Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 2, chapter 8: Offshore Ornithology

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Liverpool Bay CCS Limited
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Offshore ES
Offshore Ornithology

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Prepared by:	**Prepared for:**
RPS	**Liverpool Bay CCS Limited**

Glossary

Term	Meaning
Cumulative effect assessment	Assessment of the likely effects arising from the offshore components of the HyNet CO_2 Transportation and Storage Project – Offshore ('Proposed Development') alongside the likely effects of other development activities in the vicinity of the Proposed Development.
Effect	The consequence of an impact
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Impact	A change that is caused by an action
Magnitude	Size, extent, and duration of an impact.
Maximum Design Scenario	The maximum design parameters of each Proposed Development asset (both on and offshore) considered to be a worst case for any given assessment but within the range of the Project Description Envelope.
Mitigation Measure	Measure which would avoid, reduce, or remediate an impact
Non-statutory stakeholder	Organisations with whom the regulatory authorities may choose to engage who are not designated in law but are likely to have an interest in a proposed development.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Project Design Envelope (PDE)	Also known as the Rochdale Envelope, the PDE concept is routinely utilised in both onshore and offshore planning applications to allow for some flexibility in design options, particularly offshore, and more particularly for foundations and turbine type, where the full details of the project are not known at application submission but where sufficient detail is available to enable all environmental impacts to be appropriately considered during the EIA.
Project lifetime effects	Effects that occur throughout more than one phase of the project (construction, operations and maintenance, and decommissioning) interacting to potentially create a more significant effect upon a receptor than if just assessed in isolation in a single phase.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in Chapter 3: Proposed Development Description.
Receptor-led effects	Effects that interact spatially and/or temporally resulting in inter-related effects upon a single receptor.
Residual Impact	Residual impacts are the final impacts that occur after the proposed mitigation measures have been put into place, as planned.
Scoping Opinion	Sets out the Secretary of State's response to the Applicants Scoping Report and contains the range of issues that the Secretary of State, in consultation with statutory stakeholders, has identified should be considered within the EIA.
The Applicant	This is Liverpool Bay CCS Ltd.
Transboundary effects	Impacts from a project within one state affect the environment of another state(s).

Acronyms and Initialisations

Acronym/Initialisation	Description
CCS	Carbon Capture and Storage
CEA	Cumulative Effects Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
DECC	The Department of Energy and Climate Change, merged with the Department for Business, Innovation and Skills, to form the Department for Business, Energy and Industrial Strategy.

Acronym/Initialisation	Description
EcIA	Ecological Impact Assessment
EEA	European Economic Area
EIA	Environmental Impact Assessment
Eni	Eni UK Limited
EPS	European Protected Species
ES	Environmental Statement
HRA	Habitats Regulations Appraisal
JNCC	the Joint Nature Conservation Committee
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
NPS	National Policy Statement
OP	Offshore Platform
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PoA	Point of Ayr
SNCB	Statutory Nature Conservation Body
UK	United Kingdom
UXO	Unexploded ordnance

Units

Unit	Description
%	Percent
km	Kilometres
km^2	Kilometres squared
m	Metres (distance)
m^2	Metres squared (area)
MW	Megawatt

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8 ORNITHOLOGY

8.1 Introduction

This chapter of the Environmental Impact Assessment (EIA) Environmental Statement (ES) presents the assessment of the potential impact of the Project on offshore ornithology. Specifically, this chapter considers the potential impact of the Proposed Development during the construction, operation and maintenance, and decommissioning phases.

The assessment presented is informed by the following technical reports:

- Volume 3, appendix K1: The Eni Hynet Offshore Ornithology Baseline Technical Report.
- Volume 3, appendix K2: The Eni Hynet Offshore Ornithology Displacement Technical Report.
- Volume 3, appendix K3: The Eni Hynet EIA Intertidal Ornithology Technical Report.
- Volume 3, appendix K4: The Eni Hynet EIA Little Tern Foraging Distribution Technical Report

The offshore ornithology chapter deals with any waterbirds that are present at some point in their life cycle in the study area. The overarching term 'waterbird' is used to refer to species that depend on wetland environment for survival at some point in their life cycle. This includes true seabirds, seaducks, and divers and grebes, gulls, terns, skuas, waders and wildfowl.

8.2 Purpose of this chapter

The primary purpose of the ES is outlined in volume 1, chapter 1. In summary, the primary purpose of this Environmental Statement is to support the Marine Licence, and Storage Permit applications for the Proposed Development. The ES sets out the findings of the Environmental Impact Assessment (EIA).

In particular this ES chapter:

- Presents the existing environmental baseline established from desk studies and site-specific surveys.
- Identifies any assumptions and limitations encountered in compiling the environmental information.
- Presents the potential environmental effects on offshore ornithology arising from the Proposed Development, based on the information gathered and the analyses and assessments undertaken
- Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects of the Proposed Development on offshore ornithology.

8.3 Study area

There are three study areas for the offshore ornithology assessment. These are:

- The offshore ornithology study area.
- The intertidal ornithology study area.
- The little tern foraging distribution study area.

Further details on these areas are provided in the following sections.

8.3.1 The offshore ornithology study area

The Offshore Ornithology Study Area is defined as the area encompassing the Proposed Development, which includes the offshore structures, offshore cables and subsea cables, plus an additional 10 km buffer in order to account for the displacement of sensitive divers and seaducks.

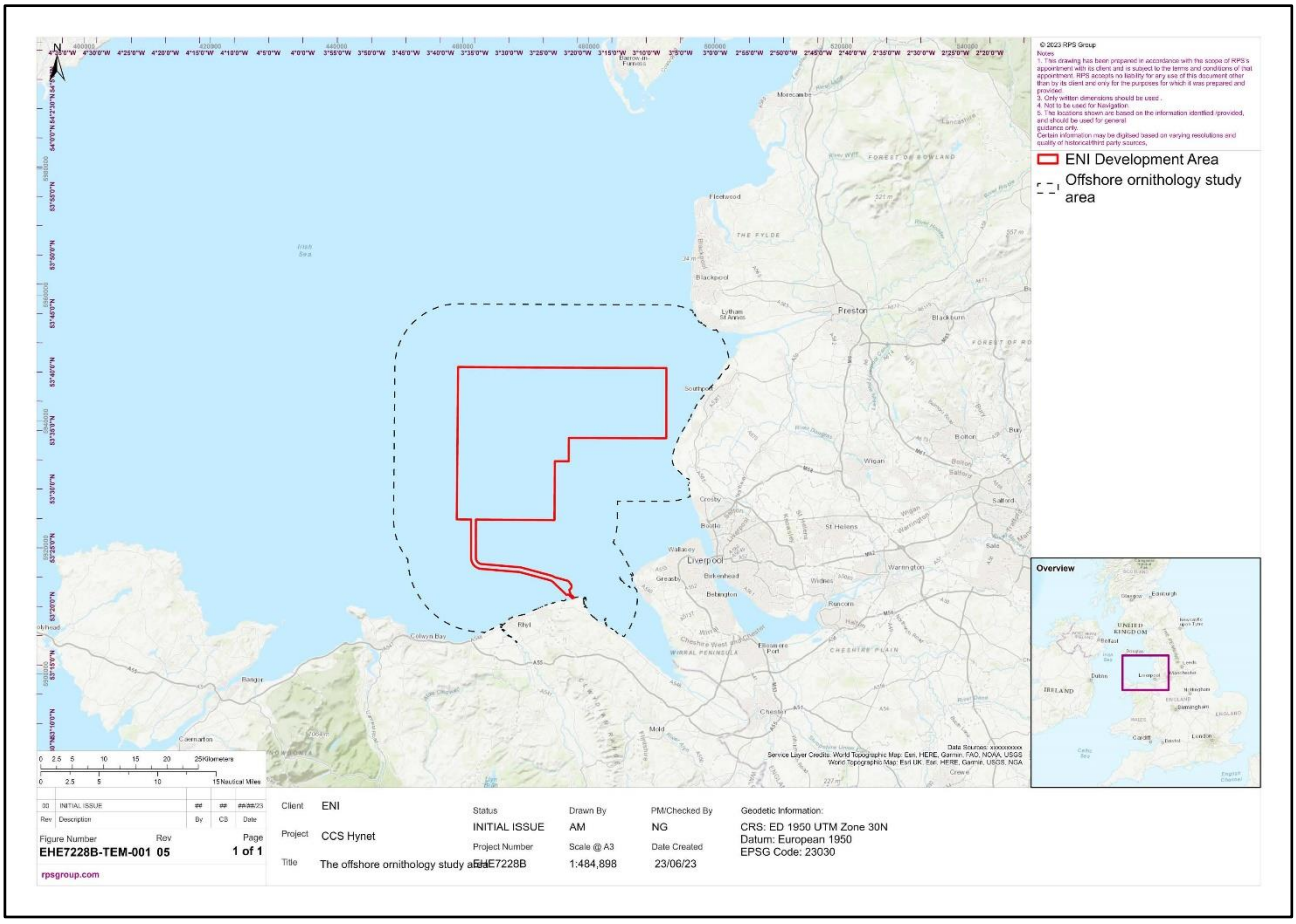

Figure 8-1: The Offshore Ornithology Study Area

Additionally, there are several protected sites designated for marine and coastal waterbirds with connectivity to the Proposed Development area. Figure 8-2 shows the designated sites (international and national) with relevant ornithology features that are within 315 km of the Proposed Development area and given consideration within the assessment. A distance of 315 km was used to assess connectivity to the Proposed Development as this is the mean maximum foraging range for Northern gannet as taken from Woodward, *et. al*. (2014).

