation and maintenance than they are during construction.

Conclusion

1.6.3.315 Adverse effects on the Ribble and Alt Estuaries SPA which undermine the conservation objectives of the SPA will not occur across the wintering, passage or breeding season as a result of disturbance and displacement from operation and maintenance activities.

Table 1.104: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA intertidal features for disturbance and displacement from operation and maintenance activities

Conservation objectives	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	The disturbance will be temporary in nature and impact a very small portion of available habitats. It is therefore predicted that there will be a negligible impact on the distribution and habitat usage of the intertidal features.
Maintain or restore the distribution of each of the qualifying features within the site.	

Ribble and Alt Estuaries Ramsar

Intertidal features

1.6.3.316 As stated in **paragraph 1.6.3.276**, passage dunlin are the only intertidal feature that differs from those stated under the Ribble and Alt Estuaries SPA citation. The area used by this species that may be at risk of disturbance is also stated within that paragraph, the area is considered to be negligible.

Conclusion

1.6.3.317 Adverse effects on the qualifying intertidal features of the Ribble and Alt Estuaries Ramsar site will not occur as a result of disturbance and displacement from operation and maintenance activities.

Martin Mere SPA and Ramsar site

1.6.3.318 Pink-footed goose are the only feature of both the Martin Mere SPA and Martin Mere Ramsar site for which an appropriate assessment is required. As this species is not considered to be an intertidal species no assessment of the potential impact of operation and maintenance activities in the intertidal area is required.

Morecambe Bay and Duddon Estuaries SPA

Intertidal features

1.6.3.319 Of the six qualifying features of the Morecambe Bay and Duddon Estuaries SPA that require an appropriate assessment, three were recorded in the intertidal area and can be considered as intertidal features. There are herring gull (breeding), lesser black-backed gull (breeding and wintering seasons) and sandwich tern (breeding).

1.6.3.320 As stated in **paragraph 1.6.3.293** foraging herring gull are not considered to be sensitive to disturbance, and as shown in **paragraph 1.6.3.294** a negligible area of available foraging range is likely to be subjected to disturbance.

1.6.3.321 **Paragraph 1.6.3.295** illustrates that a negligible area of available foraging area for breeding lesser black-backed gull is also likely to be subjected to disturbance. As discussed in **paragraph 1.6.3.296** the wintering range of lesser black-backed gull is likely to be larger than that in the breeding season. Therefore, the area of available foraging habitat likely to be subjected to disturbance can be considered to be smaller than that during the breeding season.

1.6.3.322 As shown in **paragraph 1.6.3.297**, the area of intertidal habitat available to sandwich tern that may be subjected to disturbance is also negligible.

Conclusion

1.6.3.323 Adverse effects on the qualifying intertidal features of the Morecambe Bay and Duddon Estuaries SPA that undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from operation and maintenance activities. An assessment of the potential impact against each of the relevant conservation objectives is presented in **Table 1.105**.

Table 1.105: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Estuaries SPA for disturbance and displacement from operation and maintenance activities

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	The disturbance will be temporary in nature and impact a very small portion of available habitats. It is therefore predicted that there will be a negligible impact on the distribution and habitat usage of the intertidal features.
Maintain or restore the distribution of the qualifying features within the site.	

Morecambe Bay Ramsar

1.6.3.324 As the features of the Morecambe Bay Ramsar site that may be affected by disturbance and displacement due to operation and maintenance activities are the same as those for the Morecambe Bay and Duddon Estuary SPA, the SPA can be viewed as a proxy for the Ramsar site. Therefore, no additional adverse impacts are predicted to occur at the Ramsar site.

Bowland Fells SPA

Intertidal features

1.6.3.325 One feature of the Bowland Fells SPA is screened in for appropriate assessment and can be considered an intertidal feature, this is breeding lesser black-backed gull. **Paragraph 1.6.3.301** identifies that a negligible area of available foraging habitat is likely to be subjected to disturbance.

Conclusion

1.6.3.326 Adverse effects on the qualifying features of the Bowland Fells SPA which undermine the conservation objectives of the SPA will not occur as a result of disturbance and displacement from operation and maintenance activities. An assessment of the potential impact against each of the relevant conservation objectives is presented in **Table 1.106**.

Table 1.106: Conclusions against the conservation objectives of the Bowland Fells SPA for disturbance and displacement from operation and maintenance activities

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	The impacts of disturbance will not affect the habitats in the same way as the birds and the extent

Conservation objective	Conclusion
Maintain or restore the structure and function of the habitats of the qualifying features.	of temporary damage to habitats will be equal to that caused by the impact of temporary habitat loss. Therefore, there will be no additional impact upon the supporting habitats and their extent and distribution, structure and function, and supporting processes will remain unaffected.
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	The disturbance will be temporary in nature and impact a very small portion of available habitats. It is therefore predicted that there will be a negligible impact on the distribution and habitat usage of the intertidal features.
Maintain or restore the distribution of the qualifying features within the site.	

1.6.4 Assessment of adverse effects in-combination

1.6.4.1 The in-combination effects assessment follows the methodology set out in **section 1.4.5** and is presented in a series of tables (one for each potential in-combination effect). It must be noted that in keeping with the approach set out in **section 1.4.5**, the onshore and intertidal ornithology in-combination assessment only considers projects based upon the location of the impact, i.e., only projects with impacts landwards of MLWS are considered (for the assessment projects with offshore (below MLWS) impacts please refer to **section 1.5.4**).

1.6.4.2 Scenarios 1 to 3 (as described in **section 1.4.5**) consider the in-combination impact of the offshore elements of the Morgan Offshore Wind Project: Generation Assets and the Morecambe Offshore Windfarm: Generation Assets alongside the Transmission Assets. An assessment of the potential for in-combination impacts resulting from the construction, operation and maintenance and decommissioning phases of these elements on the integrity of SPAs and Ramsar sites is presented in scenario 3.

1.6.4.3 The scenario 4 assessment of adverse effects in-combination considers the impact associated with the Transmission Assets together with other projects and plans. The projects and plans identified as relevant to the in-combination assessment presented within this document are based upon the results of a Cumulative Effects Assessment screening exercise undertaken at the ES stage and based on chapters within the ES (see Volume 1, Annex 5.5: Cumulative screening matrix and location plan, document reference: F1.5.5).

1.6.4.4 However, for the onshore and intertidal ornithology in-combination assessment, only projects which are within 1 km of the onshore infrastructure area (the area within which the landfall transition joint bay, onshore export cables, onshore substations and 400 kV grid connection cable will be located) and intertidal infrastructure area and also have a footprint greater than 0.5 ha have been screened in due to lack of in-combination impacts at a greater distance or smaller spatial extent.

1.6.4.5 The onshore and intertidal ornithology in-combination assessment methodology has followed the methodology set out in Volume 1, Chapter 5: Environmental Assessment Methodology of the ES (document reference F1.5). As part of the assessment, all projects and plans considered alongside

the Transmission Assets have been allocated into 'tiers' reflecting their current stage within the planning and development process.

- Tier 1
  - Under construction;
  - Permitted application;
  - Submitted application; or
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact.
- Tier 2
  - Scoping report has been submitted.
- Tier 3
  - Scoping report has not been submitted;
  - Identified in the relevant Development Plan; or
  - Identified in other plans and programmes.

1.6.4.6 The specific projects and plans screened into the onshore and intertidal ornithology in-combination assessment, are presented in **Table 1.107** and **Figure 1.6**. A total of 34 projects have been screened into this in-combination assessment.

1.6.4.7 No Tier 2 or Tier 3 projects have been identified that are relevant to onshore ornithology as part of the in-combination effects assessment screening exercise. Therefore, scenarios 4b and 4c (as described in **section 1.4.5**) are deemed to be irrelevant and have not been assessed.

Table 1.107: List of Tier 1 projects, plans and activities considered within the in-combination assessment

Project/plan (reference on Figure 1.6)	Status	Distance from the Onshore Order Limits and Intertidal Infrastructure Area (nearest point, km)	Description of project/plan	Approximate footprint of project/plan (ha)	Overlap with the Transmission Assets
Residential development of 280 properties – Bloor Homes North West Reference: 1	Permitted	0.28	Up to 280 dwellings, with associated infrastructure and open space.	14.5	Temporal overlap with the construction and operation phases of the Transmission Assets.
Construction of crossroads at junction of Kilnhouse Lane, Queensway and the proposed Heyhouses Bypass - Rowland Homes Ltd Reference: 3	Under construction	0.25	In support of application 08/0058 (1,150 residential dwellings). This application seeks to provide an interim access arrangement, to allow further parcels of the Richmond Point site to be developed (beyond the current limit of 168 dwellings). This includes a signal-controlled pedestrian crossing and an interim access road.	1.58	Temporal overlap with the construction and operation phases of the Transmission Assets.
Installation of a solar photovoltaic (PV) farm - Lightsource SPV 142 on behalf of Lightsource bp Reference: 4	Under construction	0.37	Installation of solar panels and associated infrastructure, approximately 25-Megawatt peak (MWp). 40-year operating life, with a further six months to allow for decommissioning and reinstatement.	75.4	Temporal overlap with the construction and operation phases of the Transmission Assets.
Creation of sports pitches and open space - Blackpool Airport Enterprise Zone Reference: 6	Under construction	Within order limits	Blackpool Airport Enterprise Zone - formation of 12 natural grass sports pitched with a portion designated as public open space.	11.5	Temporal overlap with the construction and operation phases of the Transmission Assets.
Erection of 12 dwellings - Brooksland Ltd Reference: 8	Under construction	0.04	Erection of twelve dwellings, including three six-bed and nine five-bed dwellings. All are 2.5 storeys tall.	4.8	Temporal overlap with the construction and operation phases of the Transmission Assets.
Gas fired electricity generating facility (GFEGF) - Statera Energy Limited Reference: 10	Pending	0.05	Development of an energy facility comprising a gas fired electricity generation facility made up of 11 4.5 MW Gas Engine Casements with associated cooling fans, control buildings, switch gear, transformers, gas regulation compound, gas connection compound and a 132 kV substation, access, fencing, internal roads, attenuation tanks and other ancillary infrastructure.	1.2	Temporal overlap with the construction and operation phases of the Transmission Assets.
Outline planning for residential development of 155 properties - Gladman Developments Reference: 22	Pending	0.24	Outline application for up to 155 dwellings with open public space, sustainable drainage systems, vehicular access and landscaping. Indicative plans show houses up to 2.5 storeys high.	Total site area is 6.84, of which 4.37 will be developed	Temporal overlap with the construction and operation phases of the Transmission Assets.
Outline application for business, industrial and storage warehouse uses - Blackpool Council Reference: 23	Under construction	Within order limits	An outline planning application for a mixed-use development including for business, industrial and warehousing, with all matters reserved.	13	Spatial and temporal overlap with the construction and operation phases of the Transmission Assets.

Project/plan (reference on Figure 1.6)	Status	Distance from the Onshore Order Limits and Intertidal Infrastructure Area (nearest point, km)	Description of project/plan	Approximate footprint of project/plan (ha)	Overlap with the Transmission Assets
Development of 882 properties - Kensington Developments Reference: 24	Under construction	0.37	The development of 882 dwellings as a component of approved outline application for 1,150 dwellings, including temporary access.	24.7	Temporal overlap with the construction and operation phases of the Transmission Assets.
Development of 66 properties - Kensington Developments Reference: 25 and 165	Under construction	0.07	The development of 66 dwellings as a component of approved outline application for 1,150 dwellings, including temporary access.	64.8	Temporal overlap with the construction and operation phases of the Transmission Assets.
Erection of one public house and associated infrastructure - Whyndyke Reference: 33	Permitted	0.05	Reserved matters application for one public house (matters of layout, scale, appearance, access and landscaping applied for), including access works, parking facilities and landscaping treatment, associated with the outline planning application ref: 11/0221 for the development of 1,400 residential properties, industrial units, road infrastructure, primary school, car parking, allotments, sports pitches and landscaping.	Total area of whole project is 90.86, the area of the public house and related landscaping, car park etc. is 0.75	Temporal overlap with the construction and operation phases of the Transmission Assets.
Residential development of 28 affordable dwellings - Great Places Housing Association Reference: 101	Under construction	0.84	Erection of 22 affordable dwellings and six affordable apartments with associated car parking, landscaping and access from Bowden Lane.	0.6	Temporal overlap with the construction and operation phases of the Transmission Assets.
Outline application for a residential development of 52 dwellings - Rowland Homes Ltd Reference: 192	Under construction	0.71	Residential development of 52 dwellings and demolition of existing dwelling, stables and paddocks.	1.7	Temporal overlap with the construction and operation phases of the Transmission Assets.
Application for approval of reserved matters for a residential development - Countryside Properties (UK) Ltd and Warton East Developments Ltd Reference: 238	Under construction	0.71	Application for 364 dwellings and associated works, comprising of two-, three- and four-bedroom houses all over two storeys.	0.7	Temporal overlap with the construction and operation phases of the Transmission Assets.
Amendment to planning application for site access associated with a residential development - Hallam Land Management Reference: 239	Under construction	0.97	Application for the layout, appearance, landscaping and scale of 96 residential dwellings and associated open space and infrastructure.	3.7	Temporal overlap with the construction and operation phases of the Transmission Assets.
Application for approval of reserved matters for a residential development and associated infrastructure - Morris Homes Ltd Reference: 240	Under construction	0.88	The development of approximately 160 residential dwellings and associated infrastructure.	4.6	Temporal overlap with the construction and operation phases of the Transmission Assets.

Project/plan (reference on Figure 1.6)	Status	Distance from the Onshore Order Limits and Intertidal Infrastructure Area (nearest point, km)	Description of project/plan	Approximate footprint of project/plan (ha)	Overlap with the Transmission Assets
Application for approval of reserved matters for a residential development and associated infrastructure and landscaping - Story Homes Ltd and Hollins Strategic Land Reference: 298	Under construction	0.32	A residential development of 170 units that will be a mix of one and five bed dwellings, all of which will be two storeys. The development will include extensive areas of open space.	12.9	Temporal overlap with the construction and operation phases of the Transmission Assets.
Outline application for residential development of 30 dwellings - Mr Robinson Reference: 303	Pending	0.21	Outline application for 30 residential dwellings, including 10 affordable homes. The site has been identified with emerging Fylde Local Plan to 2032: Revised.	1.2	Temporal overlap with the construction and operation phases of the Transmission Assets.
Application for alterations to existing sports facilities and erection of new structures - Preston North End Football Club Reference: 475	Permitted	0.62	Demolition of the existing single-storey southern extension to the sports hall and erection of a new two-storey building to the east of the sports hall and ancillary infrastructure. A new outdoor store and security hut is also included.	4.1	Temporal overlap with the construction and operation phases of the Transmission Assets.
Erection of two two-storey buildings consisting of industrial/storage and office units and associates infrastructure - Mr Martin Crouch Reference: 718	Permitted	Within Order Limits	Development of two buildings comprising 16 units - each unit with a warehouse, staff room and supporting infrastructure. This includes access and car parking.	0.7	Spatial and temporal overlap with the construction and operation phases of the Transmission Assets.
Outline planning application for commercial development and related infrastructure - Blackpool Council Reference: 719	Permitted	0.32	Phase one of the Blackpool Enterprise Zone comprising road infrastructure and highways improvement, new access road, café, retail unit, nursey and associated infrastructure.	13.6	Temporal overlap with the construction and operation phases of the Transmission Assets.
Relocation of intermediate roundabout - Lancashire County Council Reference: 783	Permitted	0.50	Relocation of intermediate roundabout on the proposed Heyhouses to M55 Link Road and realignment of adjacent highways to tie in with highway alignment.	2.6	Temporal overlap with the construction and operation phases of the Transmission Assets.
Application for redesign and realignment of the southern end of the Heyhouses to M55 link road - Lancashire County Council Reference: 784	Permitted	0.70	The M55 Heyhouses Link Road will deliver a new 2.5 km single carriageway road between Lytham St Annes Way near Peel Hill and North Houses Lane to the north of St Annes. Includes construction compound and working area.	7.4	Temporal overlap with the construction and operation phases of the Transmission Assets.

Project/plan (reference on Figure 1.6)	Status	Distance from the Onshore Order Limits and Intertidal Infrastructure Area (nearest point, km)	Description of project/plan	Approximate footprint of project/plan (ha)	Overlap with the Transmission Assets
Residential development of 41 properties and associated infrastructure - Breck Reference: 810	Pending	0.49	Erection of 41 dwellings with associated access off Ash Court, car parking, open space, landscaping and pumping station.	1.1	Temporal overlap with the construction and operation phases of the Transmission Assets.
Erection of a battery energy storage system - Energi Generation Reference: 812	Under construction	0.74	Erection of a 20 MW battery energy storage system facility consisting of 120 battery cabinets, a welfare/office building, security fencing, CCTV columns, access and internal roads, parking, landscaping and all other associated infrastructure.	0.6	Temporal overlap with the construction and operation phases of the Transmission Assets.
Recreational centre at Phoenix Park – De Pol Associates Reference: 820	Permitted	0.02	Dry ski slope, mountain bike track, creation of leisure lake and siting of up to 13 lodges to be occupied by children in care (Class C2) together with associated development.	10.6	Temporal overlap with the construction and operation phases of the Transmission Assets.
Screening opinion for proposed changes to golf course - Booth Ventures Reference: 834	Pending	0.86	Proposed land reprofiling and landscaping, including drainage engineering of the golf course at Lytham Green Drive Golf Club - formal request for Scoping Opinion.	6.2	Temporal overlap with the construction and operation phases of the Transmission Assets.
Scoping opinion in respect of a 49.9MW solar farm - Natural Power Consultants Ltd Reference: 879	Pending	0.12	Proposed development comprises the construction and operation of a 49.9 MW solar farm and associated infrastructure, including solar PV modules, transformers, inverter units, a switch room, fencing and security measures, access tracks, onsite and offsite cabling, landscaping and habitat enhancement.	69.7	Temporal overlap with the construction and operation phases of the Transmission Assets.
Hybrid planning application relating to the infrastructure associated with the Enterprise Zone - Blackpool Council Reference: 882	Pending	Within Order Limits	Highways improvement works and drainage works, construction of new access roads and an outline planning application for the construction of 5 hangars, a commercial unit and car park alongside associated infrastructure.	3.6	Spatial and temporal overlap with the construction and operation phases of the Transmission Assets.
Outline planning application for the erection of a residential care home and associated infrastructure - Muller Property Group Reference: 883	Pending	0.99	Proposed demolition of existing buildings and structures and the subsequent erection of a residential care home with up to 76 rooms (use Class C2) and associated infrastructure to include a sub-station, vehicular access, car parking, servicing and other associated works.	0.8	Temporal overlap with the construction and operation phases of the Transmission Assets.
Variation of condition two of a planning application for a battery storage facility - Penwortham Storage Limited Reference: 914	Under construction	0.02	Development of a 49.99 MW battery storage facility with associated infrastructure and landscaping.	1.5	Temporal overlap with the construction and operation phases of the Transmission Assets.
Formation of new access onto North Houses Lane and construction of	Pending	0.77	Formation of a new access between North Houses Lane and the construction of a connecting road between the new access and the Richmond Point	1.63	Temporal overlap with the construction and operation phases of the Transmission Assets.