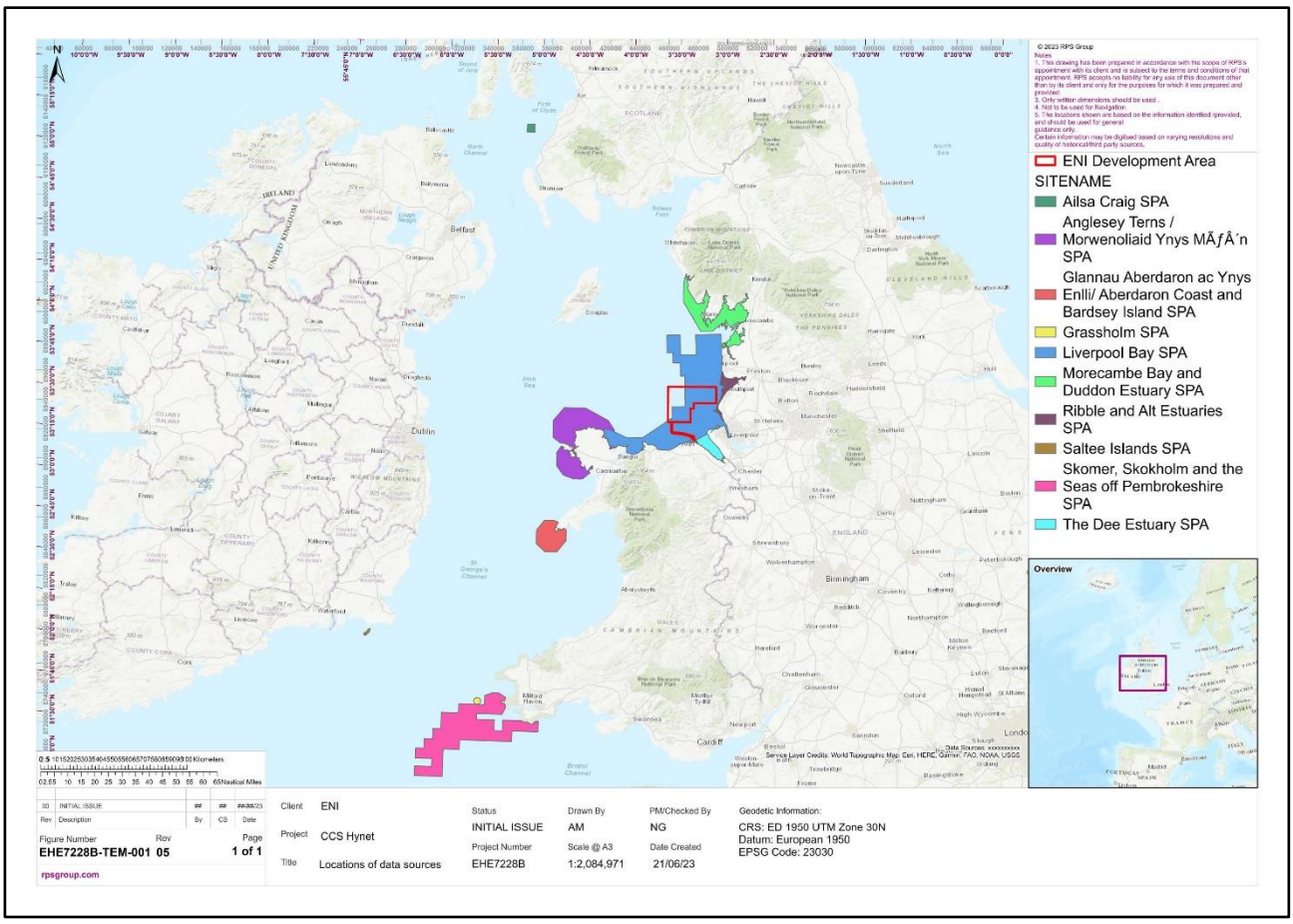

Figure 8-2: Designated Sites Within 315 Km Of The Proposed Development

8.3.2 The intertidal ornithology study area

The intertidal ornithology study area is situated on the outer western edge of the Dee Estuary in Denbighshire, North Wales. It encompasses the proposed landfall plus a 500 m buffer. This 500 m buffer is included to take account of bird interests that may occur adjacent or close to the proposed landfall. The intertidal ornithology study area extends from Mean High Water Spring (MHWS) to up to 2 km seawards (see Figure 8-3).

The intertidal ornithology study area is primarily composed of mud and sand flats, the nearshore waters are shallow and a strong tidal current sweeps outward from the estuary mouth. The gradient of the beach is shallow and large expanses of mud and sandflats can be exposed at low tide. It is of importance to waterbirds that may utilise these habitats for roosting, loafing, or foraging.

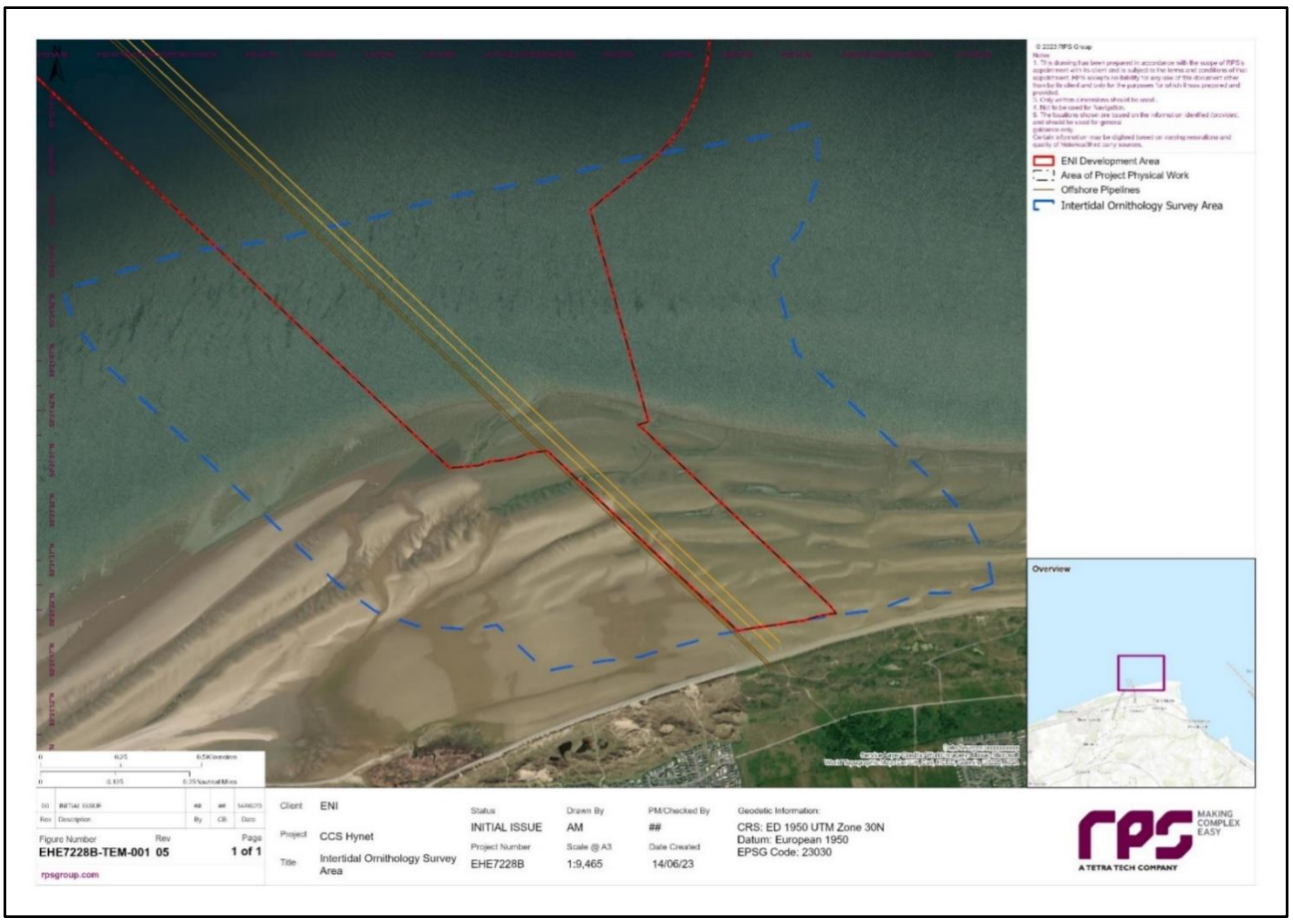

Figure 8-3: The Intertidal Ornithology Study Area

8.3.3 The little tern foraging distribution study area

The little tern foraging distribution study area is situated on the outer western edge of the Dee Estuary in Denbighshire, North Wales. The study area was designed using published evidence on foraging ranges (Parsons et al., 2015; Woodward et al., 2019).

As little tern mostly forage in the nearshore waters within close proximity of their colony, the study area encompasses all of the intertidal and nearshore waters up to 4.5km either side of the main colony at Gronant Dunes and extends to 2km offshore (this was the distance at which land based surveyors could reliably identify little tern using spotting scopes with x 60 magnification as per Joint Nature Conservation Committee guidance (2004)).

Figure 8-4 shows the location and extent of the study area. As little tern use both the intertidal (when it is inundated) and subtidal zones for foraging, the landward extent of the surveys was taken as Mean High Water Spring (MHWS).

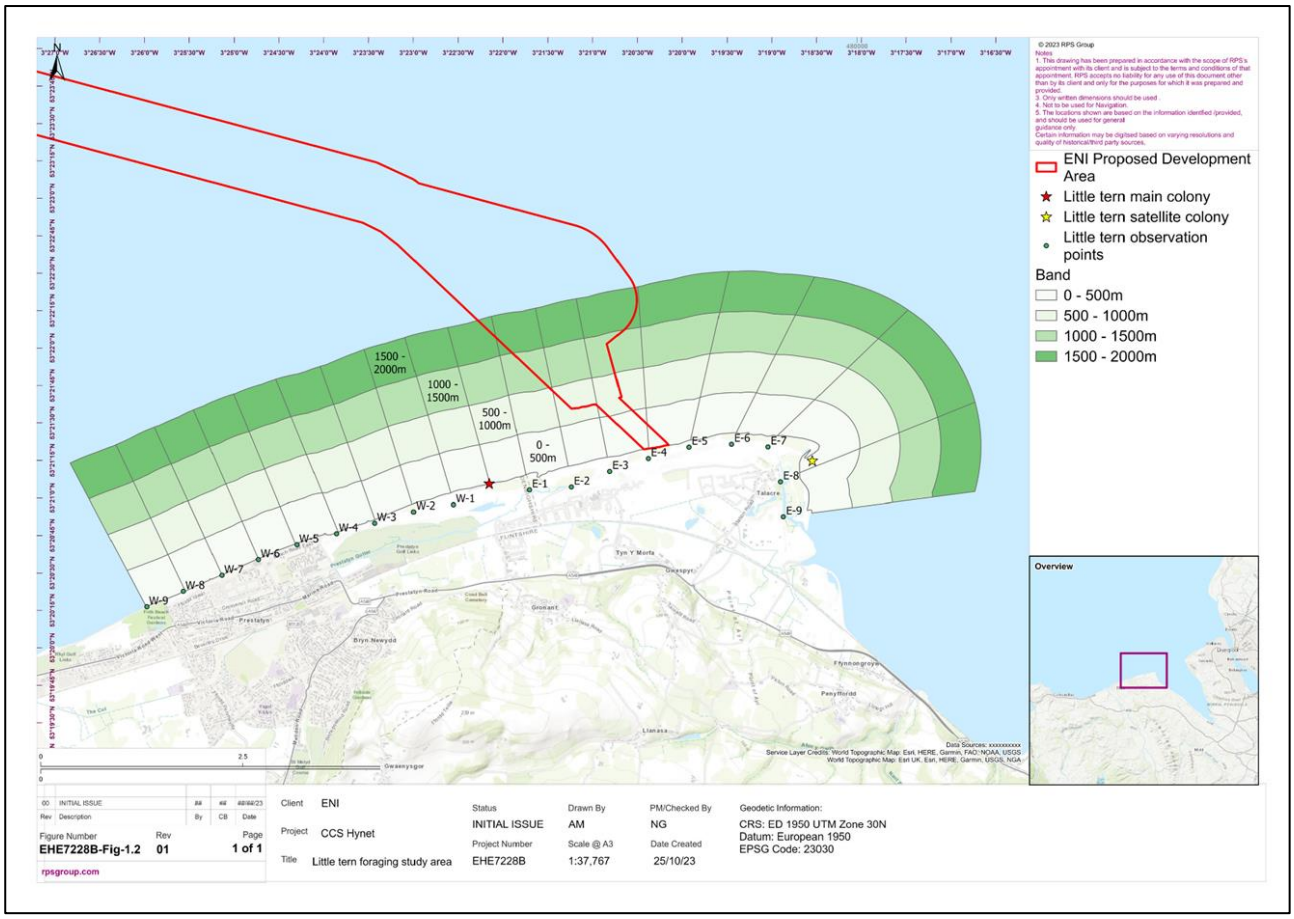

Figure 8-4: The Little Tern Foraging Distribution Study Area

8.4 Policy and legislative context

8.4.1 Legislation

8.4.1.1 Habitats and Species Regulations

The Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) require the assessment of significant effects on internationally important nature conservation sites where these may arise as a result of a project.