Project/plan (reference on Figure 1.6)	Status	Distance from the Onshore Order Limits and Intertidal Infrastructure Area (nearest point, km)	Description of project/plan	Approximate footprint of project/plan (ha)	Overlap with the Transmission Assets
connecting road to Richmond Point Development - Rowland Homes Reference: 926			Development, to include associated highway reconfiguration works and supporting infrastructure and landscaping.		
Scoping opinion in respect of a 25 MW solar farm - Bluefield Renewable Developments Ltd Reference: 948	Permitted	Within Order Limits	Request for a scoping opinion in respect of a 25 MW solar farm battery energy storage scheme and associated development and infrastructure.	32	Spatial and temporal overlap with the construction and operation phases of the Transmission Assets.

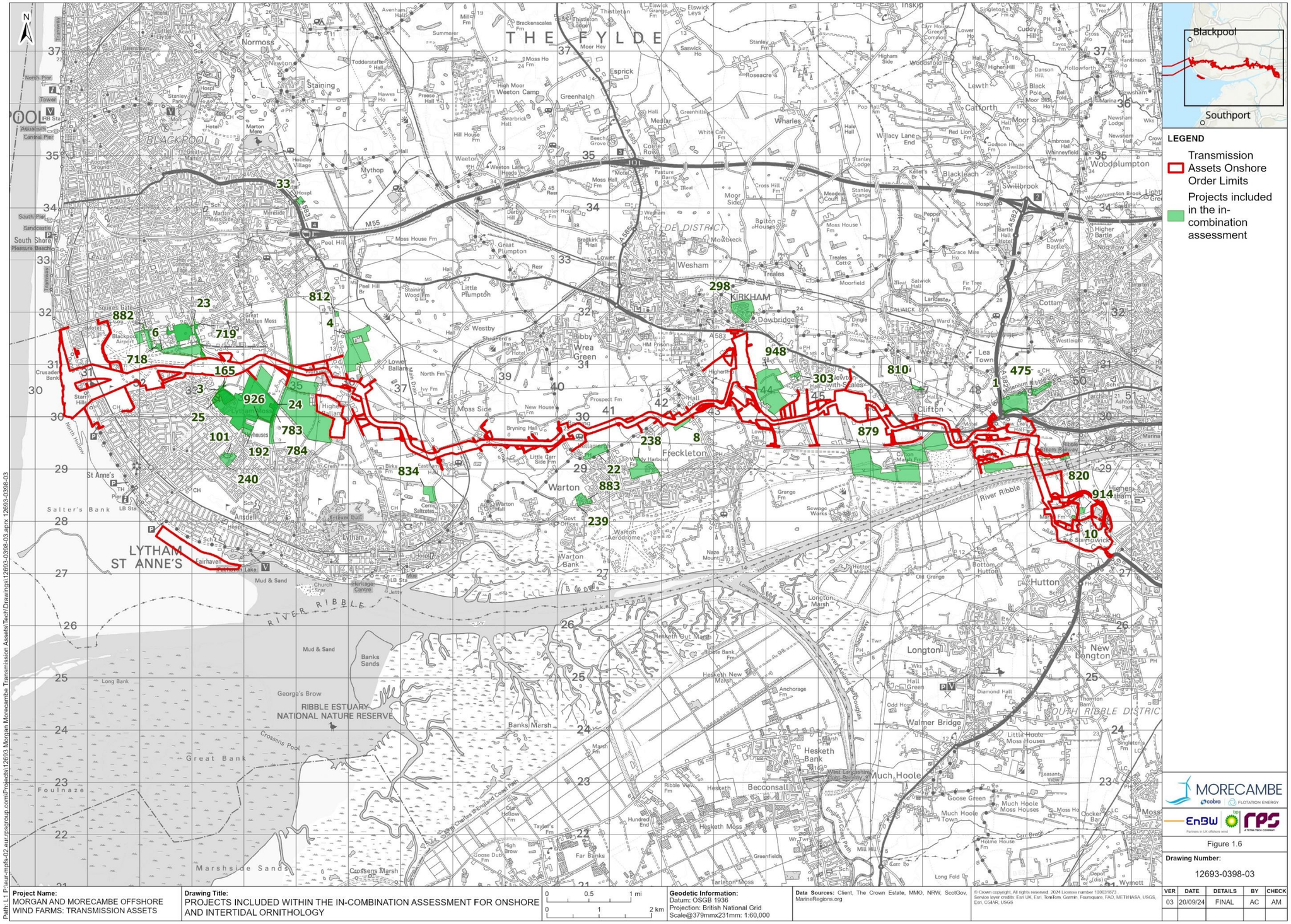

Figure 1.6: Projects included within the in-combination assessment for onshore and intertidal ornithology features

Scenario 1: Transmission Assets together with Morecambe Generation Assets only

1.6.4.8 Onshore and intertidal ornithology has been scoped out of the assessment conducted for the Morecambe Generation Assets. This has been agreed in the Scoping Opinion for Morecambe Offshore Windfarm (Generation Assets) (The Planning Inspectorate, 2022b).

1.6.4.9 The potential impacts of Morecambe Generation Assets scoped in for assessment are:

- direct disturbance due to work activity (presence and movements of vessels and other plant, lighting etc.) for construction, operation and maintenance and decommissioning phases;
- disturbance/displacement/barrier effect due to presence of turbines and other infrastructure for operation and maintenance phase;
- collision risk from operational wind turbine generators for operation and maintenance phase; and
- indirect effects through effects on prey species/habitats of prey species for construction, operation and maintenance and decommissioning phases.

1.6.4.10 Of the above impacts, the disturbance/displacement/barrier effect due to the presence of turbines and other infrastructure and collision risk from operational wind turbine generators are not relevant to Transmission Assets. These potential impacts are not of relevance as Transmission Assets do not present a collision risk, nor do they include above ground infrastructure, such as turbines, that might present disturbance, displacement or a barrier effect.

1.6.4.11 There is some overlap with those potential impacts assessed for Transmission Assets alone and from direct disturbance due to work activity (presence and movements of vessels and other plant, lighting etc.) and indirect effects through effects on prey species/habitats of prey species.

1.6.4.12 For those potential impacts listed in **paragraph 1.6.4.9**, a conclusion of no adverse effect on site integrity was concluded for all assessed sites and each of the above impacts within the Report to Inform Appropriate Assessment presented for Morecambe Offshore Windfarm: Generation Assets (Royal HaskoningDHV, 2024).

1.6.4.13 Although onshore ornithology has been scoped out, therefore an in-combination assessment of terrestrial species is not possible nor appropriate, several bird species that are qualifying features of the Ribble and Alt Estuaries SPA and Ramsar site, Liverpool Bay/Bae Lerpwl SPA, Morecambe Bay and Duddon Estuary SPA and Morecambe Bay Ramsar site were assessed for potential adverse effects (Royal HaskoningDHV, 2024). These were lesser black-backed gull, herring gull, common scoter, and red-throated diver. These birds were included for assessment following their identification within the windfarm site.

1.6.4.14 No significant adverse effects from any assessed impacts are anticipated for any of these species from the Transmission Assets alone.

1.6.4.15 Common scoter and red-throated diver would be vulnerable to impacts at the landfall and coastal intertidal area of Transmission Assets. An assessment of the potential for in-combination effects on these species, qualifying species of the Liverpool Bay/Bae Lerpwl SPA, is presented within **section 1.5.4**.

1.6.4.16 As indicated within **section 1.6.3.102**, the foraging ranges of herring gull and lesser black-backed gull are 85.6 km and 236 km respectively (Woodward *et al.*, 2019). The temporary loss of habitat associated with the works for Transmission Assets equates to 0.02% of available range for herring gull and less than 0.00% for lesser black-backed gull during the breeding season. During the non-breeding season gulls are very flexible in their habitat use and are not tied to nest sites, therefore the loss of habitat would be expected to equate to a lower percentage than that during the breeding season.

1.6.4.17 The only potential impact from the Morecambe Generation Assets that was screened in for lesser black-backed gull and herring gull was collision risk from the operation and maintenance phase. No adverse effect on site integrity was concluded for any of the designated sites for which these two species are qualifying features.

1.6.4.18 As stated in **paragraph 1.6.4.10** collision risk is not a relevant impact for the Transmission Assets. It can therefore be concluded that there will be no adverse impact from in-combination impacts with the Morecambe Offshore Windfarm Generation Assets.

Scenario 2: Transmission Assets together with Morgan Generation Assets only

1.6.4.19 The HRA Stage 2 ISAA produced in support of the Morgan Offshore Wind Project Generation Assets (RPS, 2024) highlighted the potential of collision risk for qualifying features of five designated sites that were also assessed for potential adverse effects for Transmission Assets. These sites were Morecambe Bay and Duddon Estuary SPA, Morecambe Bay Ramsar site, Ribble and Alt Estuaries SPA and Ramsar site and Bowland Fells SPA.

1.6.4.20 Collision risk and in-combination effects were assessed for the operation and maintenance phase of the Morgan Generation Assets. Collision risk impacts are not applicable to the Transmission Assets, therefore are not considered further regarding the in-combination effects of Transmission Assets. A conclusion of no adverse effect on the integrity of the SPAs and Ramsar sites from collision risk and in-combination effects was reached within the HRA Stage 2 ISAA produced in support of the Morgan Offshore Wind Project Generation Assets (RPS, 2024).

Scenario 3: Transmission Assets together with Morgan Generation Assets and Morecambe Generation Assets

1.6.4.21 As outlined in **paragraphs 1.6.4.17** and **1.6.4.19** collision risk was identified as a potential impact from both the Morgan and Morecambe Generation Assets. No adverse effects on the integrity of SPAs and Ramsar sites was anticipated from this potential impact (RPS, 2024). As collision risk is not an applicable potential impact from the Transmission Assets no further in-combination analysis for this combined scenario is considered here.

Scenario 4: Scenario 3 together with Tier 1, Tier 2 and Tier 3 projects

In-combination impact of permanent loss of supporting habitats

1.6.4.22 The construction and decommissioning phases of the Transmission Assets will result in the permanent loss of habitat which supports ornithological features across the substation and permanent infrastructure area. Although impacts of permanent loss of habitat will only apply to the substations and landscaping areas, all projects and plans within 1 km of the Onshore Order Limits and Intertidal Infrastructure Area have been included within this in-combination assessment to evaluate the maximum potential for cumulative impact to occur.

1.6.4.23 The known maximum total of potential habitat loss from the identified projects and plans is approximately 391.53 ha if all are built to cover the entire proposed footprint. There is a total of 6.6 ha across three projects that involve demolition of existing buildings and construction in the same footprint. This is not considered to represent new habitat loss (these are projects 192, 475 and 883 within **Table 1.107**). Where any project listed within **Table 1.107** has a quoted site area of "< 1 ha", an area of 1 ha was used as a worst-case scenario for calculating maximum potential habitat loss.

1.6.4.24 Most developments would provide some green space in reality. However, these green spaces are highly unlikely to be used by protected features due to the high level of recreational disturbance associated with these developments. Therefore, the entirety of each project footprint included under this potential impact is considered to be permanently lost.

1.6.4.25 Of the total maximum habitat loss of 391.53 ha from all included projects and plans, 308.33 ha has been consented. As part of the planning applications for these sites it was concluded that no adverse effect on site integrity of any assessed site would arise from any of the plans.

1.6.4.26 The projects and plans within **Table 1.107** are over both greenfield and brownfield land, and therefore the permanent loss of habitat (391.53 ha) may not represent a loss of FLL, or optimal habitat for birds.

1.6.4.27 When viewed cumulatively with the Transmission Assets, the total area of permanent habitat loss is 413.43 ha. Permanent habitat loss associated with the Transmission Assets is 21.9 ha which accounts for 5.30% of this total.

1.6.4.28 The initial assessment of permanent habitat loss, for the other permitted Tier 1 projects focuses on the loss of land functionally linked to the Ribble and Alt Estuaries SPA. As noted in **paragraph 1.6.3.56** up to 261,799 m^2 (26.18 ha) of highly FLL (Bowland Ecology, 2021) will be temporarily lost during the construction phase of the Transmission Assets within the onshore export cable corridor. However, no FLL will be permanently lost. None of the projects or plans identified are within the boundary of the SPA. No Tier 1 project has concluded a significant impact on this FLL through loss of habitat. The largest project within 1 km of the Onshore Order Limits and Intertidal Infrastructure Area (the Queensway development), has provided a compensation area to offset the loss of FLL, this is known as the Farmland Conservation Area and both temporary and permanent impacts associated with the Queensway development and M55 link road updates are mitigated

for in this area, including supplementary feeding of geese and swans. This compensation area will not be impacted as the cable route is proposed to avoid this area.

1.6.4.29 Other residential developments which have a large footprint and therefore, large potential land take, concluded no adverse impacts on onshore and intertidal ornithological features with mitigation measures in place (e.g., timings of works, use of access routes, information packs for new residents highlighting the compensation areas).

1.6.4.30 As assessed within the alone assessment, there were no species for which the area of permanent supporting habitat loss from the Transmission Assets was deemed to present a significant adverse impact.

1.6.4.31 To avoid repetition all three impacts screened into the in-combination assessment are viewed together when assessing against the conservation objectives of each SPA. The in-combination impacts on the seven SPA and Ramsar sites are listed in **Table 1.108** to **Table 1.114**.

1.6.4.32 It can be concluded that the Transmission Assets in-combination with other plans and projects would not prevent any of the conservation objectives from being achieved due to permanent loss of supporting habitat.

In-combination impact of temporary loss of supporting habitat and/or resource availability

1.6.4.33 As outlined in **paragraph 1.6.4.23**, if all of the projects and plans identified within this in-combination assessment, as listed in **Table 1.107**, are constructed to the full extent of the proposed site area there is a maximum total area of permanent habitat loss equating to 413.43 ha (including Transmission Assets). The impact of temporary habitat loss is predicted to be less than that of any permanent loss.

1.6.4.34 As noted in **paragraph 1.6.3.56** up to 193,413 m^2 (19.34 ha) of highly FLL (Bowland Ecology, 2021) will be temporarily lost during the construction phase of the Transmission Assets within the onshore export cable corridor. Considering this potential impact, the Applicants have committed to adopting an alternative site for supplementary feeding of pink-footed goose, located at a suitable distance from construction activities. This mitigation will begin prior to the commencement of construction works within the FLL. Additionally, measures will be put in place on land to the south of Newton with Scales that include the creation and maintenance of suitable foraging and roosting habitat for goose, duck, swan and wader species.

1.6.4.35 **Table 1.78** contains further detail on those measures adopted by the Applicants.

1.6.4.36 To avoid repetition of the in-combination assessment all three impacts screened into assessment are combined when assessing against the conservation objectives of each SPA. The in-combination impacts on the seven SPA and Ramsar sites are listed in **Table 1.108** to **Table 1.114**.

1.6.4.37 As the impact on habitat loss from those project and plans is considered under the impact of permanent loss of habitat and considering those measures adopted by the Applicants, it can be concluded that the Transmission Assets in-combination with other plans and projects would not prevent any conservation objectives from being achieved due to the impact of temporary loss of supporting habitat and/or resource availability.

In-combination impact of disturbance and displacement from construction, decommissioning, and operation and maintenance activities

1.6.4.38 The construction, decommissioning, and operation and maintenance phases of the Transmission Assets may result in the disturbance and displacement of ornithological receptors. Cumulatively these impacts have the potential to be greater when combined with impacts from other projects and plans. However, there is no publicly available information available on the construction timeframes for the projects and plans identified for this in-combination assessment (**Table** 1.107). In the absence of this information, it is difficult to quantify any potential impact from the in-combination impacts as a result of disturbance and displacement.

1.6.4.39 The Richmond Point development, formerly known as the Queensway housing development, located to the east of the B5261 at Lytham St Annes, is subject to details contained within **Table** 1.107 under projects 3, 24, 25 and 165, 783, 784 and 926. As such, these projects all fall under the same shadow HRA (The Environment Partnership, 2021). This shadow HRA identified the potential for disturbance to impact a total of 47.5 ha of land at Lytham Moss that is used by SPA and Ramsar site species. This represents a total of 10.6% of the area used to record SPA birds on Lytham Moss. This area of impact was determined by using Natural England's advice to the Richmond Point development on disturbance zones with 200 m from any construction activity considered likely to result in disturbance. This disturbance would be experienced during the construction and operational phases of the development. Prior to considering any mitigation measures implemented, it was concluded that the Richmond Point development alone and in-combination would result in a significant effect on SPA qualifying features from activities related to the construction and operation phases.

1.6.4.40 However, construction phase disturbance was concluded to be avoidable through the adoption of planning consents already in place for separate aspects of the housing development and the M55 link road close by. The operational phase disturbance was calculated as likely to have a significant effect on the SPA populations of whooper swan and pink-footed goose but was not expected to be significant for black-tailed godwit or Bewick's swan.

Through the implementation of mitigation measures, including the creation of the Farmland Conservation Area (FCA), it was ascertained that the project alone, and in combination would not have an adverse effect on the integrity of the Ribble and Alt Estuaries SPA.

1.6.4.41 As identified within **section 1.6.3**, Transmission Assets construction activities will not present an adverse effect due to disturbance and displacement impacts along the onshore cable corridor on the integrity of SPAs and Ramsar sites with onshore and intertidal ornithology features during the operation and maintenance phase. During the construction phase the onshore works are unlikely to occur at the same time. As such, the disturbance/displacement zones quantified in **Table 1.93** are very precautionary. The 66 months given as the duration is also the time from start to finish and does not reflect the time for which the entire area will be subject to disturbance.

1.6.4.42 Prior to the commencement of any construction works within the FCA an alternative site will be provided for the supplementary feeding of pink-footed goose conducted by the Richmond Point development. This alternative site will be provided during the core wintering bird period (November to March) and be located at a sufficient distance from the disruptive activities (disturbance distances provided in **Table 1.93**). The implementation of this distance will alleviate the risk of any noise and visual disturbance resulting from activities associated with construction, operation and maintenance and decommissioning.

1.6.4.43 Project 4, as listed in **Table** 1.107, is the installation of a solar farm over an area of 75.4 ha. Disturbance or displacement to species (including qualifying species of the Ribble and Alt Estuaries SPA and Ramsar site, Liverpool Bay/Bae Lerpwl SPA, Morecambe Bay Ramsar and Morecambe Bay and Duddon Estuaries SPA) was screened out within an Information to Inform a HRA document (Avian Ecology, 2021). The project was considered to be of sufficient distance from the SPA (3.7 km from the Ribble and Alt Estuaries SPA boundary) and the location of any qualifying species recorded during site-specific surveys sufficiently screened from disturbance so as to render any impact inconsequential.

1.6.4.44 The potential for disturbance through an increase in recreational pressures on the Ribble and Alt Estuaries SPA was assessed within a Shadow HRA conducted for project 22, a residential development of 155 properties by Gladman Developments, as listed in **Table** 1.107. As the location for this project is adjacent to Hillock Land and AFC Fylde Football Club facilities it was deemed that the site was subjected to high levels of noise disturbance prior to development. Additionally, the distance of the site to the SPA boundary, 1.7 km, was concluded to be of a sufficient distance that direct disturbance to features within the site would not occur. It was concluded that with the adoption of mitigation the project will not have an adverse impact on the integrity of the Ribble and Alt Estuaries SPA through recreational pressures either alone or in-combination.

1.6.4.45 Site-specific surveys conducted for project 23, an outline planning application for a mixed-use development by Blackpool Council, as listed in **Table** 1.107, identified one SPA qualifying species using habitats within the site boundary.

A peak count of 138 oystercatcher was recorded, a count below 1% of the Ribble and Alt Estuaries SPA population, indicating a limited contribution to FLL in the area. It was therefore concluded within the ISAA (Wardell Armstrong, 2021) produced in support of this project, that no significant adverse effects on SPA and Ramsar sites would be felt from disturbance due to this project. This project is now under construction.

1.6.4.46 The potential for direct disturbance to qualifying SPA species was screened out without further consideration within the Shadow HRA conducted for project 192 (Envirotech, 2021), an outline application for a residential development of 52 dwellings from Rowlands Homes Ltd, as listed in **Table** 1.107. This project is now under construction. The potential for direct disturbance was deemed to be insignificant.

1.6.4.47 Project 820, a recreational development by De Pol Associates, as listed in **Table 1.107**, involves the redevelopment of a site used for motocross into a leisure complex including a dry ski slope, mountain bike track and leisure lake. The potential impact of disturbance and displacement at FLL during construction and operation of the site was assessed within a Shadow HRA (ERAP, 2023). With appropriate mitigation in place, it was concluded that no adverse effect on the integrity of any designated site would be experienced. This conclusion was reached owing to the availability of other suitable resting and feeding habitat within the local area. Consent has been provided for this application.

1.6.4.48 Project 883, an outline application for a residential care home and associated infrastructure, as listed in **Table** 1.107, involves the demolition of existing structures and construction of a residential care home. As part of the planning application a Report to Inform a Habitat Regulations Assessment (Stage 1: Screening) was produced (Arbtech, 2023). The potential for disturbance impact on qualifying features of SPAs was assessed as visual and noise disturbance. These potential impacts were screened out as no likely significant effect was foreseen. This conclusion was reached as no line of sight was possible between the SPA and the development site. The site location is over 200 m from the SPA boundary and is separated by roads and buildings. It was therefore deemed likely that any development noise would not be significantly greater than existing background levels.

1.6.4.49 As no projects have predicted any impact on the SPAs and Ramsar sites, there is not likely to be an adverse effect on the integrity of these sites when considered in-combination with the Transmission Assets. Where projects have recorded a significant population of designated features the projects alone have concluded no adverse effect on site integrity due to mitigation put in place.

1.6.4.50 To avoid repetition of the in-combination assessment all three impacts screened into assessment are combined when assessing against the conservation objectives of each SPA. The in-combination impacts on the seven SPA and Ramsar sites are listed in **Table 1.108** to **Table 1.114**

1.6.4.51 It can be concluded that the Transmission Assets in-combination with other plans and projects would not prevent any of the conservation objectives from

being achieved due to the impact of disturbance and displacement from construction, decommissioning, and operation and maintenance activities.

Combined in-combination assessment tables for all three impact pathways at each SPA and Ramsar site

Liverpool Bay/Bae Lerpwl SPA

1.6.4.52 Adverse effects on the qualifying features of the Liverpool Bay/Bae Lerpwl SPA which undermine the conservation objectives of the SPA will not occur because of the three in-combination impacts (permanent loss of supporting habitat, temporary loss of supporting habitat and/or resource availability and disturbance displacement of birds from activities associated with construction, operation and maintenance and decommissioning).

1.6.4.53 An assessment of the potential in-combination impacts against each relevant conservation objective is presented in **Table 1.108** to **Table 1.114**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

1.6.4.54 Conservation objectives are taken from the Liverpool Bay/Bae Lerpwl SPA conservation advice package (Natural England, NRW, JNCC, 2022).

Table 1.108: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA interest feature red-throated diver for all in-combination impacts

Conservation objective	Conclusion
Maintain the size of the non-breeding population at a level which is at or above 1,800 pairs (mean peak 2015, 2018, 2019 and 2020).	There is no consented or proposed Tier 1 project screened into the in-combination assessment of onshore and intertidal ornithology which could impact the Liverpool Bay/Bae Lerpwl SPA qualifying feature red-throated diver in-combination with the Transmission Assets. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population of red-throated diver being maintained.
Restore the distribution of the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting feature distribution.	
Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	
Restore the extent, distribution and availability of suitable habitat which supports the feature; preventing further deterioration, and where possible, reduce any existing anthropogenic influences impacting the extent and quality (including water quality).	

Table 1.109: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA interest feature common scoter for all in-combination impacts

Conservation objective	Conclusion
Maintain the size of the non-breeding population at a level which is at or above 141,801 pairs (mean peak 2015, 2018, 2019 and 2020).	There is no consented or proposed Tier 1 project screened into the in-combination assessment of onshore and intertidal ornithology which could impact the Liverpool Bay/Bae Lerpwl SPA qualifying feature common scoter in-combination with the Transmission Assets. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population of common scoter being maintained.
Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
Maintain the distribution, abundance and availability of key food and prey items (e.g., molluscs and bivalves) to maintain the population.	
Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	

Table 1.110: Conclusions against the conservation objectives of the Liverpool Bay/Bae Lerpwl SPA interest feature common tern for all in-combination impacts

Conservation objective	Conclusion
Maintain the size of the breeding population at a level which is at or above 180 pairs (2011-2015).	There is no consented or proposed Tier 1 project screened into the in-combination assessment of onshore and intertidal ornithology which could impact the Liverpool Bay/Bae Lerpwl SPA qualifying feature common tern in-combination with the Transmission Assets. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population of common tern being maintained.
Maintain the distribution of the feature; the extent should not be reduced by anthropogenic factors.	
Minimise the frequency, duration and/or intensity of disturbance affecting the feature so that the population, its distribution within the site, or its use of the habitat is not significantly affected.	
Maintain the distribution, abundance and availability of key food and prey items (e.g., fish) to maintain the population.	
Maintain safe passage of birds moving between nesting and feeding areas.	
Maintain the extent, distribution and availability of suitable habitat which supports the feature; the quality and extent should not deteriorate by anthropogenic factors (including water quality).	

1.6.4.55 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Liverpool Bay/Bae Lerpwl SPA because of in-combination impacts with respect to the construction, operation and maintenance and decommissioning phases of the Transmission Assets.

Ribble and Alt Estuaries SPA and Ramsar site

1.6.4.56 Adverse effects on the qualifying features of the Ribble and Alt Estuaries SPA and Ramsar site which undermine the conservation objectives of the SPA will not occur as a result of the three in-combination impacts (permanent loss of supporting habitat, temporary loss of supporting habitat and/or resource availability and disturbance displacement of birds through activities associated with construction, operation and maintenance and decommissioning). An assessment of the potential in-combination impacts against each relevant conservation objective (as presented in **paragraph 1.6.2.83**) is presented in **Table 1.111**. Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.111: Conclusions against the conservation objectives of the Ribble and Alt Estuaries SPA and Ramsar site for all in-combination impacts

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	All Tier 1 projects identified would not adversely impact the integrity of the Ribble and Alt estuaries SPA and Ramsar site through the impacts assessed. The assessment in-combination mirrors that of the alone and the mitigation provided by the projects avoids an adverse effect on the habitats the SPA feature populations rely on. As the Applicants have committed to supplementary feeding and creating nearby habitat that is suitable for SPA qualifying features there will be no adverse effects on the extent and distribution of the habitats of the qualifying features at potential risk from the impact of temporary habitat loss and disturbance and displacement. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the extent and distribution, structure and function or the supporting processes on which the habitats of the qualifying features rely from being maintained or restored.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	All Tier 1 projects identified would not impact the Ribble and Alt Estuaries SPA and Ramsar site populations or distribution through the impacts assessed with the implementation of suitable mitigation. The commitments from the Transmission Assets will ensure that the permanent and temporary loss of habitat and disturbance and displacement during construction will be significantly reduced through the provision of alternative resting and feeding sites suitable for the waterbird features of the Ribble and Alt Estuaries SPA and Ramsar site. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population or the distribution of each of the qualifying features from being maintained or restored.
Maintain or retore the distribution of the qualifying features within the site.	

1.6.4.57 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Ribble and Alt Estuaries SPA and Ramsar site as a result in-combination impacts with respect to the construction and operation and maintenance phase of the Transmission Assets.

Martin Mere SPA and Ramsar site

1.6.4.58 Adverse effects on the qualifying features of the Martin Mere SPA and Ramsar site which undermine the conservation objectives of the SPA will not occur because of the three in-combination impacts (permanent loss of supporting habitat, temporary loss of supporting habitat and/or resource availability and disturbance displacement of birds through activities associated with construction, operation and maintenance and decommissioning). An assessment of the potential in-combination impacts against each relevant conservation objective (as presented in **paragraph 1.6.2.98**) is presented in **Table 1.112.** Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.112: Conclusions against the conservation objectives of the Martin Mere SPA and Ramsar site for all in-combination impacts

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	There are no Tier 1 projects consented or proposed that are likely to present an adverse impact on the integrity of the Martin Mere SPA and Ramsar site through the impacts assessed. The assessment in-combination mirrors that of the alone and the mitigation provided by the projects avoids an adverse effect on the habitats the SPA feature populations rely on. As the Applicants have committed to supplementary feeding for SPA qualifying features there will be no adverse effects on the extent and distribution of the habitats of the qualifying features. Therefore, in-combination impacts during the construction and operation and maintenance phases will not prevent the extent and distribution, structure and function or the supporting processes on which the habitats of the qualifying features rely from being maintained or restored.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	No Tier 1 projects identified would adversely impact the Martin Mere SPA and Ramsar site populations or distribution through the impacts assessed with the implementation of suitable mitigation. The commitments from the Transmission Assets will ensure that the temporary and permanent loss of habitat and disturbance and displacement during construction will be significantly reduced through the provision of alternative resting and feeding sites suitable for the designated features of the Martin Mere SPA and Ramsar site. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population or the distribution of
Maintain or retore the distribution of the qualifying features within the site.	

Conservation objective	Conclusion
	each of the qualifying features from being maintained or restored.

1.6.4.59 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Martin Mere SPA and Ramsar site as a result in-combination impacts with respect to the construction and operation and maintenance phase of the Transmission Assets.

Morecambe Bay and Duddon Estuary SPA

1.6.4.60 Adverse effects on the qualifying features of the Morecambe Bay and Duddon Estuary SPA which undermine the conservation objectives of the SPA will not occur because of the three in-combination impacts (permanent loss of supporting habitat, temporary loss of supporting habitat and/or resource availability and disturbance displacement of birds from activities associated with construction, operation and maintenance and decommissioning). An assessment of the potential in-combination impacts against each relevant conservation objective (as presented in **paragraph 1.6.2.122**) is presented in **Table 1.113.** Where the justifications and supporting evidence are the same for more than one conservation objective, the assessments have been grouped.

Table 1.113: Conclusions against the conservation objectives of the Morecambe Bay and Duddon Estuary SPA for all in-combination impacts

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	No identified Tier 1 projects are deemed likely to adversely impact the integrity of the Morecambe Bay and Duddon Estuary SPA through the impacts considered in this in-combination assessment. The assessment in-combination mirrors that of the alone and the mitigation provided by the projects avoids an adverse effect on the habitats the SPA feature populations rely on. As the Applicants have committed to supplementary feeding and creating nearby habitat that is suitable for those qualifying features there will be no adverse effects on the extent and distribution of the habitats of the qualifying feature. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the extent and distribution, structure and function or the supporting processes on which the habitats of the qualifying features rely from being maintained or restored.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	The commitment to temporary food provision and the creation of suitable habitat for the Morecambe

Conservation objective	Conclusion
Maintain or retore the distribution of the qualifying features within the site.	Bay and Duddon Estuary SPA feature populations by the Transmission Assets will minimise any additional energy expenditure resulting from the impacts assessed. There are no Tier 1 projects consented or proposed that are likely to present an adverse impact on the SPA feature populations from the impacts assessed with the implementation of suitable mitigation. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population or the distribution of each of the qualifying features from being maintained or restored.

1.6.4.61 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay and Duddon Estuary SPA as a result in-combination impacts with respect to the construction and operation and maintenance phase of the Transmission Assets.

Morecambe Bay Ramsar site

1.6.4.62 The assessment presented for the Morecambe Bay and Duddon Estuary SPA should be read as a proxy of the impact on the Morecambe Bay Ramsar site.

1.6.4.63 Adverse effects on the qualifying features of the Morecambe Bay Ramsar site will not occur because of the three in-combination impacts (permanent loss of supporting habitat, temporary loss of supporting habitat and/or resource availability and disturbance displacement of birds through activities associated with construction, operation and maintenance and decommissioning). There are no specific conservation objectives for Ramsar sites, and the assessment presented above against the conservation objectives of the Morecambe Bay and Duddon Estuary SPA should be read regarding the conclusions for Morecambe Bay Ramsar site.

1.6.4.64 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Morecambe Bay Ramsar site because of in-combination impacts with respect to the construction and operation and maintenance phase of the Transmission Assets.

Bowland Fells SPA

1.6.4.65 Adverse effects on the qualifying features of the Bowland Fells SPA which undermine the conservation objectives of the SPA will not occur because of the three in-combination impacts (permanent loss of supporting habitat, temporary loss of supporting habitat and/or resource availability and disturbance displacement of birds through activities associated with construction, operation and maintenance and decommissioning). An assessment of the potential in-combination impacts against each relevant conservation objective (as presented in **paragraph 1.6.2.131**) is presented in **Table 1.114.** Where the justifications and supporting evidence are the same

for more than one conservation objective, the assessments have been grouped.

Table 1.114: Conclusions against the conservation objectives of the Bowland Fells SPA for all in-combination impacts

Conservation objective	Conclusion
Maintain or restore the extent and distribution of the habitats of the qualifying features.	Due to the distance from the SPA, and the very low proportions of available foraging ranges that are to be temporarily lost, it is concluded that there will be only a negligible effect on the extent and distribution, structure and function, and the supporting process upon which lesser black-backed gull rely. No identified Tier 1 projects are deemed likely to adversely impact the integrity of the Bowland Fells SPA through the impacts considered in this in-combination assessment. The assessment in-combination mirrors that of the alone and the mitigation provided by the projects avoids an adverse effect on the habitats the SPA feature population relies on. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the extent and distribution, structure and function or the supporting processes on which the habitats of the qualifying features rely from being maintained or restored.
Maintain or restore the structure and function of the habitats of the qualifying features.	
Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	
Maintain or restore the population of each of the qualifying features.	Due to the distance from the Bowland Fells SPA no Tier 1 projects identified would not impact the Ribble and Alt Estuaries SPA and Ramsar site populations or distribution through the impacts assessed with the implementation of suitable mitigation. The commitments from the Transmission Assets will ensure that the permanent and temporary loss of habitat and disturbance and displacement during construction will be significantly reduced through the provision of alternative resting and feeding sites. Therefore, in-combination impacts during the construction and operation and maintenance phase will not prevent the population or the distribution of lesser black-backed gull from being maintained or restored.
Maintain or retore the distribution of the qualifying features within the site.	

1.6.4.66 Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Bowland Fells SPA as a result in-combination impacts with respect to the construction and operation and maintenance phase of the Transmission Assets.

1.7 Summary

1.7.1 Effects on site integrity – offshore ornithology

1.7.1.1 A summary of the assessments presented in this HRA Stage 2 ISAA, considering the relevant SPAs and Ramsar sites, is provided in the sections below. **Table 1.115** presents the conclusions of adverse effects on integrity in

relation to the Transmission Assets alone and in-combination with the Morecambe Offshore Windfarm: Generation Assets. **Table 1.116** presents the conclusions of adverse effects on integrity in relation to the Transmission Assets alone and in-combination with and the Morgan Offshore Wind Project: Generation Assets. **Table 1.117** presents the conclusions of adverse effects on integrity in relation to the Transmission Assets in-combination with other plans and projects (including the Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets).