The international sites relevant to offshore ornithology are Special Protection Areas (SPAs) or potential SPAs (pSPAs), and Ramsar sites. These have been traditionally referred to as European Sites or Natura 2000 sites. Following the UK's departure from the European Union (EU) they are now referred to as the National Site Network.

The Habitats Regulations also provide protection for certain species of plants and animals, referred to as European Protected Species (EPS). These Regulations set out those species that are protected and the activities that are prohibited, such as deliberate disturbance or creating damage to a breeding place.

The Habitat Regulations also provide for licences to be granted for certain operations, such as developments that may affect protected species, subject to:

- there being no satisfactory alternative; and
- the action authorised not being detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

With respect to the Project, the species present have been identified and the likely effects assessed. Where possible, effects on protected species have been avoided or minimised.

All wild birds, their nests and their eggs are protected under the Wildlife and Countryside Act (1981), as amended. This legislation makes it an offence to intentionally or recklessly:

- kill, injure or take any wild bird (excluding certain specified game and other licence-controlled species);
- take, damage destroy or otherwise interfere with the nest of any wild bird while it is in use or being built;
- obstruct or prevent any wild bird from using its nest; and
- take or destroy the egg of any wild bird.

8.4.2 The Environment (Wales) Act 2016

The Environment (Wales) Act sets out legislation to plan and manage Wales' natural resources through the Natural Resources Policy (NRP).

The policy sets out three National Priorities:

- Delivering nature-based solutions.
- Increasing renewable energy and resource efficiency.
- Taking a place-based approach.

Section 6 under Part 1 of the Act introduced a duty for public planning authorities to embed the consideration of biodiversity and ecosystems into their policy development, plans and projects.

8.4.3 The Ramsar Convention

The Ramsar Convention on Wetlands of International Importance (referred to as the Ramsar Convention) is an international treaty for the conservation and sustainable use of designated wetland areas, known as Ramsar sites. The Convention came into force in 1976.

Ramsar sites are wetlands of international importance designated under the criteria of the Ramsar Convention (i.e. the wetland supports 20,000 waterbirds and/or supports 1% of the biogeographic population of a species or subspecies (race) of waterbird).

In the UK, Ramsar sites are protected under the National Site Network, in the same way as SPAs and Special Area of Conservation (SACs).

8.4.4 The Convention on Biological Diversity

The Convention on Biological Diversity entered into force in 1993 with three main objectives:

- the conservation of biological diversity;
- the sustainable use of the components of biological diversity; and
- the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The overall objective is to encourage actions that will lead to a sustainable future. The Secretariat of the Convention is based in Montreal in Canada and aims to assist governments to implement the Convention and its programmes of work.

8.4.5 Planning policy context

Planning policy is presented in volume 1, chapter 2 of the ES.

8.4.6 National Policy Statements

There are currently six energy National Policy Statements (NPSs), two of which contain policy relevant to the Proposed Development:

- overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (DECC 2011a); and
- NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC 2011b).

These are currently being updated and draft versions were published for consultation in September 2021.

A summary of the policy and legislation relating to offshore ornithology is presented in Table 8-1.

Table 8-1: Summary Of Planning Consents And Environmental Legislation Relevant To Offshore Ornithology

Summary of Relevant Legislation	How and Where Considered in the offshore ES
NPS EN-1	
Where the proposal is subject to EIA, the applicant should ensure that the ES clearly sets out any effects on the environment, including specific fauna. An assessment is required of any likely significant effects of the proposal on the environment be they direct, indirect, secondary, cumulative, short, medium, long-term, permanent, temporary, positive, or negative at all stages of the project. Methods for avoiding or mitigating adverse effects should be included. (NPS EN-1 paragraph 4.2.1)	Assessment of the potential effects of the Project are considered in sections 8.11, 8.12, and 8.15. The mitigation methodology is considered in section 8.10.
The ES should include an assessment of the effects on the environment arising from the construction of infrastructure once completed but before it is operational. (NPS EN1 paragraph 4.2.3)	Construction, operation and decommissioning effects are identified in Table 8-16 and considered in section 8.11.
Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. (NPS EN-1 paragraph 5.3.3)	The baseline ornithological environment is described in section 8.7. Internationally and nationally designated sites are identified in Table 8-8 Important areas for offshore ornithology are described in appendix K1: Offshore Ornithology Baseline Technical Report, appendix K2: Offshore Ornithology Displacement Technical Report , appendix K3: Intertidal Ornithology Technical Report and appendix K4: Little Tern Foraging Distribution Technical Report Assessment of the potential effects on designated sites are considered in section 8.11, 8.12 and 8.15. Assessment of the potential effects on specific species are considered in section 8.11.
The important sites for biodiversity are those identified through international conventions and European Directives that the Habitats Regulations provide protection for. Potential Special Protection Areas (pSPAs) and listed Ramsar sites should be afforded the same protections within development proposals. (NPS EN-1 paragraph 5.3.9)	The importance of these sites is described in appenidix K1, Offshore Ornithology Baseline Technical Report, appendix K3, Intertidal Ornithology Technical Report (RPS Group, 2023) and appendix K4, Little Tern Foraging Distribution Technical Report
All Sites of Specific Scientific Interest (SSSIs) should be protected as if designated as sites of international importance, including those features of SSSIs not covered by international designation. (NPS EN-1 paragraph 5.3.10)	All relevant SSSIs are identified in Appendix K1: Offshore Ornithology Baseline Technical Report and appendix K3:Intertidal Ornithology Technical Report (RPS Group, 2023). Assessment of the potential effects on designated sites are considered in section 8.11, 8.12 and 8.15.

Summary of Relevant Legislation	How and Where Considered in the offshore ES
Many species and habitats have been identified as being of principal importance to biodiversity in addition to wildlife species that receive statutory protection under a range of legislative provisions. These species and habitats require conservation action. (NPS EN-1 paragraph 5.3.17)	Assessment of the potential effects of the Project are considered in sections 8.11, 8.12, and 8.15.
The highest level of biodiversity protection is afforded to sites identified through international conventions. The Habitats Regulations set out sites for which a Habitats Regulations Appraisal (HRA) will assess the implications of a plan or project, including Special Areas of Conservation and Special Protection Areas. As a matter of policy, the following should be given the same protection as sites covered by the Habitats Regulations and an HRA will also be required: (a) potential Special Protection Areas and possible Special Areas of Conservation; (b) listed or proposed Ramsar sites. (NPS-EN1 paragraph 5.4.4 & 5.4.5)	Internationally designated sites are identified in Table 8-8. The importance of these sites is described inappendix K1: Offshore Ornithology Baseline Technical Report, appendix K3: Intertidal Ornithology Technical Report and appendix K4:Little Tern Foraging Distribution Technical Report .
Where the development is subject to EIA the applicant should ensure that the Environmental Statement clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity including irreplaceable habitats. (NPS EN-1 paragraph 5.4.17)	Internationally and nationally designated sites are identified in Table 8-8. Important areas for offshore ornithology are described in appendix K1:Offshore Ornithology Baseline Technical Report, appendix K3:Intertidal Ornithology Technical Report and appendix K4 Little Tern Foraging Distribution Technical Report .
The design of Energy NSIP proposals will need to consider the movement of mobile/migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure. As energy infrastructure could occur anywhere within England and Wales, both inland and onshore and offshore, the potential to affect mobile and migratory species across the UK and more widely across Europe (transboundary effects) requires consideration, depending on the location of development. (NPS EN-1 paragraph 5.4.22)	Important areas for offshore ornithology are described in Offshore Ornithology Baseline Technical Report (RPS Group, 2024a), Appendix K2: Offshore Ornithology Displacement Technical Report, Appendix K3: Intertidal Ornithology Technical Report and appendix K4: Little Tern Foraging Distribution Technical Report Assessment of the potential effects on designated sites are considered in section 8.11, 8.12 and 8.15. Assessment of the potential effects on specific species are considered in section 8.11.
Applicants should include appropriate avoidance, mitigation, compensation, and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: • During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • The timing of construction has been planned to avoid or limit disturbance; • During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; • Habitats will, where practicable, be restored after construction works have finished; and • Opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement the location and quality will be of key importance. In this regard	The mitigation methodology is discussed in section 8.10.

Summary of Relevant Legislation	How and Where Considered in the offshore ES
habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised. (NPS EN-1 paragraph 5.4.35)	
NPS EN-3	
The applicant should assess the effects of the cable and any associated infrastructure on the marine, coastal and onshore environment. (NPS-EN3 paragraph 3.8.81)	Construction, operation and decommissioning effects are identified in Table 8-16 and considered in section 8.11.
Assessment of environmental effects of cabling infrastructure and any proposed offshore or onshore substations should assess effects both alone and cumulatively with other existing and proposed infrastructure. (NPS-EN3 paragraph 3.8.85)	Assessment of potential stand-alone impacts are considered in section 8.11. Assessment of potential cumulative impacts are considered in section 8.12.
Applicants should include details on how avoidance has been achieved, good design principles have been followed and provide proposals for mitigation, as well as demonstrating that they have considered how their proposals can contribute towards environmental net gain. (NPS-EN3 paragraph 3.8.86)	The mitigation methodology is discussed in section 8.10.
Preparation and installation of the cable route can affect the following elements of the physical offshore environment, which can have knock on impacts on other biodiversity receptors: • water quality – disturbance of the seabed sediments or release of contaminants can result in direct or indirect effects on habitats and biodiversity, as well as on fish stocks thus affecting the fishing industry. (NPS-EN3 paragraph 3.8.125)	Construction, operation and decommissioning effects are identified in Table 8-16 and considered in section 8.11.
There is the potential for the construction and decommissioning phases, including activities occurring both above and below the seabed, to impact fish communities, migration routes, spawning activities and nursery areas of particular species. (NPS-EN3 paragraph 3.8.130)	Construction and decommissioning effects are identified in Table 8-16 and considered in section 8.11.
Export cable routes will cross the intertidal/coastal zone resulting in habitat loss, and temporary disturbance of intertidal flora and fauna. (NPS-EN3 paragraph 3.8.137)	Assessment of the potential effects on specific species are considered in section 8.11.
Applicant assessment of the effects of installing cable across the intertidal/coastal zone should demonstrate compliance with mitigation measures identified by The Crown Estate in any plan-level HRA produced as part of its leasing round and include information, where relevant, about: any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice; • any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice; • potential loss of habitat • disturbance during cable installation, maintenance/repairs and removal (decommissioning); • increased suspended sediment loads in the intertidal zone during installation and maintenance/repairs;	Assessment of the potential effects on specific species are considered in section 8.11. The mitigation methodology is discussed in section 8.10.

Summary of Relevant Legislation	How and Where Considered in the offshore ES
• predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data; and • protected sites. (NPS-EN3 paragraph 3.8.138)	
Landfall and cable installation and decommissioning methods should be designed appropriately to minimise effects on intertidal/coastal habitats, taking into account other constraints. (NPS-EN3 paragraph 3.8.243)	Assessment of the potential effects are considered in section 8.11. Assessment of potential cumulative impacts are considered in section 8.12. The mitigation methodology is discussed in section 8.10.
Applicants should undertake a review of up-to-date research and all potential mitigation options presented. (NPS-EN3 paragraph 3.8.257)	A review of research conducted for other projects in the area is include in appendix K1Offshore Ornithology Baseline Technical Report. The mitigation methodology is discussed in section 8.10.

8.4.7 The Welsh National Marine Plan

The assessment of potential changes to offshore ornithology has also been made with consideration to the specific policies set out in the Welsh National Marine Plan (Welsh Government, 2019).