Liverpool Bay/Bae Lerpwl SPA

1.7.1.2 Based on the information presented in **sections 1.5.3** and **1.5.4**, **no adverse effect on integrity** of the Liverpool Bay/Bae Lerpwl SPA, with specific regard to the qualifying offshore ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Ribble and Alt Estuaries Ramsar site

1.7.1.3 Based on the information presented in **sections 1.5.3** and **1.5.4**, **no adverse effect on integrity** of the Ribble and Alt Estuaries Ramsar site, with specific regard to the qualifying offshore ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Ribble and Alt Estuaries SPA

1.7.1.4 Based on the information presented in **sections 1.5.3** and **1.5.4, no adverse effect on integrity** of the Ribble and Alt Estuaries SPA, with specific regard to the qualifying offshore ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Morecambe Bay and Duddon Estuary SPA

1.7.1.5 Based on the information presented in **sections 1.5.3** and **1.5.4, no adverse effect on integrity** of the Morecambe Bay and Duddon Estuary SPA, with specific regard to the qualifying offshore ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Morecambe Bay Ramsar site

1.7.1.6 Based on the information presented in **sections 1.5.3** and **1.5.4**, **no adverse effect on integrity** of the Morecambe Bay Ramsar site, with specific regard to the qualifying offshore ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Table 1.115: Summary of conclusions of the Appropriate Assessment for the Transmission Assets alone and in-combination with Morecambe Offshore Windfarm: Generation Assets

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morecambe Offshore Windfarm: Generation Assets
Offshore ornithological features					
Liverpool Bay/Bae Lerpwl SPA	Red-throated diver Cormorant Common scoter Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Ribble and Alt Estuaries Ramsar site	Red-throated diver	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morecambe Offshore Windfarm: Generation Assets
	Cormorant Common scoter		sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.		
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Ribble and Alt Estuaries SPA	Scaup Cormorant Common scoter	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morecambe Offshore Windfarm: Generation Assets
			• In-combination temporary habitat loss/disturbance and increased SSC.		
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Morecambe Bay and Duddon Estuary SPA	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morecambe Offshore Windfarm: Generation Assets
			sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.		
Morecambe Bay Ramsar site	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

Table 1.116: Summary of conclusions of the Appropriate Assessment with respect to the Transmission Assets alone and in-combination with Morgan Offshore Wind Project: Generation Assets

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morgan Offshore Wind Project: Generation Assets
Offshore ornithological features					
Liverpool Bay/Bae Lerpwl SPA	Red-throated diver Cormorant Common scoter Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Ribble and Alt Estuaries Ramsar site	Red-throated diver Cormorant	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morgan Offshore Wind Project: Generation Assets
	Common scoter		sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.		
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Ribble and Alt Estuaries SPA	Scaup Cormorant Common scoter	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morgan Offshore Wind Project: Generation Assets
			• In-combination temporary habitat loss/disturbance and increased SSC.		
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Morecambe Bay and Duddon Estuary SPA	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets alone	Conclusion – Transmission Assets in-combination with Morgan Offshore Wind Project: Generation Assets
			sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.		
Morecambe Bay Ramsar site	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

Table 1.117: Summary of conclusions of the Appropriate Assessment with respect to the Transmission Assets in-combination with other plans and projects (including Morecambe Offshore Windfarm: Generation Assets and Morgan Offshore Wind Project: Generation Assets)

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects	Conclusion – Transmission Assets in-combination with other Tier 1 and Tier 2 plans/projects	Conclusion – Transmission Assets in-combination with Tier 1, Tier 2 and Tier 3 plans/projects
Offshore ornithological features						
Liverpool Bay/Bae Lerpwl SPA	Red-throated diver Cormorant Common scoter Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects	Conclusion – Transmission Assets in-combination with other Tier 1 and Tier 2 plans/projects	Conclusion – Transmission Assets in-combination with Tier 1, Tier 2 and Tier 3 plans/projects
			and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.			
Ribble and Alt Estuaries Ramsar site	Red-throated diver Cormorant Common scoter	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• In-combination disturbance and displacement from	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects	Conclusion – Transmission Assets in-combination with other Tier 1 and Tier 2 plans/projects	Conclusion – Transmission Assets in-combination with Tier 1, Tier 2 and Tier 3 plans/projects
			airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.			
Ribble and Alt Estuaries SPA	Scaup Cormorant Common scoter	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects	Conclusion – Transmission Assets in-combination with other Tier 1 and Tier 2 plans/projects	Conclusion – Transmission Assets in-combination with Tier 1, Tier 2 and Tier 3 plans/projects
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Morecambe Bay and Duddon Estuary SPA	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species. • In-combination temporary habitat	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects	Conclusion – Transmission Assets in-combination with other Tier 1 and Tier 2 plans/projects	Conclusion – Transmission Assets in-combination with Tier 1, Tier 2 and Tier 3 plans/projects
			loss/disturbance and increased SSC.			
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Morecambe Bay Ramsar site	Cormorant Eider Red-breasted merganser	Construction/decommissioning	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination indirect impacts from underwater sound affecting prey species.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar sites	Relevant qualifying features	Project phase	Potential impact	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects	Conclusion – Transmission Assets in-combination with other Tier 1 and Tier 2 plans/projects	Conclusion – Transmission Assets in-combination with Tier 1, Tier 2 and Tier 3 plans/projects
			• In-combination temporary habitat loss/disturbance and increased SSC.			
		Operation and maintenance	• In-combination disturbance and displacement from airborne sound, underwater sound and presence of vessels and infrastructure. • In-combination temporary habitat loss/disturbance and increased SSC.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

1.7.2 Effects on site integrity – onshore and intertidal ornithology

Liverpool Bay/Bae Lerpwl SPA

1.7.2.1 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Liverpool Bay/Bae Lerpwl SPA, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Ribble and Alt Estuaries SPA

1.7.2.2 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Ribble and Alt Estuaries SPA, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Ribble and Alt Estuaries Ramsar site

1.7.2.3 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Ribble and Alt Estuaries Ramsar site, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Morecambe Bay and Duddon Estuary SPA

1.7.2.4 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Morecambe Bay and Duddon Estuary SPA, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Morecambe Bay Ramsar site

1.7.2.5 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Morecambe Bay Ramsar site, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Martin Mere SPA

1.7.2.6 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Martin Mere SPA, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Martin Mere Ramsar site

1.7.2.7 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Martin Mere Ramsar site, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects.

Bowland Fells SPA

1.7.2.8 Based on the information presented in **sections 1.6.3** and **1.6.4**, no adverse effect on integrity of the Bowland Fells SPA, with specific regard to the qualifying onshore and intertidal ornithological features for which LSE could not be excluded, is predicted as a result of the Transmission Assets, either alone or in-combination with other plans and projects

Table 1.118: Summary of conclusions of the Appropriate Assessment with respect to the Transmission Assets in-combination with other plans and projects

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
Onshore and intertidal ornithological features					
Liverpool Bay/Bae Lerpwl SPA	Common scoter (non-breeding) Red-throated diver (non-breeding) Common tern (breeding)	• Construction/decommissioning • Operation and maintenance	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
Ribble and Alt Estuaries SPA	Pink-footed goose (non-breeding) Whooper swan (non-breeding) Shelduck (non-breeding) Wigeon (non-breeding) 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) Ruff (breeding) Dunlin (non-breeding) Sanderling (non-breeding)	Construction/decommissioning.	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
	Knot (non-breeding) Redshank (non-breeding) Lesser black-backed gull (breeding) Common tern (breeding) Non-breeding waterbird assemblage Breeding waterbird assemblage				
Ribble and Alt Estuaries Ramsar site	Pink-footed goose (non-breeding) Whooper swan (non-breeding) Wigeon (non-breeding) Teal (non-breeding) Oystercatcher (non-breeding) Ringed plover (non-breeding)	Operation and maintenance: – Pink-footed goose (non-breeding) – Oystercatcher (non-breeding) – Golden plover (non-breeding) – Lesser black-backed gull (breeding)	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Construction/decommissioning	• Permanent loss of supporting habitats		

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
	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) Lesser black-backed gull (breeding)		• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects		
		Operation and maintenance: – Pink-footed goose (non-breeding) – Oystercatcher (non-breeding) – Golden plover (non-breeding) – Lesser black-backed gull (breeding)	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects		
Martin Mere SPA	Pink-footed goose	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
			operation and maintenance activities • In-combination effects		
Martin Mere Ramsar site	Pink-footed goose	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
Morecambe Bay and Duddon Estuary SPA	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Herring gull (breeding) Lesser black-backed gull	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
	(breeding and non-breeding) Sandwich tern (breeding)	Operation and maintenance: – Pink-footed goose (non-breeding) – Golden plover (non-breeding) – Curlew (non-breeding) – Lesser black-backed gull (breeding)	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects		
Morecambe Bay Ramsar site	Pink-footed goose (non-breeding) Golden plover (non-breeding) Curlew (non-breeding) Herring gull (breeding) Lesser black-backed gull (breeding and non-breeding) Sandwich tern (breeding)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance: – Pink-footed goose (non-breeding) – Golden plover (non-breeding) – Curlew (non-breeding)	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and		

SPA and Ramsar Site	Relevant qualifying features	Project phase	Potential impact	Conclusion - Transmission Assets alone	Conclusion – Transmission Assets in-combination with Tier 1 plans/projects
		– Lesser black-backed gull (breeding)	operation and maintenance activities • In-combination effects		
Bowland Fells SPA	Lesser black-backed gull (breeding)	Construction/decommissioning	• Permanent loss of supporting habitats • Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects	No adverse effect on the integrity of the site.	No adverse effect on the integrity of the site.
		Operation and maintenance	• Temporary loss of supporting habitats and/or resource availability • Disturbance and displacement from construction, decommissioning, and operation and maintenance activities • In-combination effects		

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Appendix A

Apx Table 1: The peak counts of SPA features recorded during site specific surveys

Species	Intertidal landfall surveys		Intertidal Ribble crossing surveys		Terrestrial bird surveys (WWO and BBS)		Peak count in the relevant (to citation) season
	2021/2022	2022/2023	2022/2023	2023/2024	2022/2023	2023/24	
Pink-footed goose (wintering)	0	0	0	0	5,324	8,319	**8,319**
Whooper swan (wintering)	0	0	30	0	132	123	**132**
Shelduck (non-breeding)	1	1	11	66	75	374	**374**
Wigeon (non-breeding)	0	0	822	670	1,647	878	**1,647**
Teal (non-breeding)	0	0	275	167	261	312	**312**
Common scoter (non-breeding)	4,000	3934	0	0	0	0	**4,000**
Oystercatcher (non-breeding)	822	1,073	54	28	9	126	**1,073**
Ringed plover (non-breeding)	7	93	0	0	0	0	**93**
Golden plover (non-breeding)	1	0	0	0	100	381	**381**
Grey plover (non-breeding)	118	62	2	0	2	0	**118**
Curlew (non-breeding)	9	1	24	10	410	696	**696**
Bar-tailed godwit (non-breeding)	625	500	0	0	0	0	**625**

Species	Intertidal landfall surveys		Intertidal Ribble crossing surveys		Terrestrial bird surveys (WWO and BBS)		Peak count in the relevant (to citation) season
	2021/2022	2022/2023	2022/2023	2023/2024	2022/2023	2023/24	
Black-tailed godwit (passage)	0	0	0	0	2	137	**137**
Black-tailed godwit (non-breeding)	0	0	14	0	390	423	**423**
Ruff (breeding)	0	0	0	0	0	0	**0**
Dunlin (passage)	1,031	20	3	46	0	0	**1,031**
Dunlin (non-breeding)	4,200	677	222	46	0	0	**4,200**
Sanderling (passage)	2,134	800	0	0	0	0	**2,134**
Sanderling (wintering)	4,702	3,934	0	0	0	0	**4,702**
Knot (non-breeding)	370	300	0	0	0	0	**370**
Redshank (passage)	13	0	15	0	14	9	**14**
Redshank (non-breeding)	70	33	40	22	7	61	**70**
Black-headed gull (breeding)	156	82	166	N/A	0	5,330	**5,330**
Black-headed gull (non-breeding)	877	620	296	80	1,297	1,927	**1,927**
Herring gull (breeding)	1,543	1,600	156	83	185	1,009	**1,543**
Lesser black-backed gull (breeding)	40	20	41	N/A	8	205	**205**
Lesser black-backed gull (non-breeding)	353	210	2	2	152	177	**353**
Sandwich tern (breeding)	84	427	0	0	0	0	**427**

Species	Intertidal landfall surveys		Intertidal Ribble crossing surveys		Terrestrial bird surveys (WWO and BBS)		Peak count in the relevant (to citation) season
	2021/2022	2022/2023	2022/2023	2023/2024	2022/2023	2023/24	
Common tern (breeding)	90	17	5	0	0	0	**90**
Red-throated diver (non-breeding)	6	14	0	0	0	0	**14**
Non-breeding assemblage	N/A						**25,736**
Breeding assemblage	N/A						**2,370**

Apx Table 12: The monthly totals for SPA and Ramsar features found during the terrestrial surveys of the Onshore Order Limits plus 500 m buffer (i.e., breeding bird surveys and wintering and migratory surveys). Peak counts are highlighted in red

Species	2022								2023												2024		
	Apr	May	Jun	Jul	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Bar-tailed Godwit																					**3**	1	
Black-headed Gull			9			697	1,134	307	1,042	1,297	39				**5,330**		1,240	1,012	981	1,927	962	1,110	535
Black-tailed Godwit					2		10	125	3	390		4	2		137		20	88			14		**423**
Common Tern		2	**10**	10																			
Cormorant	8		2	**13**			2		2	5										6			2
Curlew	17		1	75		48	119	410	39	305	49	63		8	187		41	20	**696**	312	203	93	95
Dunlin							**21**															12	21
Golden Plover						19		100			41										**381**		
Grey Plover								**2**															
Herring Gull			10		38	185	142	35	166	153	97	1			95		66	**1,009**	17	68	117	240	219
Knot	**700**																						
Lapwing	76	39	90	33	91	66	445	763	628	58	44	51	56	148	372		5	154	724	3	**2,081**	426	142
Lesser Black-backed Gull			8				9			87	152				**205**		33	47	20		5	176	90
Oystercatcher	43	11	22	34						9		10	11	9	11				6	**126**	3	2	66
Pink-footed Goose				4	787	4,093	4,265	5,324	1,551	711							3,384	**8,319**	503	3,097	2,100	4,960	59
Redshank	14			1			6	2		4	7	9	5	10							3	19	**61**
Ruff								**2**															
Sanderling	**7**																						
Shelduck	92	40	14	7			4	4	35	75	61	72	73	16				12	7	23	121	**374**	243

Shoveler					**29**		9		19	23	17	20		12	1			14		2		13	31
Teal	1			3	261	20	241	3	186	134	32	11						**312**	105	91	284	176	237
Whooper Swan						14	8	22	42	**132**	3									3	36	123	42
Wigeon					106	107	599	1,040	534	**1,818**	980		1					482	489	310	86	434	878

Apx Table 23: The monthly totals for SPA and Ramsar features found during the intertidal surveys at the Intertidal Infrastructure Area. Peak counts are highlighted in red

Species	2021				2022												2023							
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Bar-tailed Godwit	0	0	**625**	71	11	25	6	40	0	0	0	0	27	458	500	4	0	285	250	1	0	0	0	1
Black-headed Gull	64	81	260	780	236	**877**	156	2	0	102	137	141	14	30	550	225	620	247	44	0	0	51	82	32
Common Scoter	0	0	200	0	226	250	700	0	0	103	248	**4,000**	800	357	290	505	3,934	950	1,892	30	0	0	63	180
Common Tern	0	0	0	0	0	0	0	0	0	29	5	0	0	0	0	0	0	0	0	17	0	4	0	**90**
Cormorant	6	1	1	0	1	1	0	2	2	5	0	14	54	12	13	**112**	7	9	6	22	4	1	15	0
Curlew	0	0	7	**9**	2	9	1	2	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
Dunlin	0	7	1,200	250	66	**4,200**	510	1,031	7	0	3	0	12	20	25	55	77	50	677	120	0	0	0	19
Golden Plover	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grey Plover	0	0	62	10	49	37	19	**118**	0	0	0	0	1	0	0	11	0	62	50	0	0	0	0	0
Herring Gull	59	90	570	535	227	842	196	118	1,543	430	165	653	720	94	**1,600**	212	1,500	500	216	812	143	580	460	414
Knot	0	1	113	**370**	0	0	0	52	0	0	0	0	0	0	0	300	0	33	300	0	0	0	0	0
Lesser Black-backed Gull	4	40	2	0	0	14	2	130	295	**343**	255	353	42	0	2	2	1	15	20	101	30	210	137	90
Oystercatcher	35	23	105	284	822	413	343	93	66	31	65	110	35	62	500	94	720	**1,073**	176	136	18	1	47	93
Redshank	0	8	23	37	**70**	39	51	13	0	0	0	0	0	10	16	31	6	33	24	0	0	0	0	0
Red-throated Diver	0	0	0	0	0	2	0	0	0	0	0	6	**14**	10	6	11	1	3	1	4	0	0	0	0
Ringed Plover	9	14	3	12	0	37	31	0	0	0	7	0	33	0	32	2	15	19	0	2	0	0	4	**93**
Sanderling	21	152	800	705	390	**4,702**	628	2,134	115	0	220	5	800	220	514	417	2,000	2,000	420	450	35	0	9	121
Sandwich Tern	1	2	0	0	0	0	0	0	0	0	84	4	0	0	0	0	0	0	0	20	0	15	12	**427**
Shelduck	0	0	0	0	0	0	0	0	**1**	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0

Apx Table 34: The monthly totals for SPA and Ramsar features found during the intertidal surveys at the river Ribble crossing. Peak counts are highlighted in red. As the Applicants have committed to avoiding impacts in this area via the use of trenchless techniques, these totals are just for reference and were not used in the assessment.

Species	2022			2023												2024		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Black-headed gull	141	51	250	**296**	262	16	0	23	17	166	149	57	31	5	41	80	8	38
Black-tailed godwit	0	0	**14**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common tern	0	0	0	0	0	0	0	**5**	4	2	1	0	0	0	0	0	0	0
Cormorant	5	**11**	5	2	2	0	1	0	1	1	1	2	1	1	5	2	1	1
Curlew	4	**24**	2	8	9	2	0	0	0	16	19	1	10	2	2	2	2	2
Dunlin	3	0	65	**222**	0	0	0	0	0	0	0	0	46	13	0	0	0	0
Grey plover	0	**2**	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herring gull	**156**	0	13	0	15	12	0	15	55	77	111	83	4	0	17	10	0	1
Lapwing	411	85	**444**	367	111	7	0	2	8	46	230	82	49	75	16	41	44	12
Lesser black-backed gull	2	0	0	0	0	0	0	0	32	4	**41**	2	1	0	0	0	0	1
Oystercatcher	0	0	0	1	**54**	45	0	1	18	2	6	1	0	0	0	0	4	28
Redshank	19	**40**	24	20	6	12	15	0	1	0	13	10	5	9	19	22	13	14
Shelduck	0	1	5	11	2	7	11	5	9	0	0	0	0	0	1	26	**66**	6
Teal	39	108	215	**275**	43	47	8	0	0	0	5	13	65	40	167	85	34	42
Whooper swan	0	0	**30**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wigeon	83	94	**822**	521	196	446	2	0	0	0	0	0	315	465	513	670	280	170

Appendix C

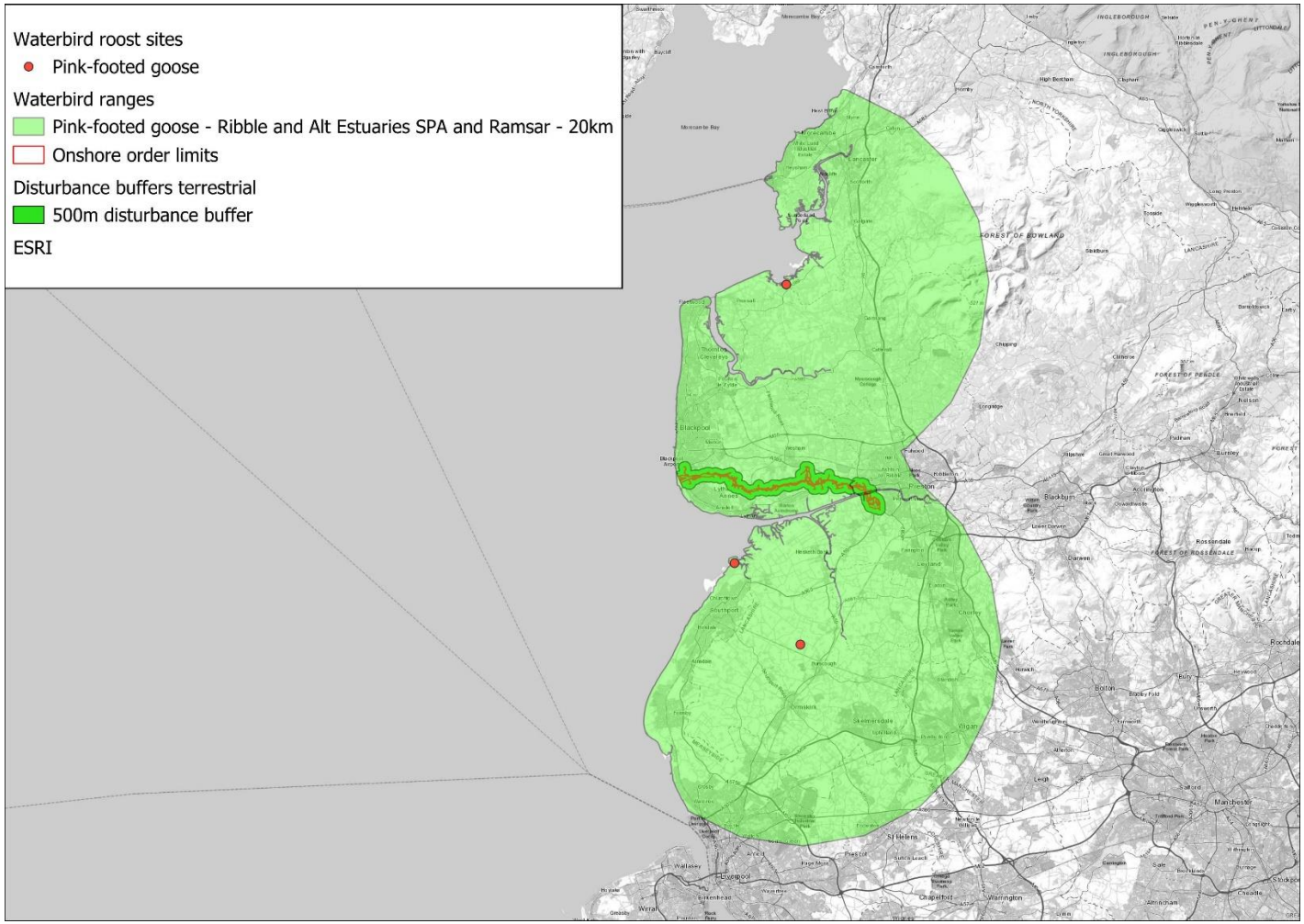
Apx Table 5: The seasonality of the relevant features as taken from Natural England's conservation advice (Natural England, 2017). The months when the features are expected to be present are highlighted in green

Feature name	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bar-tailed godwit	Non-breeding												
Black-headed gull	Breeding												
Black-tailed godwit	Non-breeding												
Common tern	Breeding												
Common scoter	Non-breeding												
Curlew	Non-breeding												
Dunlin	Non-breeding												
Golden plover	Non-breeding												
Grey plover	Non-breeding												
Herring gull	Breeding												
Knot	Non-breeding												
Lesser black-backed gull	Breeding												
Lesser black-backed gull	Non-breeding												
Oystercatcher	Non-breeding												
Pink-footed goose	Non-breeding												
Redshank	Non-breeding												

Feature name	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Red-throated diver	Non-breeding												
Ringed plover	Non-breeding												
Ruff	Breeding												
Sanderling	Non-breeding												
Sandwich tern	Breeding												
Shelduck	Non-breeding												
Teal	Non-breeding												
Whooper swan	Non-breeding												
Wigeon	Non-breeding												

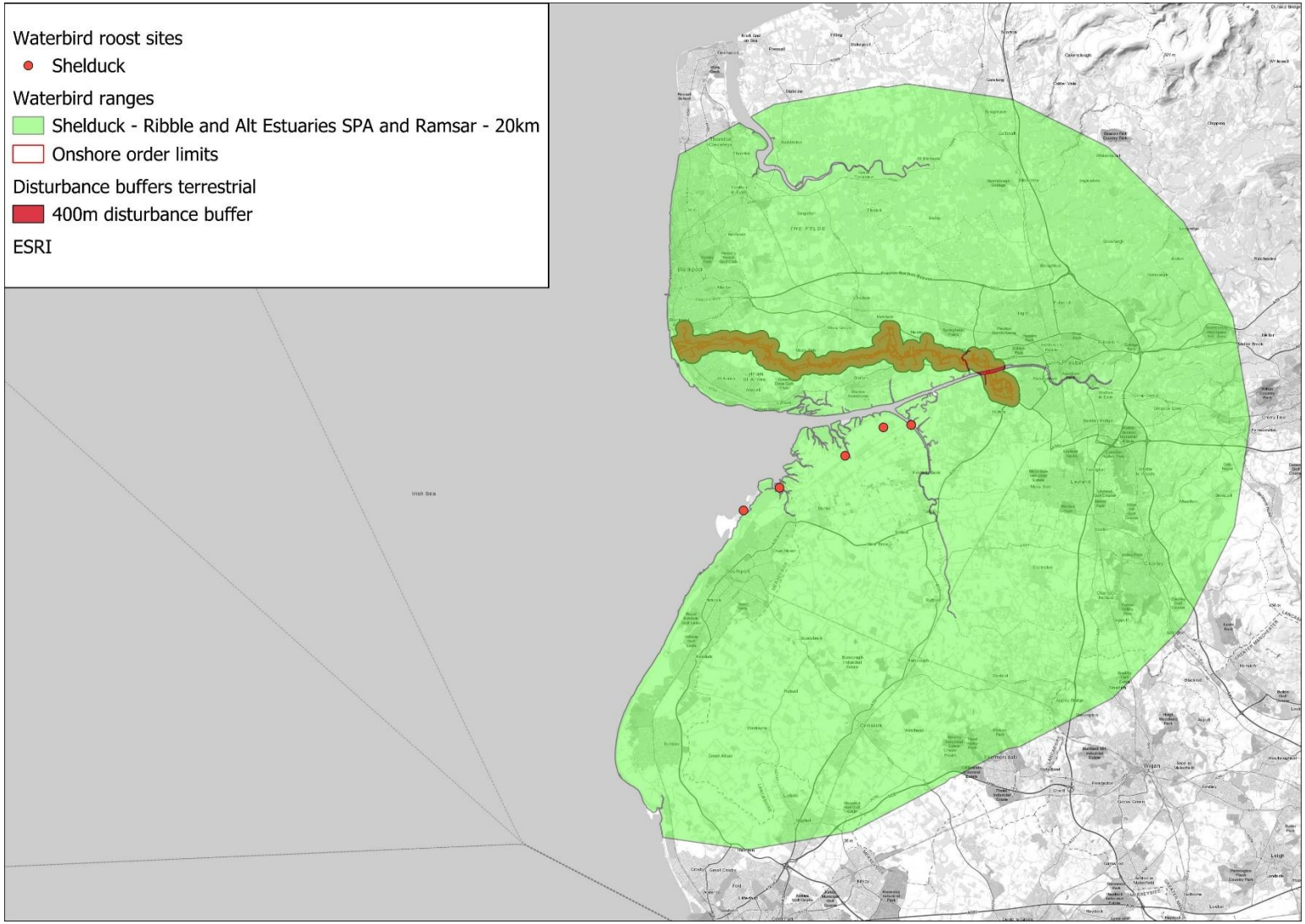
Appendix D

Apx Figure 1: The roost sites and 20 km terrestrial foraging range of the metapopulation of pink-footed goose with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



Apx Figure 2: The overlap of the terrestrial foraging range of whooper swan with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al*. (2015).

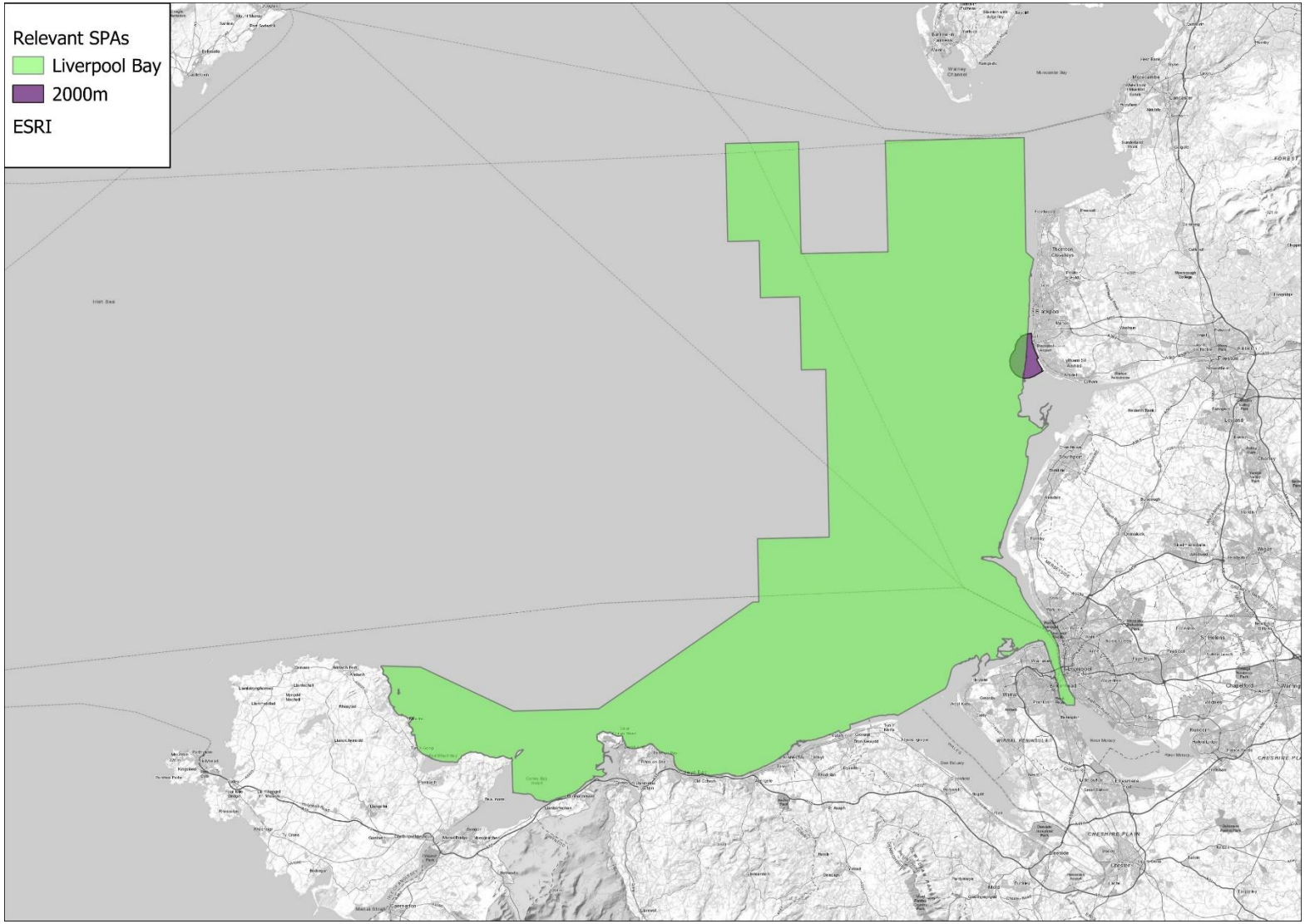
Apx Figure 3: The overlap of the terrestrial foraging range of shelduck with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



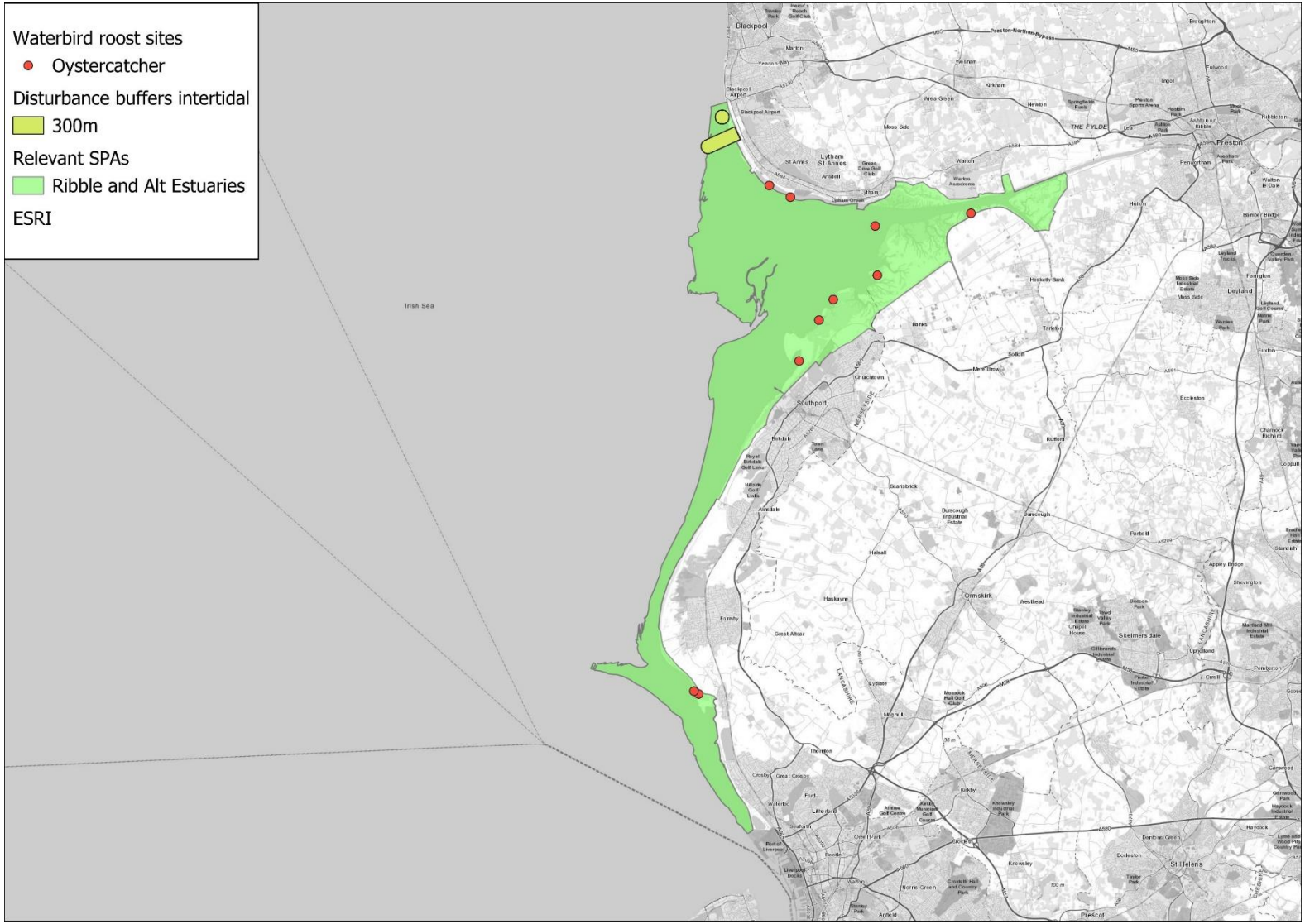
Apx Figure 4: The overlap of the terrestrial foraging range of wigeon with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).

Apx Figure 5: The overlap of the terrestrial foraging range of teal with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).