The Welsh National Marine Plan was published on 12 November 2019 and sets out the policy for the next 20 years for the sustainable use of Welsh seas. It includes sector objectives for renewable energy to support the decarbonisation of the Welsh economy.

Table 8-2: Welsh National Marine Plan And Its Relevance To Offshore Ornithology

Policy	Key provisions	How and where considered in the offshore ES
ENV_01: Resilient marine ecosystems	Proposals should demonstrate how potential impacts on marine ecosystems have been taken into consideration and should, in order of preference: • avoid adverse impacts; and/or • minimise impacts where they cannot be avoided; and/or • mitigate impacts where they cannot be minimised. If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding. Proposals that contribute to the protection, restoration and/or enhancement of marine ecosystems are encouraged.	Assessment of the potential effects are considered in section 8.11. The mitigation methodology is discussed in section 8.10.
ENV_02: Marine Protected Areas	Proposals should demonstrate how they: • avoid adverse impacts on individual Marine Protected Areas (MPAs) and the coherence of the network as a whole; • have regard to the measures to manage MPAs; and • avoid adverse impacts on designated sites that are not part of the MPA network.	Assessment of potential impacts on designated sites are considered in section 8.11.

Policy	Key provisions	How and where considered in the offshore ES
ENV_05: Underwater sound.	Proposals should demonstrate that they have considered man-made noise impacts on the marine environment and, in order of preference: • avoid adverse impacts; and/or • minimise impacts where they cannot be avoided; and/or • mitigate impacts where they cannot be minimised. If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding.	Sources of man-made noise are identified in Table 8-16.
ENV_07: Fish species and Habitats	Proposals potentially affecting important feeding, breeding (including spawning and nursery) and migration areas or habitats for key fish and shellfish species of commercial or ecological importance should demonstrate how they, in order of preference: • avoid adverse impacts on those areas; and/or • minimise adverse impacts where they cannot be avoided; and/or • mitigate adverse impacts where they cannot be minimised. If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding	Potential impacts on fish, and therefore prey availability for birds, are identified in Table 8-16 and considered in section 8.11.16.

8.4.8 The North West Inshore and North West Offshore Marine Plan

The assessment of potential changes to offshore ornithology has also been made with consideration to the specific policies set out in the North West Inshore and North West Offshore Marine Plan (HM Government, 2021) in Table 8-3.

The North West Inshore and North West Offshore Marine Plan was published in June 2021 and provides a framework that will shape and inform decisions over how the areas' waters are developed, protected and improved over the next 20 years. It covers an area of around 7,100 square kilometres of inshore and offshore waters stretching from the Solway Firth border with Scotland to the River Dee border with Wales. It is very busy; the low-lying coastlines and diverse marine environments share limited space with a large variety of activities.

Table 8-3: North West Inshore and North West Offshore Marine Plan And Its Relevance To Offshore Ornithology

Policy	Key provisions	How and where considered in the offshore ES
Marine protected areas NW-MPA-1	Proposals that support the objectives of marine protected areas and the ecological coherence of the marine protected area network will be supported. Proposals that may have adverse impacts on the objectives of marine protected areas must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate	Assessment of potential impacts on designated sites are considered in section 8.11. The mitigation methodology is discussed in section 8.10.

Policy	Key provisions	How and where considered in the offshore ES
	- adverse impacts so they are no longer significant.	
Marine protected areas NW-MPA-2	Proposals that enhance a marine protected area's ability to adapt to climate change, enhancing the resilience of the marine protected area network, will be supported. Proposals that may have adverse impacts on an individual marine protected area's ability to adapt to the effects of climate change, and so reduce the resilience of the marine protected area network, must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant.	Assessment of potential impacts on designated sites are considered in section 8.11. The mitigation methodology is discussed in section 8.10.
Disturbance NW-DIST-1	Proposals that may have significant adverse impacts on highly mobile species through disturbance or displacement must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant.	Assessment of the potential effects are considered in section 8.11. The mitigation methodology is discussed in section 8.10.

8.5 Consultation

Table 8-4: A Summary Of The Key Consultations To Date

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in this chapter
27/01/2023	OPRED	The ES should assess the environmental effects of the Project upon features of nature conservation interest. It is recommended that the ES thoroughly assesses the potential for the Project to affect national or international sites of nature conservation importance. This should include a full assessment of the direct and indirect effects of the Project on the features of all important nature conservation sites including, but not limited to, Natural England's Impact Risk Zones, Sites of Special Scientific Interest (SSSI), Marine Conservation Zones (MCZ) and Designated Sites with Fish and Shellfish Qualifying Features. Further website information on these sites and how this may be accessed is provided in Annex 2. In particular, it is noted that the following Welsh sites have been omitted in Table 7-7 (Designated Sites with Fish and Shellfish Qualifying Features) of the ES scoping report: o Dee Estuary SAC, designated for river and sea lamprey. o River Dee and Bala Lake SAC, designated for Atlantic salmon, river and sea lamprey.	This ES assess the impact of the Proposed Development upon features of nature conservation of internationally and nationally designated ornithological sites in 8.11.

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in this chapter
		o Afon Gwyrfai a Llyn Cwellyn SAC, designated for Atlantic salmon. o Afon Eden SAC - Cors Goch Trawsfynydd, designated for Atlantic salmon and Freshwater peal mussel. o River Teifi SAC, designated for Atlantic salmon, river and sea lamprey	
27/01/2023	OPRED	The Developer is advised to ensure that the ES appropriately assesses the impact of all phases of the Project (I.e., construction, operation, maintenance and decommissioning) on protected species including, for example: pinnipeds, cetaceans, fish, marine turtles, birds, marine invertebrates, bats etc. Information on the relevant legislation protecting these species can be found at https://www.gov.uk/government/publications/protected-marine-species	All phases of the project that were scoped in for assessment in this Offshore Ornithology chapter have assessed on all species of protected waterbird that are likely to utilise the study areas 8.11.1 to 8.11.22.
27/01/2023	OPRED	It is advised that records of protected species are sought from the appropriate local biological record centres, nature conservation organisations and NBN Atlas (https://nbnatlas.org/). It is also advised that consideration should be given to the wider context of the location of the Project, in terms of habitat linkages and protected species populations in the wider area to assist the impact assessment.	Records were sought for waterbirds from the BTO and the Joint Nature Conservation Committee (JNCC) on breeding, wintering, and passage birds that utilise the habitats within the study areas. These were used to inform the baseline 8.7.
27/01/2023	OPRED	Table 7-20: Mean max foraging ranges with standard deviation (SD) for seabird species. The use of Woodward *et al.*, 2019 mean max plus 1 standard deviation foraging ranges is welcomed. It is advised that breeding season foraging ranges for razorbill and guillemot are those within appendix 1 of Woodward *et al.*, 2019 which excludes data from Fair Isle where the foraging range may have been unusually high due to reduced prey availability during the study year. Therefore, the foraging range to use for razorbill is 73.8 km + 48.4 km and for guillemot is 55.5 km + 39.7 km.	This has been noted and used where appropriate.
27/01/2023	OPRED	Section 7.5.3 and Section 7.5.4. Consideration should be given as to whether seabird surveys of the platform will be required to ascertain if nesting and/or roosting seabirds are (or have been) using the structures. JNCC have generated an advice note on Seabird Survey Methods for Offshore Installations: Black-legged kittiwakes including example offshore installation seabird survey recording forms and a black-legged kittiwakes information and resources signposting document which may be useful for seabird surveys of offshore platforms. Consideration should also be given to the anthropogenic disturbance and displacement of Red-Throated Diver and Common Scoter which are features of Liverpool Bay SPA, and which are also included as a priority species in	Nesting bird surveys of the offshore platforms have already been undertaken by RSK Biocensus (RSK) between 8th and 13th June 2022. Nesting black-legged kittiwake were present on four of the six platforms and a nesting bird strategy (also authored by (RSK) in December 2022) was created following these surveys. The effects of anthropogenic disturbance and displacement on red-throated diver and common scoter have also been considered in the Offshore Ornithology Displacement Technical Report and both species have been carried forward for assessment in 8.11.1.

Date	Consultee and type of response	Issue raised	Response to issue raised and/or where considered in this chapter
		Section 7 of the Environment (Wales) Act 2016. Both species are sensitive to anthropogenic disturbance and displacement. Details of where further information can be found on this is provided in Annex 2.	
27/01/2023	OPRED	Table 7-22: Impacts Proposed to be Scoped into the Assessment for Offshore Ornithology. In addition to the vessel movements in the construction and decommissioning phases of the Project, the maintenance and repair vessel movements also have the potential to impact on ornithology receptors during the operational phase and so should be factored into the assessment.	This has been scoped in and is considered within section 8.11.7.
27/01/2023	OPRED	Should work be undertaken during the non-breeding season, this would be likely to coincide with the presence of red-throated diver and common scoter in the Liverpool Bay SPA. The number of boat movements associated with the works should therefore be included within the ES. The significance of any increase in vessel movements, in particular those that transit the Liverpool Bay SPA should be presented in relation to the disturbance to the red-throated diver and common scoter, covering any vessel transit routes taken. Interim advice of the treatment of displacement for red-throated diver is available at Joint Statutory Nature Conservation Body (SNCB) Interim Displacement Advice Note | JNCC Resource Hub (https://hub.jncc.gov.uk/assets/9aecb87c-80c5-4cfb-9102-39f0228dcc9a).	The number of vessels has been included in the Maximum Design Scenario (MDS) presented in section 8.8.1.

8.6 Methodology to inform the baseline

8.6.1 Offshore ornithology

The Offshore Ornithology baseline was compiled solely from desk-top sources. There is a wealth of available data on the density, distribution, and seasonality of marine birds within the study area. The most relevant pieces of literature that were drawn on are HiDef Aerial Surveying Limited (2023), Waggitt, *et al*. (2022), Bradbury *et al*. (2014), Webb, *et. al*. (2006), and Lawson, *et. al*. (2016). A full list of all desk-top sources that were consulted during the derision of the offshore ornithology baseline are available within the Eni Hynet ES Offshore Ornithology Baseline Technical Report , Appendix K1

8.6.2 Intertidal ornithology

The methodology used a combination of diurnal and nocturnal intertidal surveys that ran between October 2022 and April 2023, these results were then compared with the most recent relevant WeBS sector counts to derive the baseline.

The RPS surveys were based on WeBS Core Count (high tide) and the Low Tide Count methodologies of the BTO, JNCC, RSPB, Wildfowl and Wetlands Trust (WWT), WeBS scheme as outlined by Gilbert *et al.* (1998).

Surveyors made six hourly counts per survey, and a minimum of two survey visits (reflecting different tidal influences) per month between September 2022 to April 2023. All surveys were carried out by competent and experienced field ornithologists.

The nocturnal element of the intertidal and nearshore bird survey follows the same approach as the diurnal surveys, except that the surveys ran on a reduced intensity (i.e. single survey visit of a half tidal cycle (six-hour period) per month between November 2022 and March 2023 inclusive). The methodology followed best practice guidance as per Bird Survey & Assessment Steering Group (Bird Survey & Assessment Steering Group, 2022). All surveys were carried out by competent and experienced field ornithologists using a combination of thermal imagers and camcorders with infrared capabilities used alongside high powered infrared laser torches.

A detailed methodology for the RPS surveys is included in Appendix K3: Intertidal Ornithology Technical Report.

8.6.3 Little tern foraging distribution

The survey methodology was based on Parsons *et al*. (2015).

The little tern foraging distribution survey programme consisted of 8 survey visits spaced throughout the little tern breeding season (May 2023 to July 2023 inclusive; see volume 3, appendix K4 for full details of the survey programme).