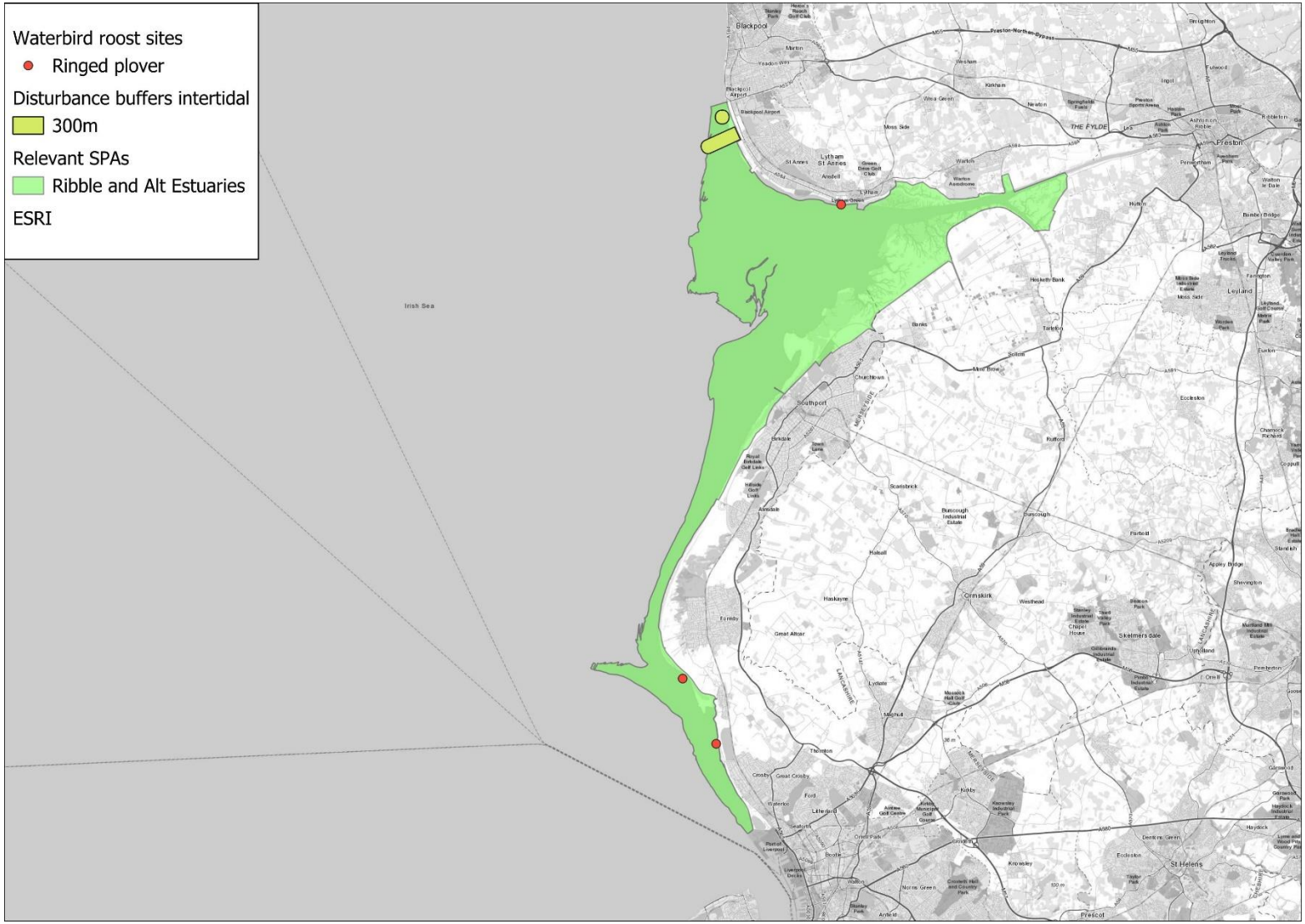
Apx Figure 6: The overlap of areas used by common scoter and red-throated diver with the Intertidal Infrastructure Area and the appropriate disturbance buffer.



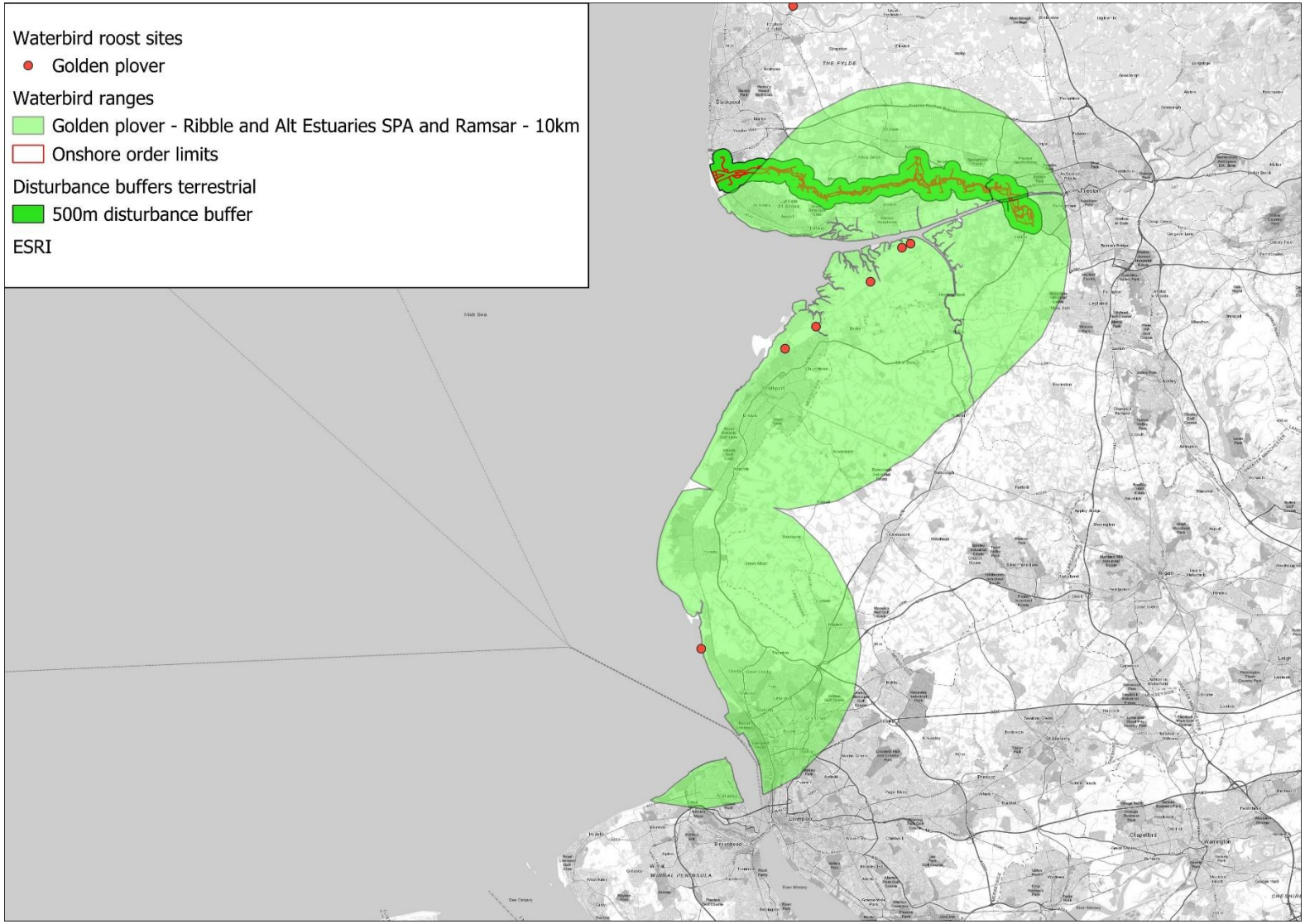
Apx Figure 7: The overlap of the intertidal foraging range of oystercatcher with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



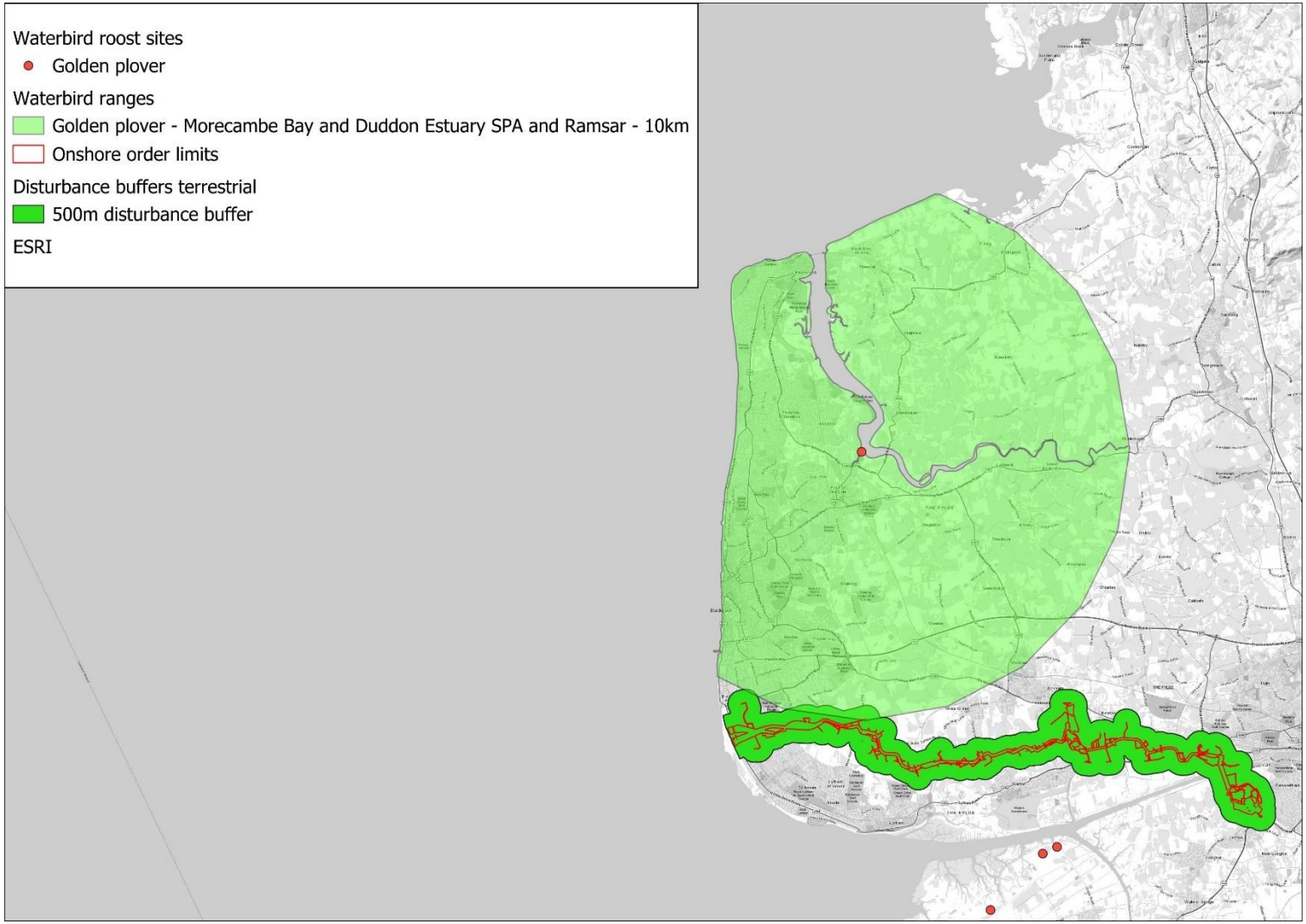
Apx Figure 8: The overlap of the intertidal foraging range of ringed plover with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



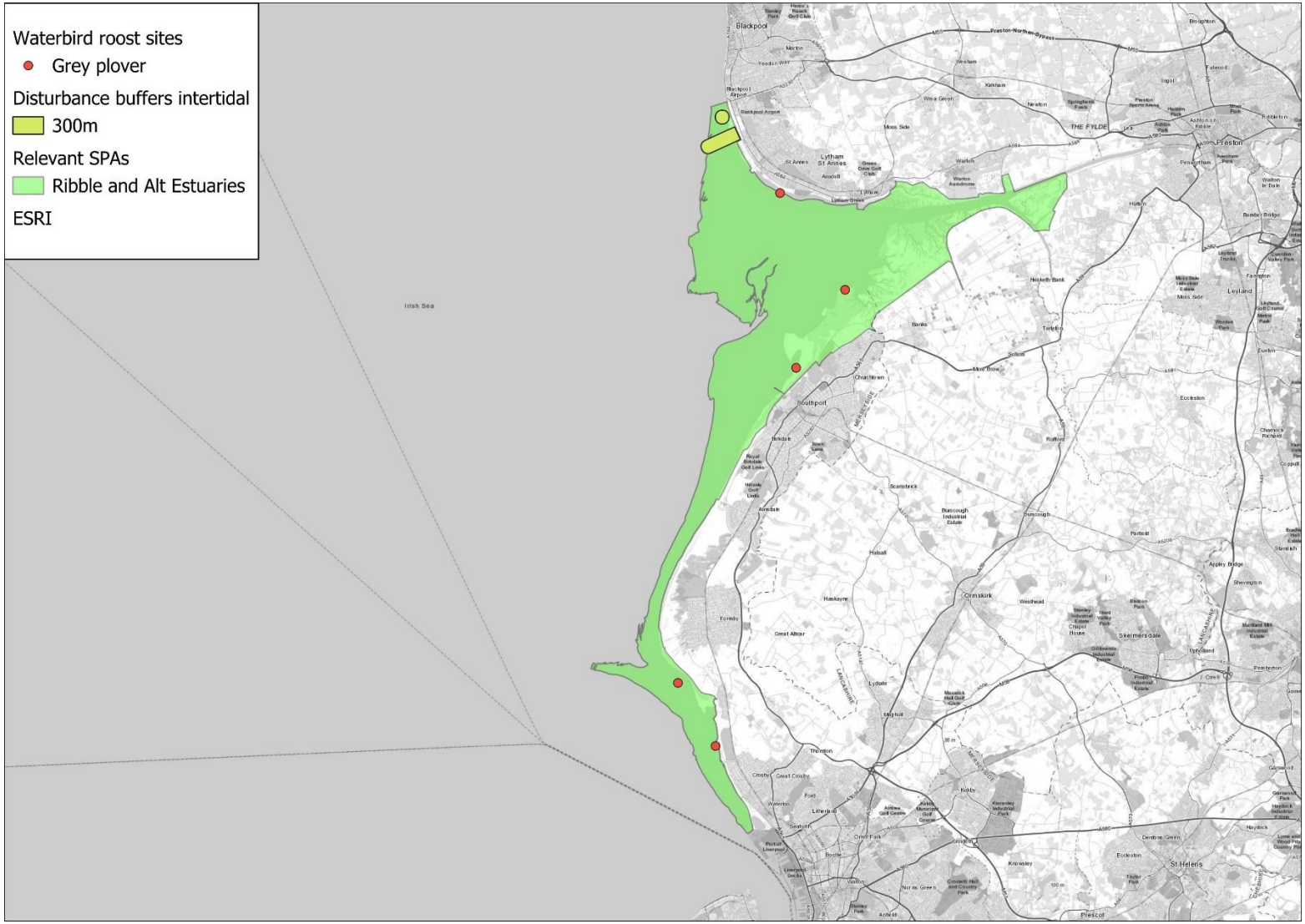
Apx Figure 9: The overlap of the terrestrial foraging range of Ribble and Alt Estuaries SPA and Ramsar golden plover with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al*. (2015).



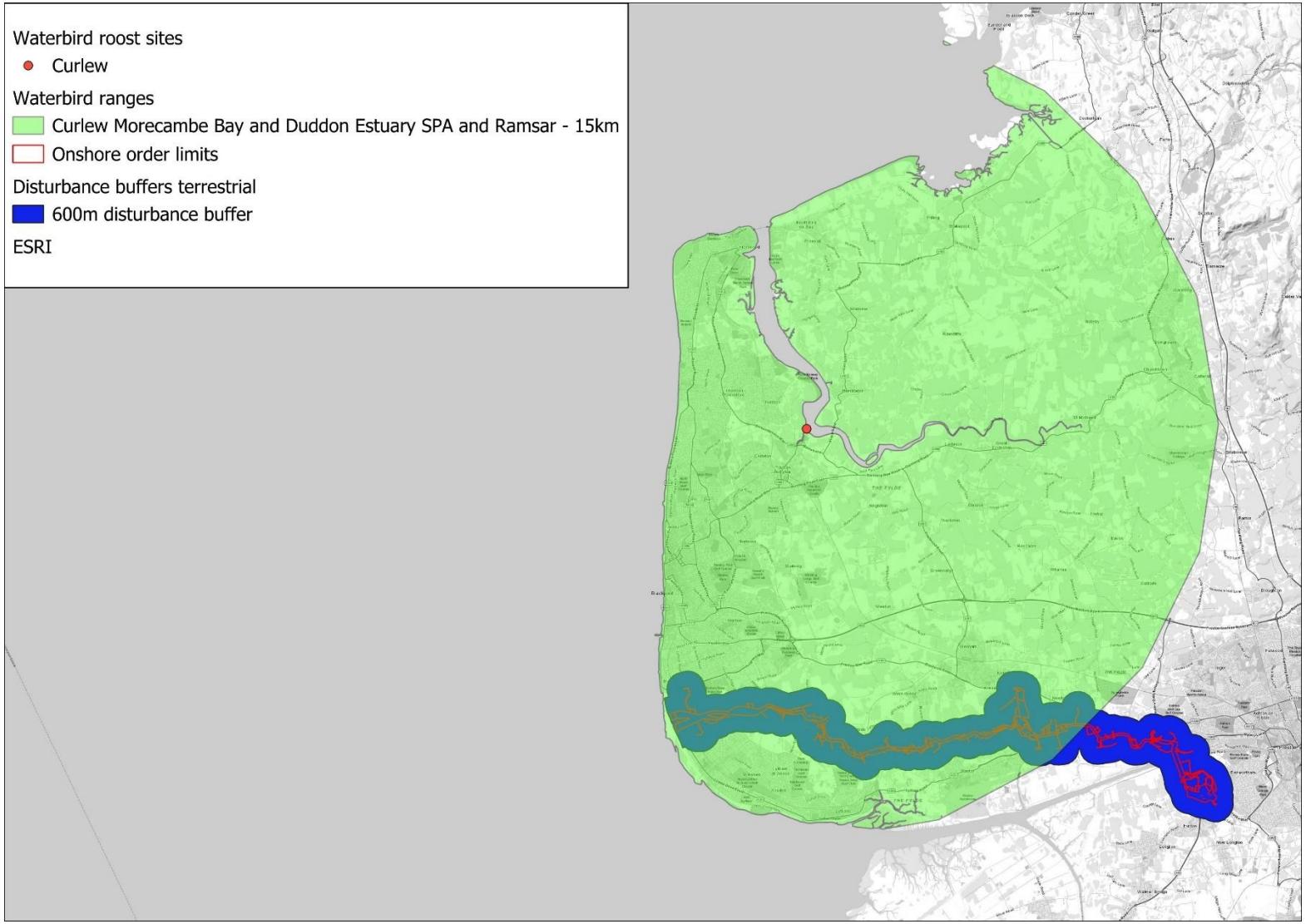
Apx Figure 10: The overlap of the terrestrial foraging range of Morecambe Bay and Duddon Estuaries SPA and Ramsar golden plover with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al*. (2015).



Apx Figure 11: The overlap of the intertidal foraging range of grey plover with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al*. (2015).

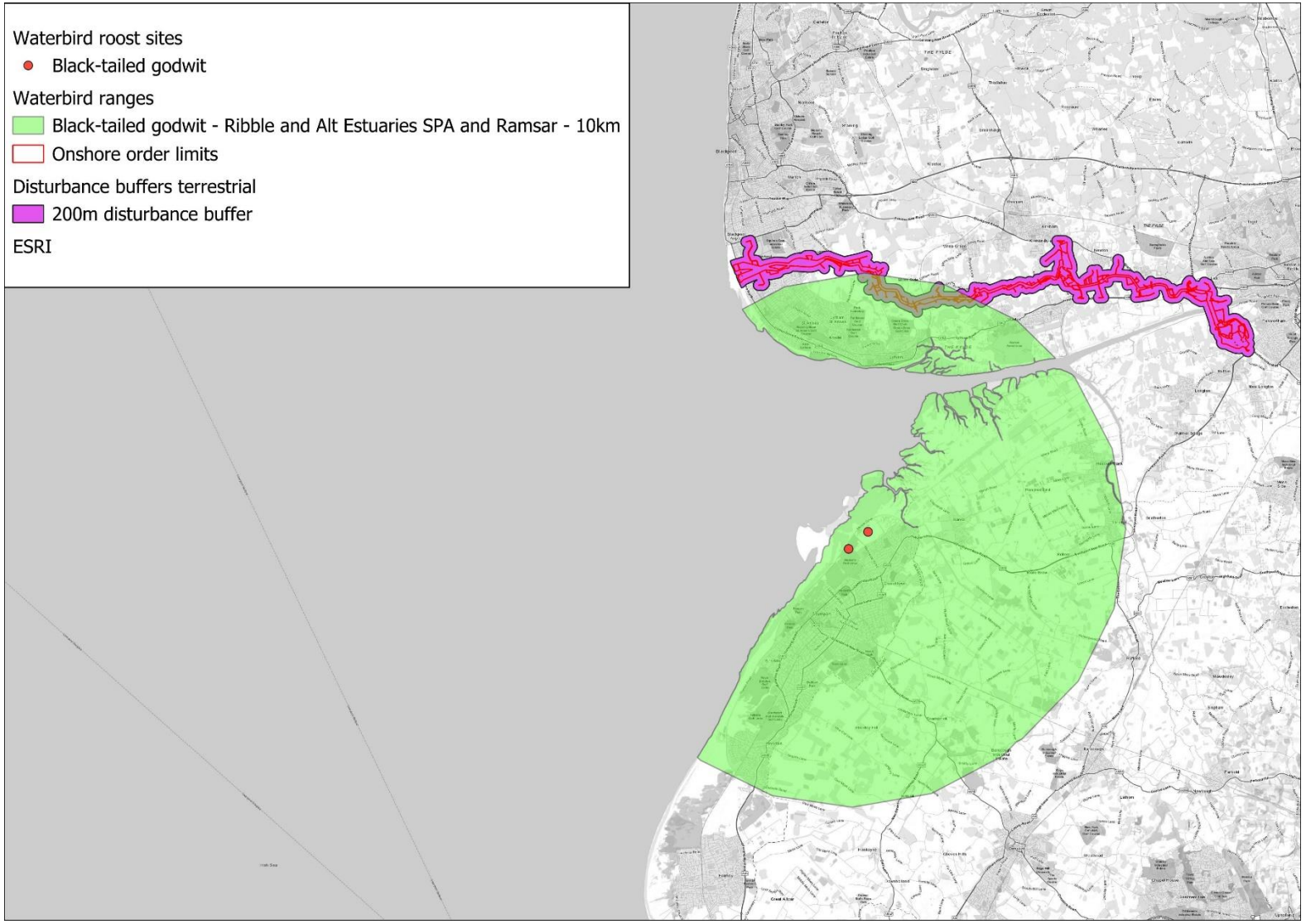


Apx Figure 12: The overlap of the terrestrial foraging range of curlew with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).

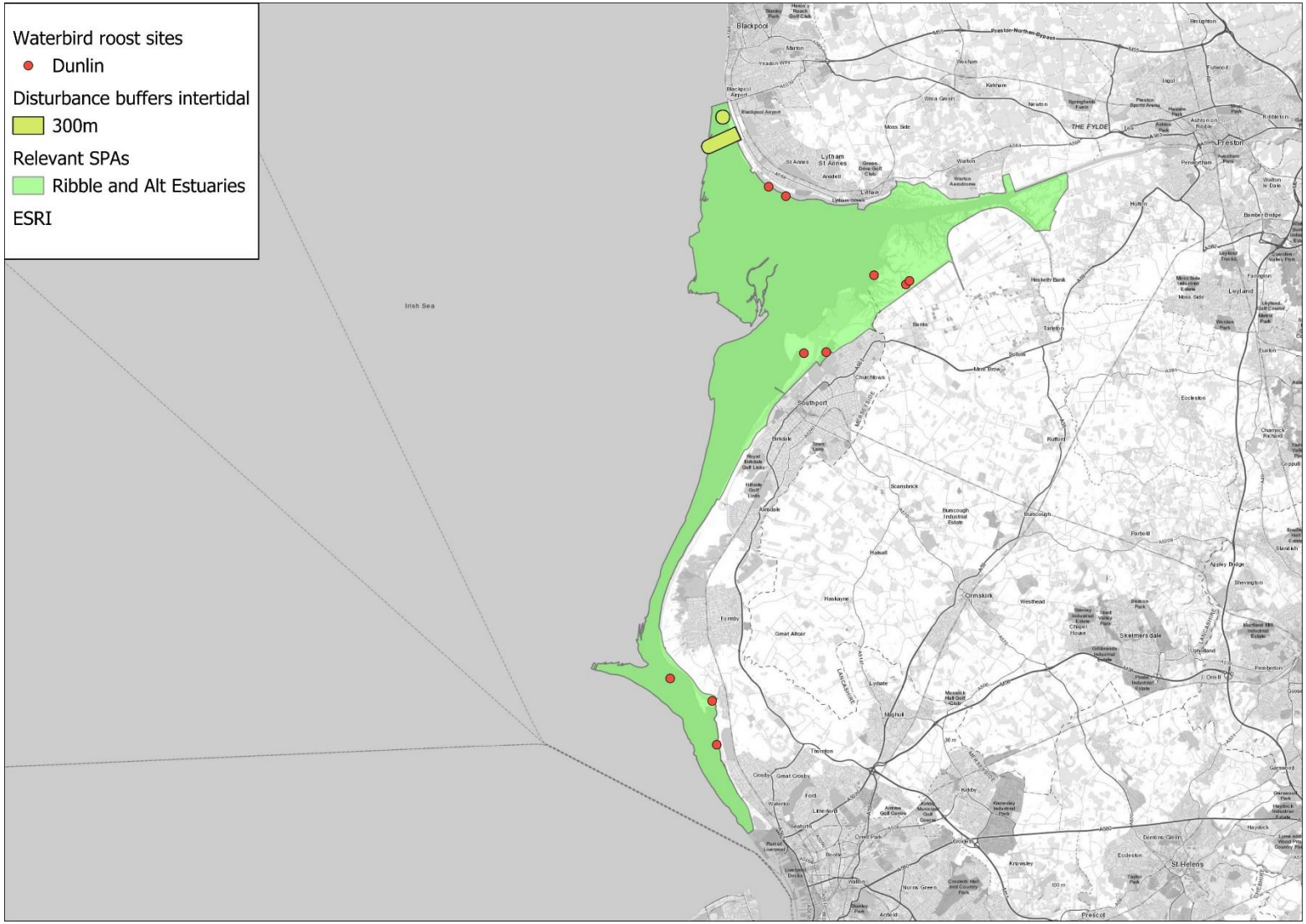


Apx Figure 13: The overlap of the intertidal foraging range of bar-tailed godwit with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).

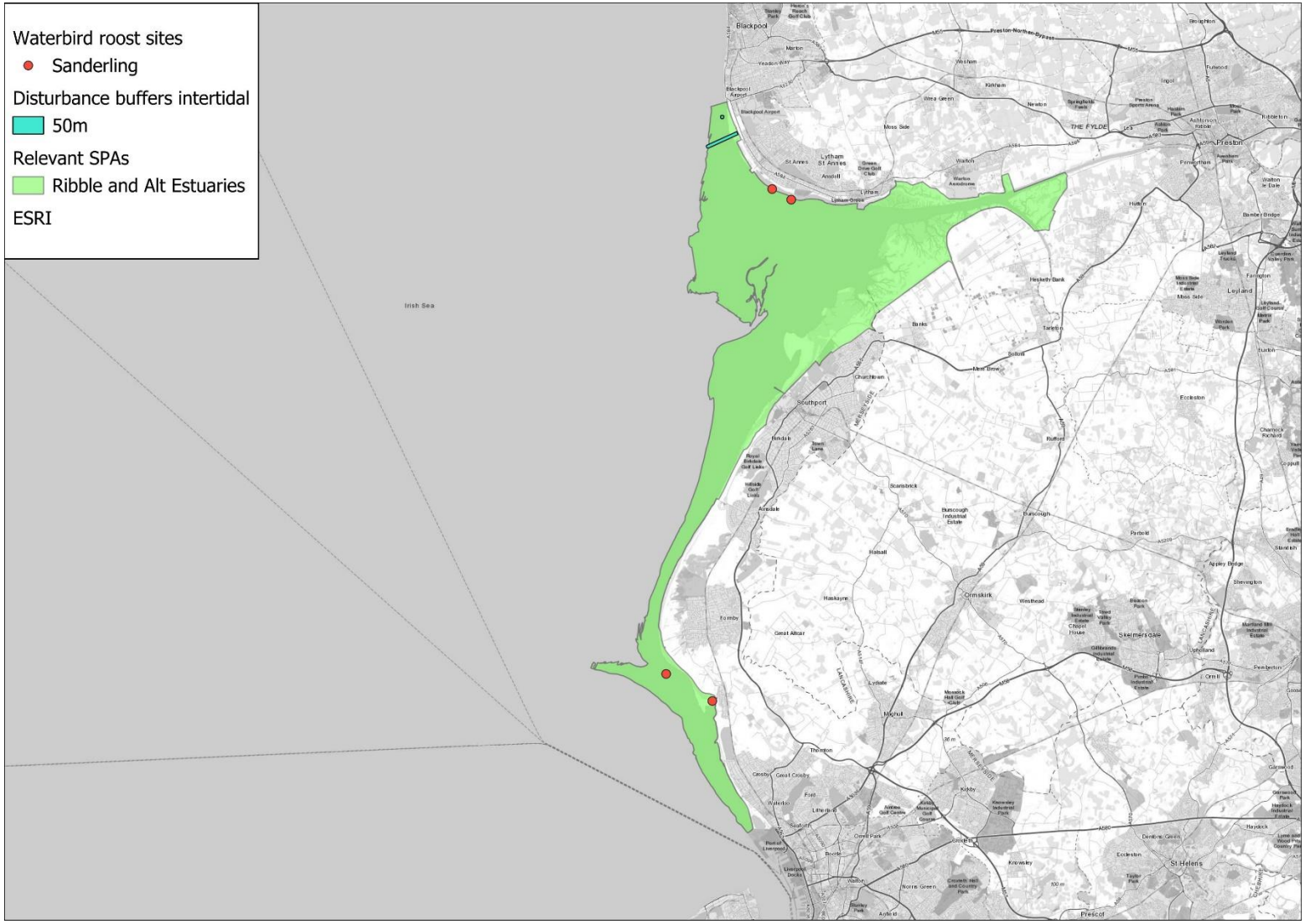
Apx Figure 14: The overlap of the terrestrial foraging range of black-tailed godwit with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



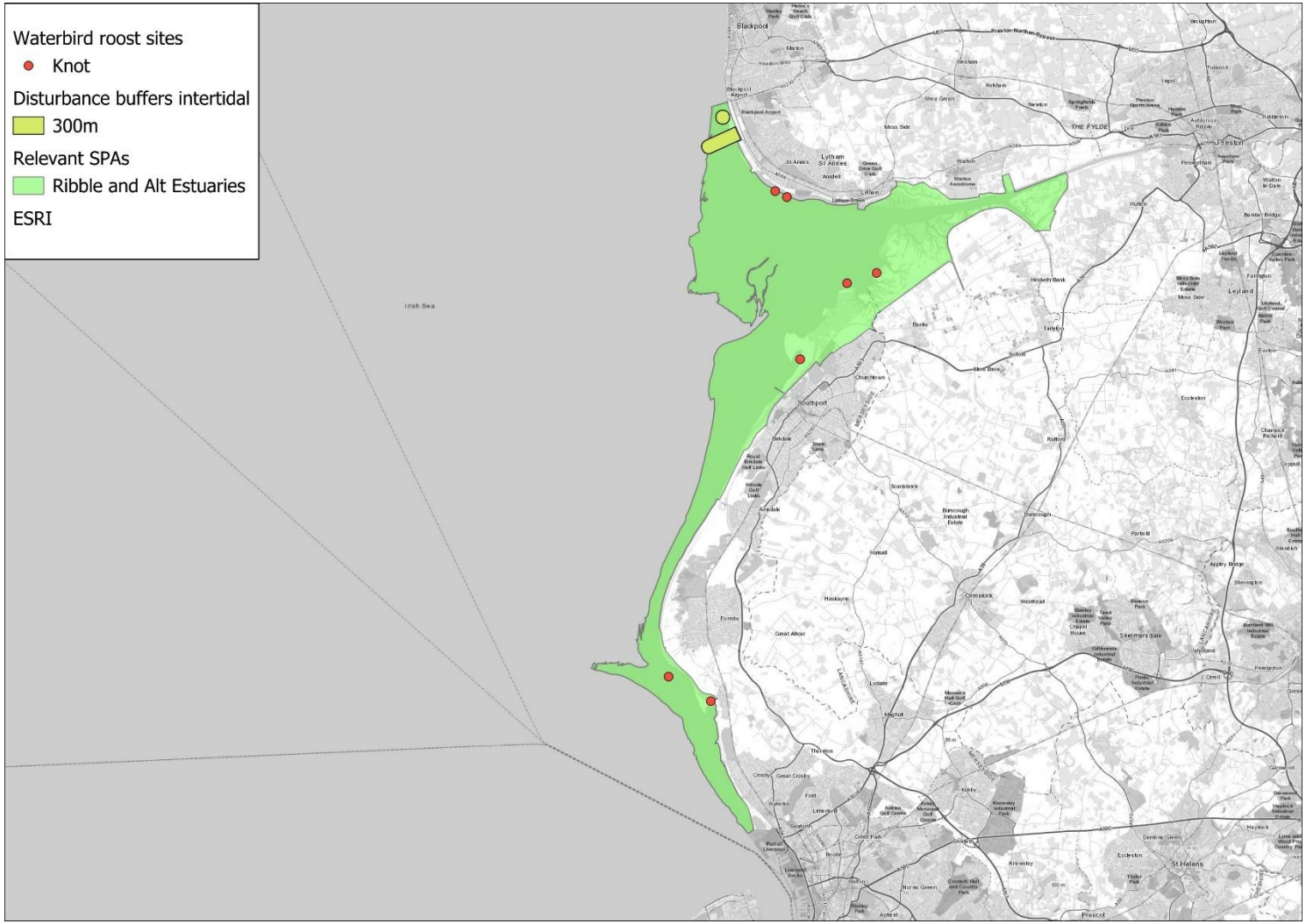
Apx Figure 15: The overlap of the intertidal foraging range of dunlin with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



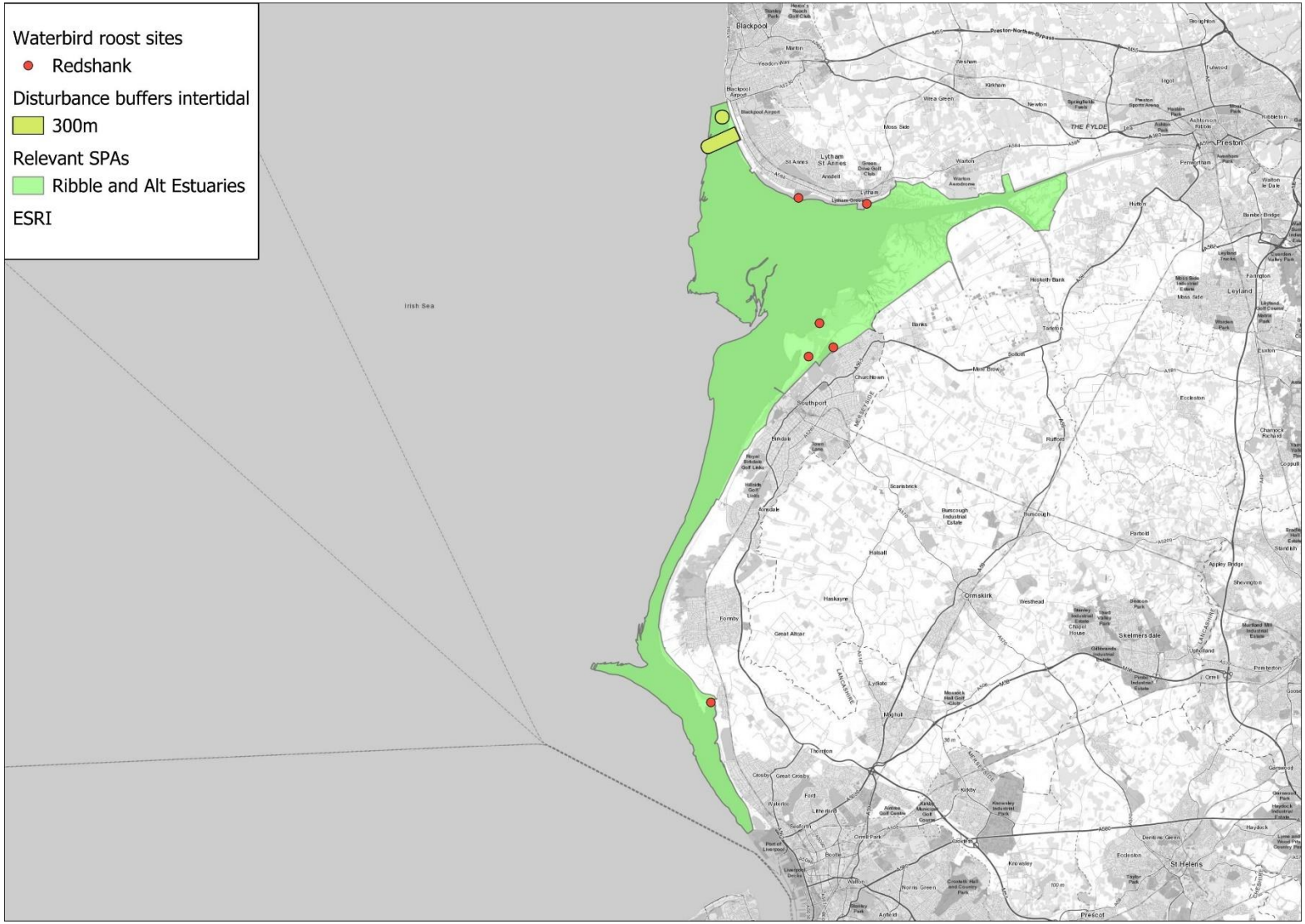
Apx Figure 16: The overlap of the intertidal foraging range of sanderling with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