- Counts were undertaken from 18 vantage points located on the upper shore above MHWS.
- Survey started at different tidal states, i.e., low, high, ebb, and flood.
- During each survey, two surveyors started at the observation points closest to the little tern colony (W-1 and E-1) and then moved outwards to W-9 and E-9. These were spaced as close to 500m apart as possible, except for between E-6 and E-9 as access was restricted. Therefore, surveyors had to use the inland path and took the best vantage points as close to 500m apart as was possible. Due to the curvature of the estuary mouth the eastern part of the study area has a larger surface area.
- At each observation point the surveyors stopped for a 30min period (this time is based on the mean foraging trip duration for little terns lasting between 16 and 29 minutes according to Perrow *et al*. (2006)) and looked outwards perpendicular to the shore and recorded all little terns within each zone. Little terns that were at their colonies were not recorded. The following details were recorded:
- Number and age of little terns (adult or juvenile).
- Flight direction (only marked as west or east, e.g., if birds heading northeast then marked as east).
- Behaviour (actively foraging, transiting, on sea, etc.).
- Distance from the shoreline (0 m – 500 m, 500 m – 1000 m, 1000 m – 1500 m, 1500 m – 2000 m).
- Notes, e.g., if terns are carrying prey.
- Numbers of common tern and sandwich tern were also recorded as secondary target species.

Disturbance – Any source of disturbance to the birds across the study area at the time of the count was recorded. The perceived effect of disturbance on abundance and behaviour of birds in the count sector was also scaled according to the following categories (see Table 8-5).

Surveys were carried out by experienced ornithologists using binoculars and spotting scopes with x 60 magnification (volume 3, appendix K4).

Table 8-5: Disturbance Scale

Effect Notation	Definition
W	Weak e.g. change in behaviour, but birds not excluded
M	Moderate e.g. birds excluded from parts of the recording sector
S	Strong e.g. avoidance of the recording sector

Additional survey data was also collected, including:

- Weather conditions (wind speed using the Beaufort Scale, cloud cover estimated as eighths or octas of the sky, sea state, and visibility.
- Date
- Tidal state range during survey period.

8.7 Existing baseline description

8.7.1 Offshore ornithology

8.7.2 General overview

The offshore ornithology study area is defined as the area encompassing the Eni Development Area, which includes the offshore structures, offshore cables and subsea cables (including intertidal habitats up to MHWS, plus an additional 10 km buffer, or up to Mean Low Water Springs where this is less than 10 km (Figure 8-1). The 10 km distance was applied to account for the displacement of sensitive divers and sea ducks which are highly sensitive to vessel movements (Schwemmer *et al.*, 2011; Burger *et al.*, 2019) and are present in the Liverpool Bay in internationally important numbers.

Appendix K1: Offshore Ornithology Baseline Technical Report provides a detailed baseline characterisation of offshore ornithology (which includes only marine and waterbird species) within the Eni Development Area for the Hynet Carbon Dioxide Transportation and Storage Project and wider region. Data was collated through a detailed desktop review of relevant material within the region (Table 8-6). There are several protected sites designated for marine birds with connectivity to the Eni Proposed Development Area. Table 8-7 shows the designated sites with relevant ornithology features that are within 315 km of the Eni Proposed Development Area and given consideration within this assessment. The 315 km distance is the mean maximum foraging range for northern gannet (as taken from Woodward, *et. Al*., 2019) and was the range used to assess connectivity with the proposed development. Supplementary material from HiDef Aerial Surveying Limited (2023), Waggitt *et al.* (2020), Bradbury *et al.* (2014), and Lawson *et. Al.* (2016) was used to produce maps showing the spatial variation in densities of species across seasons in the Offshore Ornithology study area. Species identified and their associated densities in the area were used to assess the predicted displacement in relation to the Eni Development, as presented in appendix K2: Offshore Ornithology Displacement Technical Report.

Appendix K2: Offshore Ornithology Displacement Technical Report presents the method and results of the Matrix table approach (using 'Disturbance Sensitivity' and 'Habitat Specialization' scores from Bradbury *et al*. (2014) (expanded from Furness *et al*., 2013) as recommended by the Joint SNCB Interim Displacement Advice Note (SNCB 2022)), to assess seabird displacement resulting from the Eni Development Project during the construction, operations and maintenance, and decommissioning phases. The report considered the most sensitive species found within the Proposed Development area. The displacement was assessed on the installation of new power cables and cable protection, construction of the new Douglas platform and associated construction activities and on the operation and maintenance of the new Douglas platform. For the purposes of displacement assessment therefore, peak densities of seabirds were identified within:

- the Area of Project Physical Work plus a 2 km buffer which overlaps with the Liverpool Bay/Bae Lerpwl SPA and the Area of Project Physical Work plus a 4 km buffer which overlaps with the Liverpool Bay/Bae Lerpwl SPA work (if appropriate for the species i.e. common scoter and red-throated diver);
- the Area of Project Physical Work plus a 2 km buffer; and
- the Douglas platform plus a 2 km buffer.

Potential displacement and mortality rates were calculated for each sensitive species in the area: little tern, common tern, common scoter, red-throated diver, little gull, sandwich tern, Manx shearwater, northern gannet, northern fulmar, and European storm petrel; as well as the likelihood of predicted mortalities surpassing the 1% baseline mortality threshold.

Table 8-6: Summary Of Key Desktop Reports Used To Inform Offshore Ornithology Baseline Technical Report

Title	Source	Year	Author
Densities of qualifying species within Liverpool Bay/Bae Lerpwl SPA: 2015 to 2020 (NECR440)	Natural England	2023	HiDef Aerial Surveying Limited
Awel Y Môr OWF Offshore Ornithology Baseline Characterisation Report	APEM Ltd.	2022	Boa, *et al.*
LBA CCS Transport and Storage Project Feasibility Study Pre-EN	Eni Progetti	2021	ENI
Seabird Monitoring Programme Report 1986-2019	JNCC	2021	JNCC
Distribution maps of cetacean and seabird populations in the North-East Atlantic	Journal of Applied Ecology	2020	Waggitt *et al.*
Desk-based revision of seabird foraging ranges used for HRA screening	BTO Research Report	2019	Woodward *et al.*
Gwynt Y Môr OWF Post-construction Aerial Surveys 2016 to 2019	APEM Ltd.	2017 – 2019	Goddard *et al.*, 2017, 2018, Goulding *et al.*, 2019
UK Offshore Energy Strategic Environmental Assessment OESEA3	Department of Energy and Climate Change (DECC)	2016	DECC
An Assessment of the Numbers and Distributions of Wintering Waterbirds and Seabirds in Liverpool Bay	JNCC	2016	Lawson *et al.*
Mapping Seabird Sensitivity to Offshore Wind Farms	PlosOne	2014	Bradbury *et al.*
SEA678 Data Report for Offshore Seabird Populations	University College Cork	2006	Mackey and Giménez
North Hoyle Offshore Wind Farm, Annual FEPA Monitoring Report 2004-2005	Npower Renewables	2005	RWE Group

8.7.3 Desktop study results

8.7.3.1 Designated sites

There are three designated sites that directly overlap with the Offshore Ornithology Study Area: Liverpool Bay/Bae Lerpwl SPA, Dee Estuary SPA and Ribble and Alt Estuaries SPA. In addition, the potential for offshore interaction of birds from breeding colonies with the Eni Development Area has been assessed based on the most extensive and prevalent seabird foraging ranges. In order to identify designated sites with potentially connectivity to the Proposed Development, a foraging range distance of 315 km (mean-max foraging range of northern gannet, Woodward *et al.,* 2019) was used. The list of SPAs within range of the Eni Development Area are shown in **Table 8-7**.

Table 8-7 Spa Colonies (Qualifying As An Individual Species And/Or Assemblage Of Species) Within Individual Species Range (Mean-Max Foraging Range) From The Eni Development Area

Site Name and Code	Distance to nearest point of Eni Development Area (km)	Relevant Qualifying Feature
Liverpool Bay/Bae Lerpwl SPA (UK9020294A)	0.00	• Red-throated diver *Gavia stellata* (non-breeding) • Little gull *Hydrocoloeus minutus* (non-breeding) • Common scoter *Melanitta nigra* (non-breeding) • Little tern *Sternula albifrons* (breeding) • Common tern *Sterna hirundo* (breeding)
Dee Estuary SPA (UK9013011)	0.00	• Sandwich tern *Sterna sandvicensis* (non-breeding) • Common tern *Sterna hirundo* (breeding) • Little tern *Sternula albifrons* (breeding) • Cormorant *Phalacrocorax carbo* • Great crested grebe *Podiceps cristatus*
Ribble and Alt Estuaries SPA (UK9005103)	1.00	• Lesser black-backed gull *Larus fuscus* (breeding) • Common tern (breeding)
Anglesey Terns/Morwenoliaid Ynys Môn SPA (UK9013061)	30.0	• Sandwich Tern *Sterna sandvicesis* (breeding)
Morecambe Bay and Duddon Estuary SPA (UK9020326)	22.0	• Lesser black-backed gull *Larus fuscus* (breeding and non-breeding)
Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA (UK9013121)	98.0	• Manx Shearwater *Puffinus puffinus* (breeding)
Ailsa Craig SPA (UK9003091)	196.0	• Gannet *Morus bassanus* (breeding)
Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA (UK9014051)	213.0	• Storm Petrel *Hydrobates pelagicus* (breeding) • Manx Shearwater (breeding)
Grassholm SPA (UK9014041)	224.0	• Gannet *Morus bassanus* (breeding)
Saltee Islands SPA (IE0004002)	246.0	• Fulmar *Fulmarus glacialis* (breeding) • Gannet *Morus bassanus* (breeding)

8.7.3.2 Species accounts

Table 8-8 shows the population and density of species recorded in the Eni Development Area which are qualifying features of SPAs within 315 km. Peak density estimates were generated from supplementary material from Waggitt *et al.* (2020), Bradbury *et al.* (2014), and Lawson *et. Al.* (2016). Waggitt *et al.* (2020) shows little tern and common tern are likely absent from the Liverpool Bay/Bae Lerpwl SPA area, however, both the Dee Estuary and Liverpool Bay SPAs are designated in part for supporting both species. Therefore, the approach taken for characterising little tern and common tern utilisation of the Proposed Development is based upon the foraging ranges from known colonies adjacent to the Liverpool Bay SPA. For little tern, a 5 km mean max foraging range was used (Woodward *et. Al.,* 2019). A total of 8.6% of the area available to little tern within their foraging range is located within the Proposed Development area. For common tern, an 18 km mean max foraging range was used (Woodward *et. Al.,* 2019). A total of 2.5% of the area available to common tern within their foraging range is located within the Proposed Development area. Regional populations were calculated for each species assessed in Appendix K2: Offshore Ornithology Displacement Technical Report, using data from JNCC 2023; Lawson *et al.* 2016; and Furness 2015. Great cormorant and lesser black-backed gull were not assessed for displacement and so regional population was not estimated.