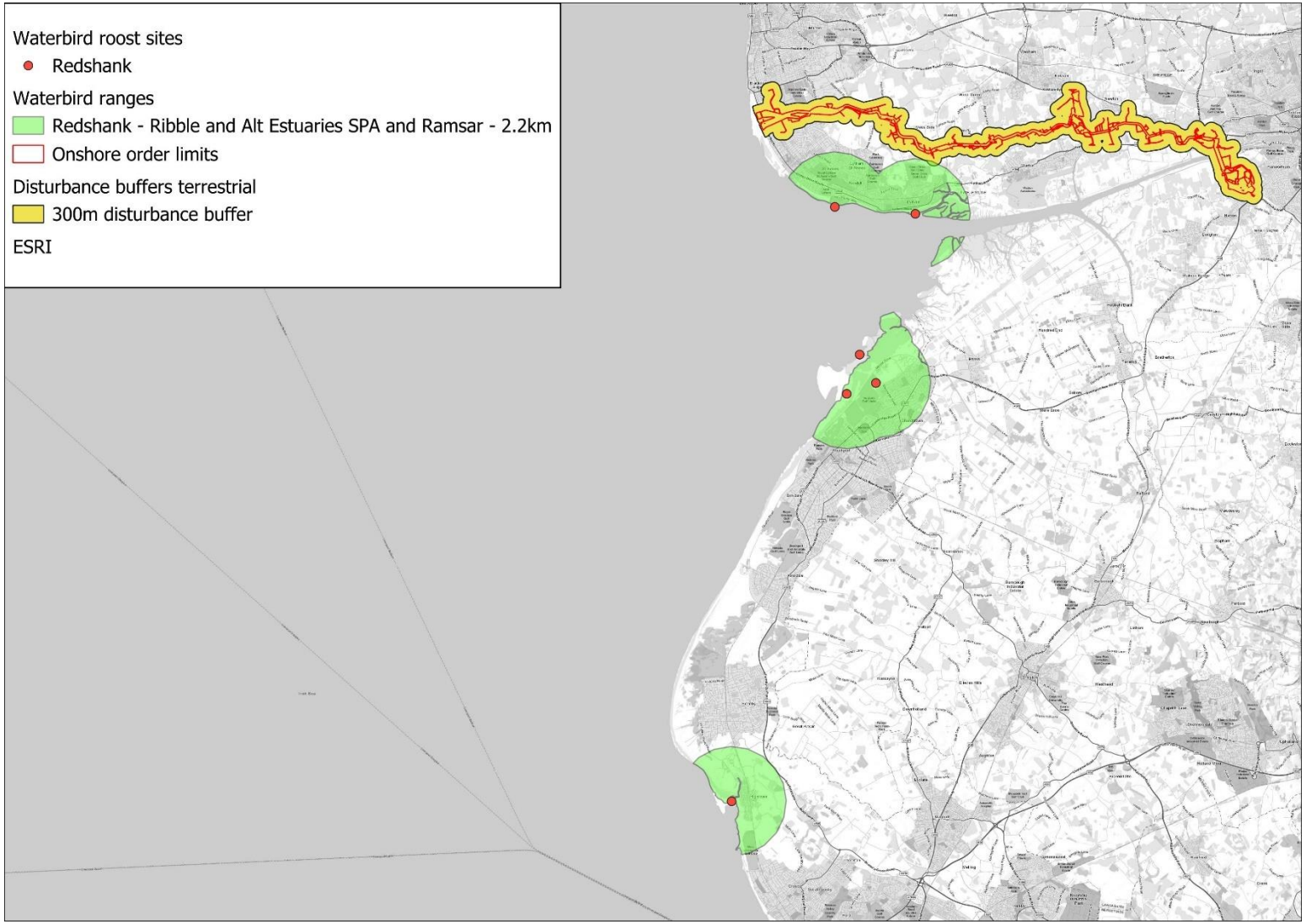
Apx Figure 17: The overlap of the intertidal foraging range of knot with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



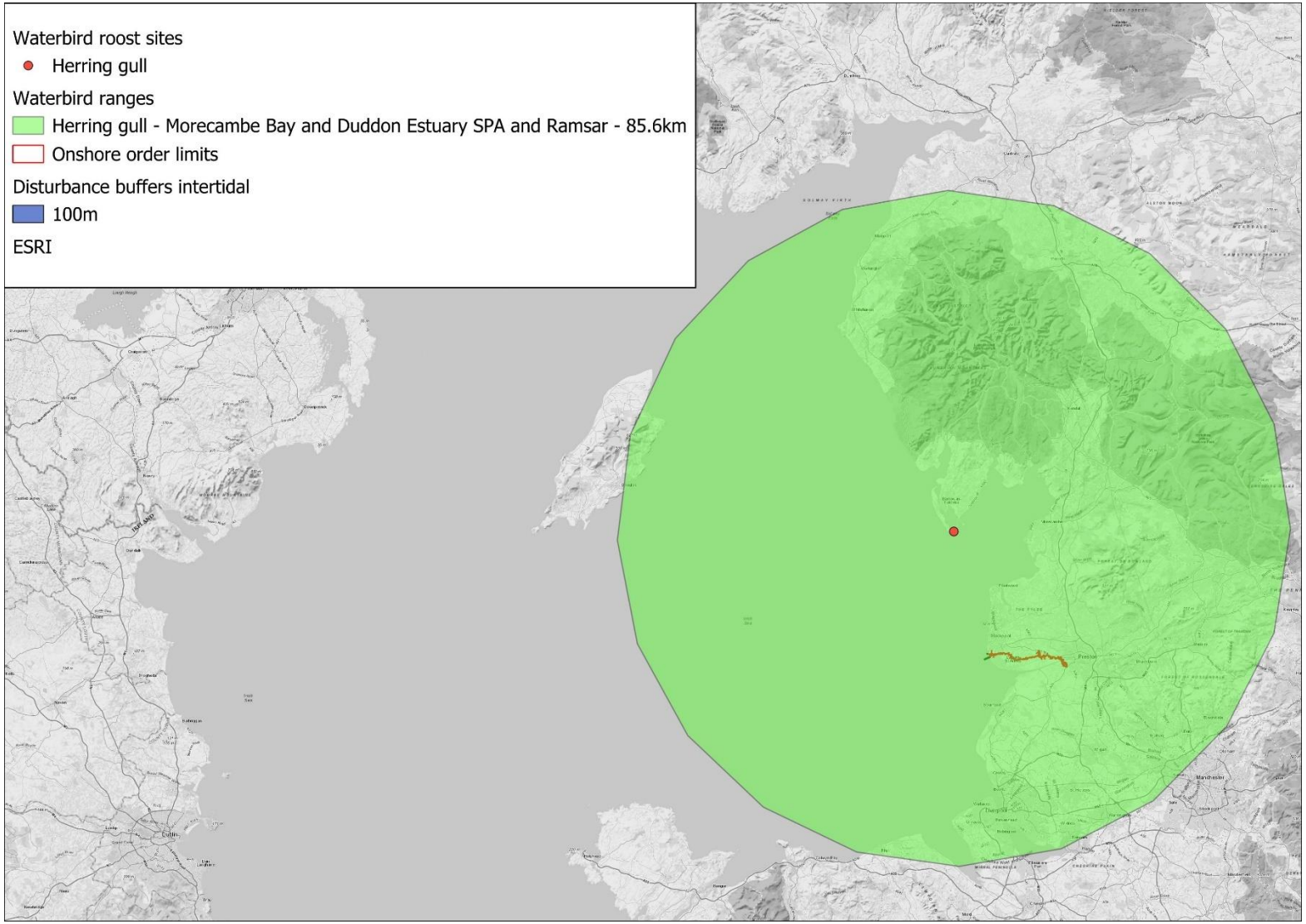
Apx Figure 18: The overlap of the intertidal foraging range of redshank with the Intertidal Infrastructure Area and the appropriate disturbance buffer using the roost site from Still *et al*. (2015).



Apx Figure 19: he overlap of the terrestrial foraging range of redshank with the Onshore Order Limits and the appropriate disturbance buffer using the roost site from Still *et al.* (2015).



Apx Figure 20: The overlap of the foraging range of herring gull with the Onshore Order Limits, the Intertidal Infrastructure area and the appropriate disturbance buffer using the colony site from the SMP (2024).

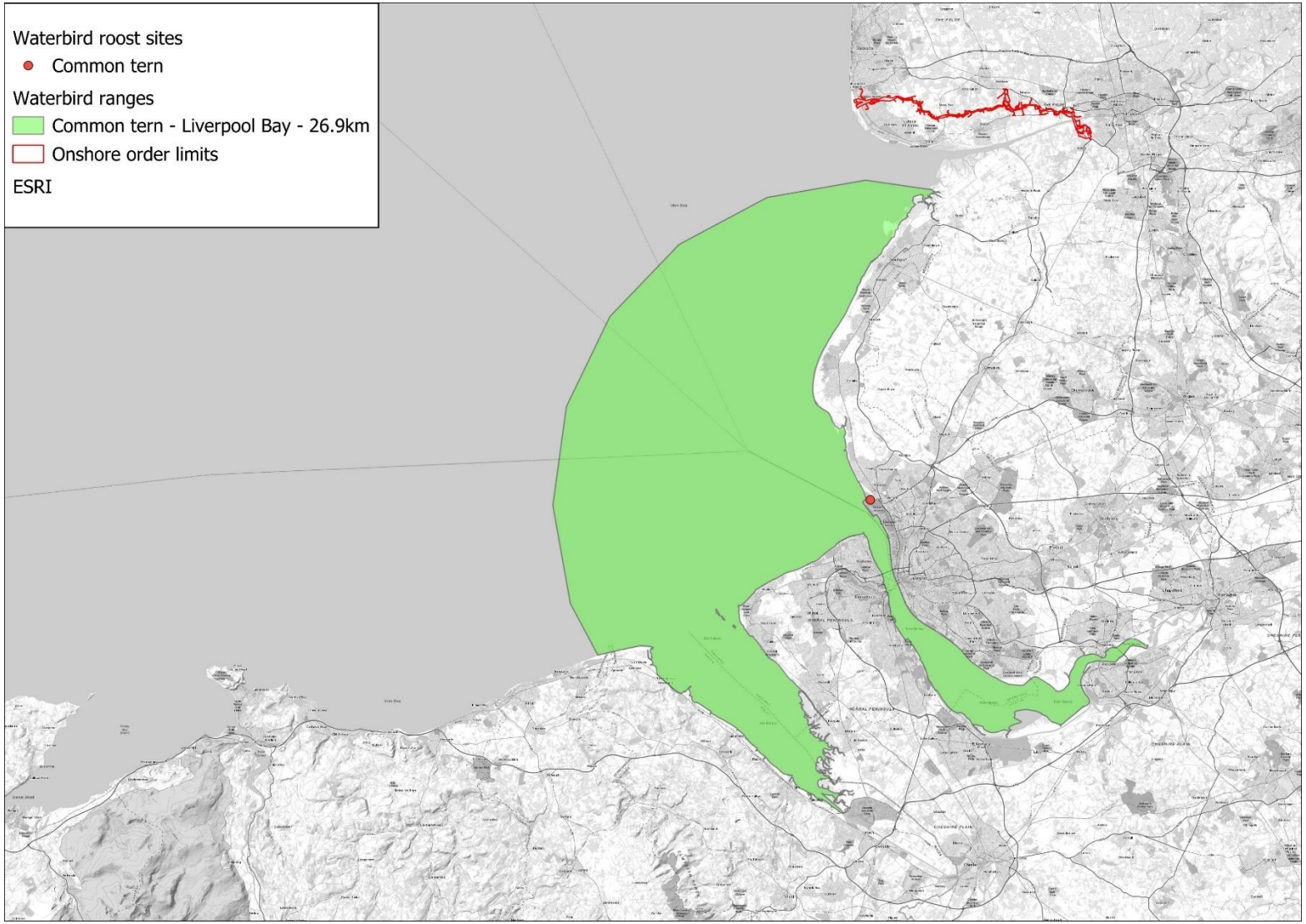


Apx Figure 21: The overlap of the foraging range of Ribble and Alt Estuaries SPA lesser black-backed gull with the Onshore Order Limits, the Intertidal Infrastructure area and the appropriate disturbance buffer using the colony site from the SMP (2024).

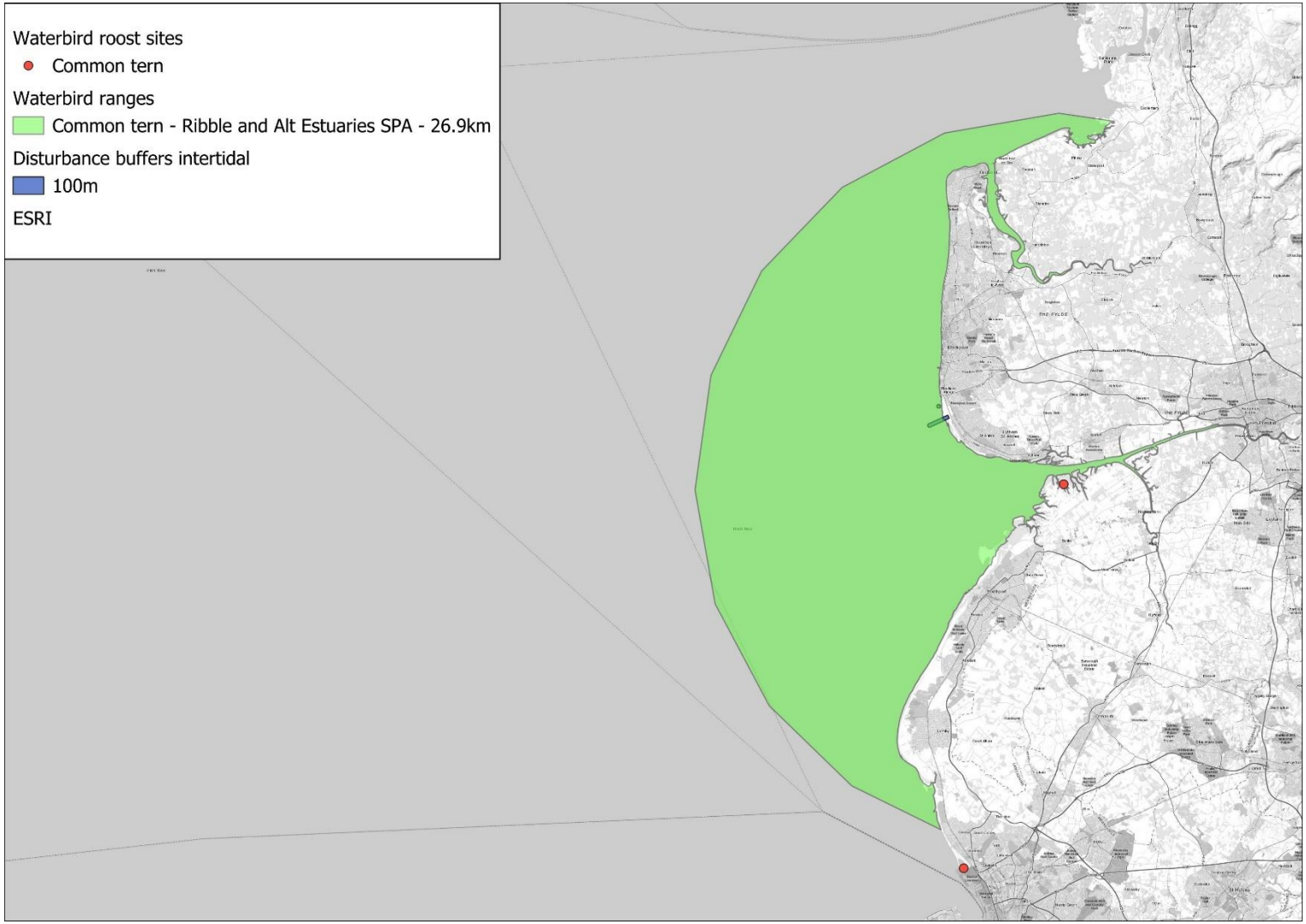
Apx Figure 22: The overlap of the foraging range of Morecambe Bay and Duddon Estuaries SPA and Ramsar lesser black-backed gull with the Onshore Order Limits, the Intertidal Infrastructure Area and the appropriate disturbance buffer using the colony site from the SMP (2024).

Apx Figure 23: The overlap of the foraging range of Bowland Fells SPA lesser black-backed gull with the Onshore Order Limits the Intertidal Infrastructure area and the appropriate disturbance buffer using the colony site from the SMP (2024).

Apx Figure 24: The overlap of the marine foraging range of Liverpool Bay/Bae Lerpwl SPA common tern with the Onshore Order Limits and the Intertidal Infrastructure area using the colony site from the SMP (2024).



Apx Figure 25: The overlap of the marine foraging range of Ribble and Alt Estuaries SPA common tern with the Onshore Order Limits, the Intertidal Infrastructure area and the appropriate disturbance buffer using the colony site from the SMP (2024).



Apx Figure 26: The overlap of the marine foraging range of Morecambe Bay and Duddon Estuaries SPA and Ramsar sandwich tern with the Onshore Order Limits, the Intertidal Infrastructure area and the appropriate disturbance buffer using the colony site from the SMP (2024).