Table 8-8: Spa With Connectivity To The Proposed Development

Species	Regional Population (within species' mean-max foraging range* of Eni Development Area)
Common scoter	141,801 (non-breeding)[1]
Red-throated diver	1,657 (non-breeding)[1]
Great cormorant	Unreported
Northern fulmar	343,042 (breeding)[1]
Manx Shearwater	967,552 (breeding)[1]
European storm petrel	179,093 (breeding)[1]
Northern gannet	449,233 (breeding)[1]
Little gull	319 (non-breeding)[1]
Lesser black-backed gull	Unreported
Sandwich tern	4,159 (breeding)[1]
Little tern	742 (breeding)[1]
Common tern	26,707 (breeding)[1]

[1]The Offshore Ornithology Displacement Technical Report (data collated from HiDef Aerial Surveying Limited (2023); JNCC 2023; Lawson *et al.,* 2016; and Furness 2015)

8.7.4 Displacement results

8.7.4.1 Background

The construction, operations and maintenance, and decommissioning of the Eni development may lead to disturbance and displacement of birds caused by airborne noise, underwater sound, and presence of vessels and infrastructure. In relation to offshore developments, displacement is defined as a reduction in the number of seabirds occurring within or immediately adjacent to an offshore development (Furness *et al.,* 2013). A high level of disturbance has the potential to displace seabirds from an area of sea in which the development activity is occurring. As a result, displaced birds may move to areas already occupied by other birds and thus face higher intra or 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 habitat 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 on other birds in areas that displaced birds move to.

There is the potential for disturbance and displacement from airborne noise, underwater sound, and presence of vessels within the Proposed Development as the result of site preparation activities in advance of installation activities, cable installation activities placements and decommissioning activities such as export cable removal. Construction activities can result in a point source of disturbance, for example when construction vessels are at a location to undertake piling and install foundations or cables. During the operations and maintenance phase, the presence of the new Douglas platform has the potential to directly disturb seabirds leading to displacement from the Proposed Development area including an area of variable size or buffer around it where the birds would usually reside. Additionally, activities associated with the operations and maintenance of the platform (e.g. vessel, helicopter and inspection drone activity) may disturb and displace species within the Proposed Development area.

The displacement assessment for the Proposed Development is based on the use of the SNCB Matrix table approach. As sensitivity to displacement differs considerably between seabird species, species were screened and progressed for the Matrix table approach using 'Disturbance Sensitivity' and 'Habitat Specialization' scores from Bradbury *et al.* (2014) and Wade *et al.* (2016) as recommended by the Joint SNCB Interim Displacement Advice Note (JNCC, 2017). In addition to the species' sensitivity rating, the abundance of birds in the Eni development area was considered as to whether species were progressed to the matrix stage. For each of the species assessed (presented in Table 8-9), displacement impacts were quantified for the population derived within the area of physical works plus 2 km buffer, as recommended by SNCBs. However, a 4 km buffer was used for common scoter and red-throated diver due to being more sensitive to disturbance from noise, boat and helicopter traffic, and can be affected up to this distance (Natural England 2021).

The Maximum Design Scenario (MDS) is represented by the maximum density of vessels and structures across the Eni development area that would cause the greatest extent of disturbance and displacement to birds for the greatest duration of impact. The MDS also represents the maximum underwater sound impacts from impact piling for each of the relevant infrastructure foundation options and the maximum number of vessel and helicopter movements that would cause greatest visual and noise disturbance and displacement to birds from the array area and offshore cable corridor. The MDS is summarised in Table 8-16.

The full approach of the displacement assessment is detailed in Appendix K2: Offshore Ornithology Displacement Technical Report.

Table 8-9: Identification Of Species Taken Forward To The Displacement Assessment

Species	Why displacement analysis is required	Stage of Eni Development displacement analysis is required for
Little tern	Species recorded within development area, qualifying feature of nearby SPA within foraging range, high uncertainty level associated with displacement vulnerability score	Installation of cable route
Common tern	Species recorded within development area, qualifying feature of nearby SPA within foraging range	Installation of cable route
Common Scoter	Species recorded within development area, qualifying feature of nearby SPA within foraging range, very high vulnerability to displacement, low uncertainty level associated with displacement vulnerability score	Installation of cable route
Red-throated diver	Species recorded within development area, qualifying feature of nearby SPA within foraging range, very high vulnerability to displacement, low uncertainty level associated with displacement vulnerability score	Installation of cable route
Little gull	Species recorded within development area, qualifying feature of nearby SPA within foraging range, moderate uncertainty level associated with displacement vulnerability score	Installation of cable route

Species	Why displacement analysis is required	Stage of Eni Development displacement analysis is required for
Sandwich tern	Species recorded within development area, qualifying feature of nearby SPA within foraging range, moderate uncertainty level associated with displacement vulnerability score	Construction and decommissioning Operational phase (Douglas platform)
Manx Shearwater	Species recorded within development area, qualifying feature of nearby SPA within foraging range, high uncertainty level associated with displacement vulnerability score	Construction and decommissioning Operational phase (Douglas platform)
Northern gannet	Species recorded within development area, qualifying feature of nearby SPA within foraging range	Construction and decommissioning Operational phase (Douglas platform)
European storm petrel	Species recorded within development area, qualifying feature of nearby SPA within foraging range, high uncertainty level associated with displacement vulnerability score	Construction and decommissioning Operational phase (Douglas platform)

8.7.4.2 Displacement from construction

As the impacts relating to disturbance from the presence of vessels during construction is temporary it is considered appropriate that a mortality rate of 0.5 to 1% is used. Table 8-10 outlines the predicted mortalities resulting from cable laying activities during the construction phase and within the most disruptive season (relative to species). For full results from all bio seasons, see Appendix K2: Offshore Ornithology Displacement Technical Report. In addition, the number of birds potentially displaced is calculated based on the potential total area occupied by vessels at any one time. These rates are still regarded precautionary for assessment of the displacement impacts, further backed up by the fact that construction is both temporally and spatially restricted to a very small area of sea at any one time.

Table 8-10: A Summary Of Mortality Estimates Based Upon The Construction Project Phase And During The Most Disruptive Season (Relative To Species)

Species	Season	Peak Density (birds per km^2)	Regional Baseline Population (individuals)		Mortality Rate used for assessment (%)	Number of individuals subject to mortality (%)	Increase in baseline mortality (%)
			Population	Baseline Mortality			
Common scoter	Non-breeding	** 33,080 – 4 year mean peak abundance (within Area of Project Physical Works + 4 km buffer)	141,801	33,080	0.5 – 1.0	165.4 – 330.8	0.49 – 0.98
Red-throated diver	Return migration	** 407.2 – 4 year mean peak abundance (within Area of Project Physical Works + 4 km buffer)	1,171	407.2	0.5 – 1.0	2.04 – 4.07	0.2 – 0.89

Species	Season	Peak Density (birds per km^2)	Regional Baseline Population (individuals)		Mortality Rate used for assessment (%)	Number of individuals subject to mortality (%)	Increase in baseline mortality (%)
			Population	Baseline Mortality			
Great cormorant	Non-breeding	1.66 birds per km^2	9,602	3,197	0.5 – 1.0	0.105 – 0.211	0.02 – 0.04
Manx shearwater	Breeding	5	1,580,895	207,097	1 – 5	0	0.000
Northern fulmar	Breeding	67.2	828,194	149,903	1 – 5	0 – 1	0.000 – 0.001
European storm petrel	Breeding	0.1	834,500	118,499	1 – 5	0	0.000
Northern gannet	Breeding	36.7	661,888	123,773	1 – 5	0 – 1	0.000 – 0.001
Little gull	Non-breeding	0.328 (within Area of Project Physical Works + 2 km buffer)	319	50	0.5-1.0	0.010-0.020	0.020-0.040
Sandwich tern	Passage	115.5	10,761	3,583	10-30	6 – 30	0.167 – 0.837
Little tern	Breeding	N/A	742	N/A	N/A	N/A	0.04 – 0.06
Common tern	Non-breeding	N/A	26,707	N/A	N/A	N/A	0.003 – 0.006

* During the operation and maintenance phase all species had increases in baseline mortality of **less than 0.00%.** ** Estimated 4 year mean peak abundance taken from HiDef Aerial Surveying Limited (2023).

Little Tern*

The Dee Estuary and Liverpool Bay/Bae Lerpwl SPA support breeding little tern, with the coastal waters being a key foraging ground for this species. It is therefore appropriate to consider the potential temporary habitat loss due to cable laying activities, with a high percentage of habitat loss likely to cause increased mortality. As shown in Appendix K2: Offshore Ornithology Baseline Technical Report, the little tern foraging range at Gronant Dunes and Point of Ayr overlap with the Proposed Development area by 8.6%.

As no known reported disturbance distances for foraging birds has been stated, a precautionary distance of 50 m is considered appropriate. Consequently, the area of impact from a single vessel at any one time could be up to 0.05 km^2. During construction, there is potential for up to 12 vessels to be present within the area. On this basis a theoretical maximum area of disturbance of up to 0.6 km^2 could occur.

Using the theoretical maximum area of disturbance of up to 0.6 km^2, approximately 0.8% of the foraging area of little terns is considered to be affected by displacement resulting from cable laying and increased vessel activity.

A breeding season abundance of 5.9 little tern could be displaced from within the 0.8% affected area. When considering a mortality rate of 0.5 to 1%, this would result in approximately 0.03 to 0.06 little tern being subject to mortality.

The breeding population estimate for little tern in the Liverpool Bay SPA is recorded as 742 individuals (Table 1.9) and, using the average baseline mortality rate of 0.2 (Table 1.10), the natural predicted mortality in the winter bio-season is 148.4 individuals per annum. The addition of 0.03 to 0.06 mortalities would increase the mortality relative to the baseline mortality rate by 0.02 to 0.04%.

In the breeding bio-season and assessed against the little tern population the predicted mortalities did not surpass a 1% baseline mortality threshold.

Common Tern*

Both the Dee Estuary and Liverpool Bay SPAs are designated in part for supporting breeding common tern. It is therefore appropriate to consider the potential temporary habitat loss due to cable laying activities, with a high percentage of habitat loss likely to cause increased mortality.

Burger (1998) suggests that common tern are disturbed by vessels at a minimum distance of 100 m. The area of impact from a single vessel at any one time could be up to a maximum distance of 0.1 km^2. During construction, there is potential for up to 12 vessels to be present within the area. On this basis a theoretical maximum area of disturbance of up to 1.2 km^2 could occur. However, during construction vessel activity will be clustered around the area of cable laying and therefore the areas of potential disturbance from each vessel will overlap and the overall area of disturbance will be considerably smaller.

As shown in Appendix K1: Offshore Ornithology Baseline Technical Report, part of the Proposed Development area overlaps with the foraging area by 2.5%. In order to incorporate the displacement resulting from cable laying and increased vessel activity, the potential impacts on common terns are considered within a radius of 1.2 km^2. As a result, approximately 0.16% of the foraging area could be affected.

A breeding season abundance of 42.7 common tern could be displaced from within the 0.16% affected area. When considering a mortality rate of 0.5 to 1%, this would result in approximately 0.21 to 0.42 little tern being subject to mortality.

The breeding population estimate for little tern in the Liverpool Bay SPA is recorded as 26,707 individuals (Table 1.9) and, using the average baseline mortality rate of 0.268 (Table 1.10), the natural predicted mortality in the winter bio-season is 7,157 individuals per annum. The addition of 0.21 to 0.42 mortalities would increase the mortality relative to the baseline mortality rate by 0.003 to 0.006%.

In the breeding bio-season and assessed against the little tern population the predicted mortalities did not surpass a 1% baseline mortality threshold.

All other seabirds

The displacement scores for all other species come in below the critical 1% threshold of excess mortality. Both common scoter and red-throated diver are near the 1% threshold however the effects are predicted to be very temporary in nature only lasting one season. Therefore, no cumulative mortality will be caused year on year.

Sandwich tern are also close to the 1% threshold. However, these are mostly composed of passage birds which are less tied to discreet areas of habitat and therefore more mobile and flexible in their use of foraging areas.

8.7.4.3 Permanent displacement from operation of Douglas platform

Although most studies have documented attraction effects of offshore platforms in both seabirds and land birds, the presence of platforms can also displace birds from otherwise suitable foraging habitat (Ronconi *et al.*, 2015). In some studies, it has been shown that shearwaters, storm petrels, and Northern fulmar occurred in lower densities close to offshore platforms compared to regions 10 km – 50 km away (AMEC, 2011). With

the lack of known consequences and rates at which birds avoid offshore structures, it is assumed therefore that for certain species, complete avoidance of the offshore platform occurs.

Table 8-11 summarises the predicted annual (BDMPS) increase in baseline mortality for the seabird species assessed as being at risk. In all bio-seasons and assessed against the regional populations, the predicted mortalities of each species did not exceed a 1% increase in baseline mortality threshold caused by the operation of the Douglas platform.

Table 8-11: Annual (BDMPS) Permanent Displacement Estimates For The Eni Development Douglas Platform Plus 2 Km Buffer During Operation Of Platform Estimates For The Eni Development Douglas Platform Plus 2 Km Buffer During Operation Of Platform

Species	Douglas platform + 2 km buffer Peak Abundance	Regional Baseline Population		Displacement Rate resulting from Eni Development (%)	Mortality Rate resulting from Eni Development (%)	Number of individuals subject to mortality	Increase in baseline mortality (%)
		Population	Baseline Mortality				
Sandwich tern	0	10,761	3,583	50-100	30-50	0	0.000
Manx shearwater	5	1,580,895	207,097	50-100	1-10	0-0	0.000
Northern gannet	32.2	661,888	123,773	50-100	1-10	0-3	0.000-0.002
Northern fulmar	54.2	828,194	149,903	50-100	1-10	0-5	0.000-0.003
European storm petrel	0.1	834,500	118,499	50-100	1-10	0	0.000

8.7.5 Intertidal ornithology

8.7.5.1 General overview

The Intertidal Ornithology Study Area sits at the mouth of the Dee Estuary, which is an important stop-off for many species of wintering and passage waders and wildfowl, in addition to providing nesting habitat for the UK's largest colony of breeding little tern.

The Intertidal Ornithology Study Area is mostly composed of sand and mudflats and/or nearshore waters. The area is mostly used by gulls, waders, and waterfowl, with small numbers of common scoter and red-throated diver utilising the nearshore waters. The nearshore waters also provide the foraging ground for breeding and passage terns.

8.7.5.2 Designated sites

There are three internationally designated sites with intertidal waterbird features within 20 km, two of these are also Ramsar sites.

Table 8-12: The Internationally Designated Sites Within 20 Km Of The Landfall Of The Proposed Developments

Sites	Distance from site	Features
The Dee Estuary SPA and Ramsar	0 km	**Non-breeding** – cormorant (*Phalacrocorax carbo*), shelduck (*Tadorna tadorna*), teal (*Anas crecca*), pintail (*Anas acuta*), wigeon (*Anas pprox*), great crested grebe (*Podiceps cristatus*), oystercatcher (*Haematopus ostralega*), grey plover (*Pluvalis squatarola*), knot (*Calidris canuta*), dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*), redshank (*Tringa pprox.*), sanderling (Calidris alba), **Breeding** – common tern (*Sterna hirundo*), little tern (*Sternula albifrons*), redshank (*Tringa pprox.*) **Passage** – ringed plover (*Charadrius hiaticula*), sandwich tern (*Sterna sandvicensis*)
Liverpool Bay SPA	0 km	**Non-breeding** – red-throated diver (*Gavia stellata),* common scoter (*Melanitta nigra),* little gull (*Hydrocoloeus minutus)* **Breeding** – little tern (*Sternula albifrons*), common tern (*Sterna hirundo*)
Mersey Narrows and North Wirral Foreshore SPA and Ramsar	7.9 km	**Non breeding** – cormorant (*Phalacrocorax carbo*), oystercatcher (Haematopus ostralegus), grey plover (*Pluvialis squatarola*), sanderling (Calidris alba), dunlin (*Calidris alpina alpina*), knot (*Calidris canuta*), bar-tailed godwit (*Limosa lapponica*), redshank (*Tringa pprox.*), little gull (*Hydrcoloeus minutus*) **Breeding** – common tern (*Sterna hirundo*)

There are also four SSSIs with intertidal waterbird features within 20 km of the landfall of the proposed development. One underpins the Mersey narrows and north Wirral foreshore SPA whilst the other three underpin the Dee Estuary SPA. Only species of interest that are not named as designated features of the internationally designated sites that they underpin are named below.

Table 8-13: The Nationally Designated Sites Within 20 Km Of The Landfall Of The Proposed Development

SSSIs	Distance from site	Features
North Wirral Foreshore SSSI	7.9 km	**Non-breeding** – greater scaup (*Anthya marila*), common scoter (*Melanita nigra*), goldeneye (*Bucephala clangula*), red-throated diver (*Gavia stellata*), great crested grebe (*Podiceps cristatus*), turnstone (*Arenaria interpres*), black-tailed godwit (*Limosa limosa*)
Dee Estuary SSSI England	4.4 km	As SPA and Ramsar
Dee Estuary/Aber Afon Dyfrdwy SSSI Wales	0 km	As SPA and Ramsar
Gronant Dunes and Talacre Warren SSSI	0 km	As Dee Estuary SPA and Ramsar

8.7.5.3 Survey results

The full findings of the diurnal and nocturnal intertidal surveys undertaken are presented in detail in Appendix K2:Intertidal Ornithology Technical Report.

A total of 51 waterbird species were identified to species level during the diurnal and nocturnal surveys. These species belonged to nine taxonomic groups:

- wildfowl (11 species);
- seaducks, divers and grebes (5 species);
- seabirds and auks (4 species);
- cormorants (1 species);
- herons (2 species);
- rails (2 species);
- waders (16 species);
- gulls (7 species); and
- terns (3 species).

Table 8-14 contains a summary of the intertidal survey results and the conservation status of each species recorded. The conservation status of each species has been used to determine whether or not it is carried through for assessment as a Valued Ornithological Receptor (VOR). All species that are SPA, Ramsar, or SSSI features have been taken through in addition to those species named on – annex 1 of the birds directive, schedule 1 of the Wildlife and Countryside Act, as amended (1981), section 7 of the Environment Act (Wales) 2016, and any species named under the red and amber lists of the Birds of Conservation Concern (BOCC 5 UK) (Stanbury *et al*., 2021) and BOCC 4 Wales (Johnstone *et al*., 2022).

Table 8-14: Summary Of Peak Counts From Either Diurnal Or Nocturnal Intertidal Survey Results

Taxonomic group	Species	Peak Count	SPA feature	Ramsar feature	SSSI feature	Annex 1	Schedule 1	Section 7	UK BoCC 5	BoCC 4 Wales
	Mute swan	2	×	×	×	×	×	×	Green	Green
	Canada goose	208	×	×	×	×	×	×	Green	Green
	Greylag goose	2	×	×	×	×	×	×	Amber	Amber
	Pink-footed goose	330	✓	✓	✓	×	×	×	Amber	Green
	Brent goose	321	×	×	×	×	×	✓	Amber	Green
	Shelduck	77	✓	✓	✓	×	×	×	Amber	Red
	Gadwall	2	×	×	×	×	×	×	Amber	Green
	Mallard	14	×	×	×	×	×	×	Amber	Green
	Teal	29	✓	✓	✓	×	×	×	Amber	Amber
	Wigeon	1	✓	✓	✓	×	×	×	Amber	Amber
	Pintail	2	✓	✓	✓	×	×	×	Amber	Amber
Seaducks, divers and grebes	Common scoter	185	✓	×	×	×	✓	✓	Red	Amber
	Great northern diver	1	×	×	×	✓	×	×	Amber	Green
	Red-throated diver	2	✓	×	×	✓	×	×	Green	Amber
	Goosander	1	×	×	×	×	×	×	Green	Green
	Great crested grebe	7	×	×	✓	×	×	×	Green	Green
True seabirds	Gannet	3	✓	×	×	×	×	×	Amber	Amber
	Kittiwake	12	✓	×	×	×	×	×	Red	Red
	Guillemot	3	✓	×	×	×	×	×	Amber	Amber
	Razorbill	2	✓	×	×	×	×	×	Amber	Amber
Cormorants	Cormorant	388	✓	✓	✓	×	×	×	Green	Green
Herons	Grey heron	2	×	×	×	×	×	×	Green	Amber
	Little egret	2	✓	×	×	✓	×	×	Green	Green
Rails	Moorhen	2	×	×	×	×	×	×	Amber	Green
	Water rail	2	×	×	×	×	×	×	Green	Amber
Waders	Oystercatcher	188	✓	✓	✓	×	×	×	Amber	Amber
	Ringed plover	59	✓	✓	✓	×	×	✓	Red	Red
	Lapwing	112	×	×	×	×	×	✓	Red	Red
	Golden plover	45	✓	×	✓	✓	×	✓	Green	Red
	Grey plover	52	✓	✓	✓	×	×	×	Amber	Red
	Knot	2	✓	✓	✓	×	×	×	Amber	Amber
	Dunlin	449	✓	✓	✓	×	×	×	Red	Red
	Sanderling	229	✓	✓	✓	×	×	×	Amber	Green
	Turnstone	1	✓	×	×	×	×	×	Amber	Amber
	Common sandpiper	7	×	×	×	×	×	×	Amber	Amber
	Redshank	4	✓	✓	✓	×	×	×	Amber	Red

Taxonomic group	Species	Peak Count	SPA feature	Ramsar feature	SSSI feature	Annex 1	Schedule 1	Section 7	UK BoCC 5	BoCC 4 Wales
	Black-tailed godwit	32	✓	✓	✓	×	✓	×	Red	Amber
	Curlew	60	✓	✓	✓	×	×	✓	Red	Red
	Whimbrel	3	×	×	×	×	✓	×	Red	Amber
	Snipe	105	×	×	×	×	×	×	Amber	Amber
	Jack snipe	1	×	×	×	×	×	×	Green	Amber
Gulls	Black-headed gull	465	×	×	✓	×	×	✓	Amber	Red
	Mediterranean gull	1	✓	×	×	✓	✓	×	Amber	Amber
	Common gull	2,852	×	×	×	×	×	×	Amber	Amber
	Great black-backed gull	43	×	×	×	×	×	×	Amber	Amber
	Herring gull	516	✓	×	×	×	×	✓	Red	Red
	Yellow-legged gull	1	×	×	×	×	×	×	Amber	Amber
	Lesser black-backed gull	21	✓	✓	×	×	×	×	Amber	Red
Terns	Common tern	3	✓	✓	✓	✓	×	×	Amber	Amber
	Little tern	44	✓	×	✓	✓	✓	×	Amber	Red
	Sandwich tern	1,043	✓	×	✓	✓	×	×	Amber	Amber

8.7.6 Little tern foraging distribution

8.7.6.1 General overview

The Gronant Dunes little tern colony is situated on the upper beach at the Gronant Dunes approx. 1.2 km from the Proposed Development. Whilst the UK has seen a decline of 42% in little tern abundance since the 1980s (SMP, 2019), the colony at Gronant has quadrupled in size over the same period. It held 211 and 212 Apparently Occupied Nests (AONs) in 2022 and 2023 (RSPB) respectively making it one of the UKs largest colonies. In addition to the main colony a satellite colony has formed to the east at Point of Ayr. This hosted 39 AONs in 2022 and 30 in 2023 (RSPB). These two colonies combined contain all of the Welsh breeding population of little tern and circa. 10% of the UK breeding population. The threshold for international importance for little tern is 190 individuals, so this site is internationally important for this species.

8.7.6.2 Designated sites

The Proposed Development passes directly through the Liverpool Bay Special Protection Area (SPA), Dee Estuary SPA, Ramsar and Site of Special Scientific Interest (SSSI), and Gronant Dunes and Talacre Warren SSSI. These sites are of national and international importance for breeding little tern and common tern (*Sterna hirundo*) and for passage sandwich tern (*Sterna sandvicensis*), see Table 8-12 and Table 8-13.

8.7.6.3 Survey results

The results of the site-specific surveys corroborate the findings of other little tern studies with 90% of foraging birds concentrated within 1.5 km offshore from MHWS and 3.5 km alongshore either side of the colony (RPS, 2024c). The highest concentrations of foraging little tern were situated close to the main colony at Gronant Dunes and within the first 1.5 km offshore (see Figure 8-5).

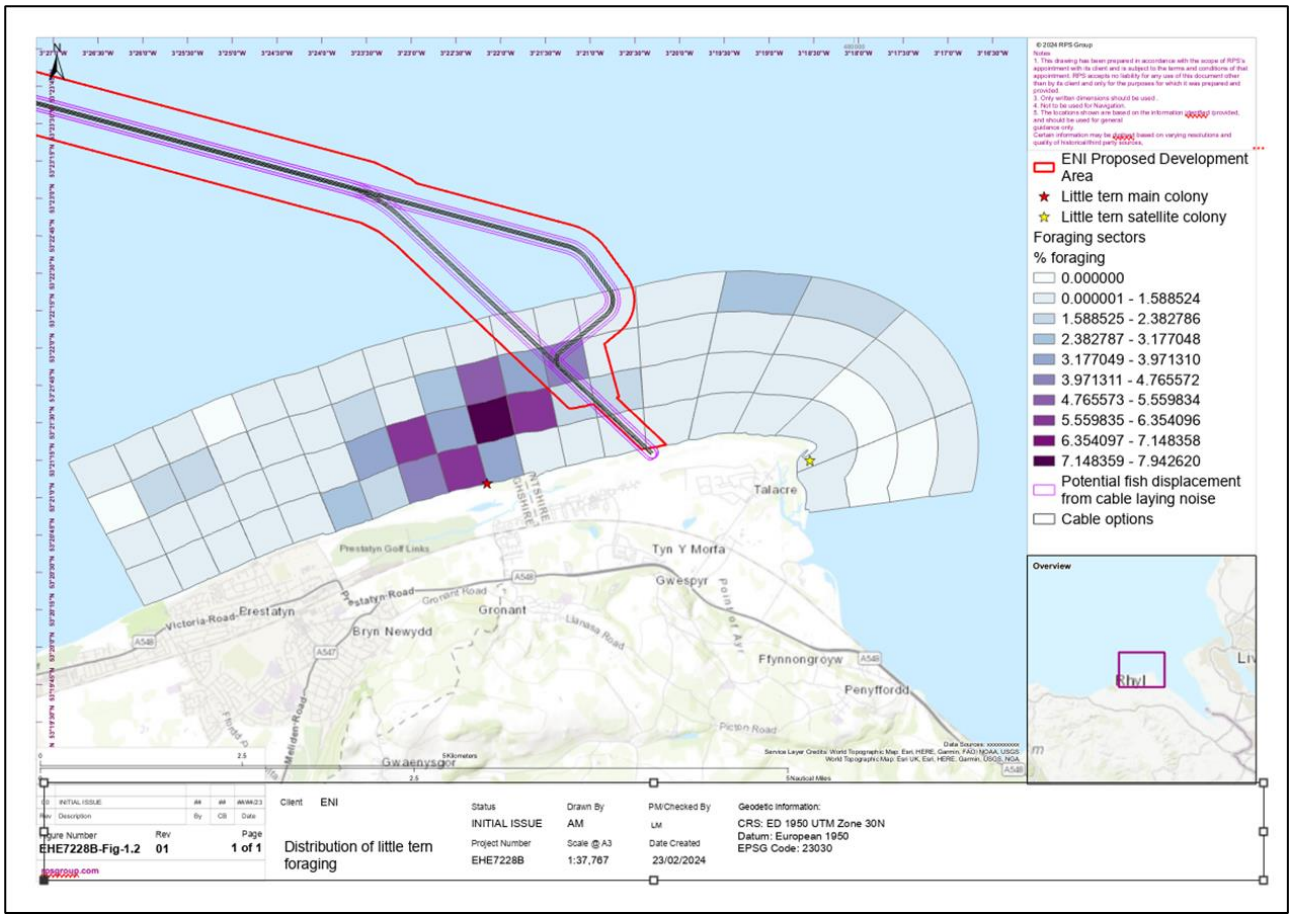

Figure 8-5: Distribution Of Foraging Little Tern Split By Count Sectors And Distance Bands

Based upon the 2023 breeding season data, between 2.4% and 2.9% of the Gronant Dunes and Point of Ayr little terns foraging distribution may be affected by changes in prey availability caused by underwater noise during cable laying activities (Table 8-15) .

There is no available data on thresholds of suspended sediment loads that may alter fish behaviour therefore this potential impact cannot be quantified. However, suspended sediments above 1,000 mg/l may cause injury or mortality of adult fish and lower levels may cause mortality of juvenile fish and eggs. Sediment loads are expected to surpass the 1,000 mg/l level in the nearshore waters.

Table 8-15: Calculations To Determine What Percentage Of Little Tern Foraging Is Located Within The Area Where Prey Availability May Be Affected By Underwater Noise

			Weighted % of overlap with 68m fish displacement zone			
			Through West Hoyle Bank		Around West Hoyle Bank	
Observation point	Distance band	% foraging per sector	Option 1.1	Option 1.2	Option 2.1	Option 2.2
E-3	1000 - 1500m	4.654	1.406	1.507	1.898	1.917
E-3	500 - 1000m	2.344	0.491	0.405	0.491	0.405
E-4	500 - 1000m	1.819	0.235	0.291	0.235	0.291
E-2	1000 - 1500m	3.324	0.145	0.075	0.000	0.000
E-2	1500 - 2000m	0.385	0.128	0.123	0.000	0.000

			Weighted % of overlap with 68m fish displacement zone			
			Through West Hoyle Bank		Around West Hoyle Bank	
Observation point	Distance band	% foraging per sector	Option 1.1	Option 1.2	Option 2.1	Option 2.2
E-4	0 - 500m	0.070	0.022	0.021	0.022	0.021
E-3	1500 - 2000m	0.385	0.003	0.009	0.028	0.016
E-5	0 - 500m	0.070	0.001	0.002	0.001	0.002
E-4	1500 - 2000m	0.735	0.000	0.000	0.207	0.216
E-4	1000 - 1500m	1.015	0.000	0.000	0.002	0.010
Total foraging overlap with the 68m underwater noise fish displacement zone			**2.431**	**2.432**	**2.884**	**2.877**

8.8 Key parameters for assessment

8.8.1 Maximum Design Scenario

The maximum design scenarios (MDSs) identified in Table 8-16 have been selected as those having the potential to results in the greatest effect on an identified receptor or receptor group.

Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here be taken forward in the final design scheme.

Table 8-16: Maximum Design Scenario Considered For The Assessment Of Potential Impacts

a C=construction, O=operation and maintenance, D=decommissioning

Potential Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Temporary habitat loss leading to displacement/disturbance of birds	✓	×	✓	**Construction Phase** **Offshore Inter-OP Cables** Number of cables: 3 Zone of disturbance: 15 m width per trench Maximum burial depth: 3 m Maximum width of trench: 1.5 m Cable length: 12 km (Douglas to Hamilton), 15 km (Douglas to Hamilton North), 35 km (Douglas to Lennox) **PoA Terminal-Douglas Cable** Number of cables: 2 Distance between cables: 30 m minimum Zone of disturbance: 15 m width per trench Maximum width of trench: 1.5 m Total length: 34 km per cable **Injection Wells – Hamilton** Number of wells: 4 Days to completion: 35 per well Distance to coastline: 23 km **Injection Wells – Hamilton North** Number of wells: 2 Days to completion: 35 per well	**Construction Phase** The MDS includes the maximum construction corridor width, within which the cables will be located – this represents the largest physical impact and greatest area of habitat loss. Open cut trenching generally represents the worst case in relation to habitat loss, compared to Horizontal Directional Drilling beneath a feature. The MDS includes the maximum number of wells to be drilled or altered. The works associated with this represent largest physical and disturbance impact. **Decommissioning Phase** Decommissioning is likely to operate within the parameters identified for construction.

Potential Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				Distance to coastline: 26 km **Injection Wells – Lennox** Number of wells: 2 targets Days to completion: 45 per well Distance to coastline: 11 km **Monitoring Wells – Hamilton Main** Number of wells: 1 Days to completion: 55 Distance to coastline: 23 km **Monitoring Wells – Hamilton North** Number of wells: 1 Days to completion: 55 Distance to coastline: 26 km **Monitoring Wells – Lennox** Number of wells: 1 Days to completion: 45 Distance to coastline: 26 km **Sentinel Wells – Hamilton North** Number of wells: 1 Days to completion: 20 Distance to coastline: 26 km **Sentinel Wells – Lennox** Number of wells: 1 Days to completion: 20 Distance to coastline: 11 km **Decommissioning Phase** Decommissioning activities are anticipated to occur within the areas affected by the construction phase. Temporary habitat loss will be limited to temporary works areas no greater in size than the construction works areas	
Disturbance and displacement from airborne sound and presence of vessels and infrastructure	✓	✓	✓	**Construction Phase** **OP and Wells** Maximum number of installation and support vessels: 3 Maximum number of tugs/anchor handlers: 7 Maximum number of cargo barges: 5 Maximum number of support vessels: 2 Maximum number of survey vessels: 2 Maximum number of seabed preparation vessels: 2 Maximum number of crew transfer vessels: 2 **Cables and Pipeline** Preferred burial technique: plough Maximum number of cable lay installation and support vessels: 4 Maximum number of jack-up vessels: 2 Maximum number of multicat vessels: 2 Maximum number of working boats: 3 Maximum number of support vessels for trenching: 1	**Construction Phase** The MDS includes the maximum number of vessels to be present on site in relation to topside installation at any given time and the extent of impact is based on this. These vessels will be present across the whole site, including each platform and well location. The preferred method for laying cables using a plough will contribute to sound levels. Magnetometer surveys have not indicated a high potential for UXO to be found however if located may be detonated *in situ*. **Operation and Maintenance Phase** The MDS includes the maximum number of vessels to be present on site in relation to the operation and maintenance of the project. These vessels will be present across the

Potential Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				Maximum number of DSV/LCV for cable pull in: 1 Maximum number of survey vessels: 1 Maximum number of seabed preparation vessels: 1 Maximum number of crew transfer vessels: 1 Maximum number of cable protection installation vessels: 1 Maximum number of cable burial installation vessels: 1 **UXO** Possibility of finding unexploded ordnance (UXO) **Operation and Maintenance Phase** Maximum number of jack-up vessels: 1 Maximum number of other vessels: 3 Maximum number of helicopters: 1 **Decommissioning Phase** Maximum number of main decommissioning and support vessels: 2 Maximum number of tug/anchor handlers: 6 Maximum number of number of barges: 4 Maximum number of cable decommissioning and support vessels: 2 Maximum number of survey vessels: 1 Maximum number of crew transfe2 vessels: 2	whole site, including each platform and well location. **Decommissioning Phase** The MDS includes the maximum number of vessels to be present on site in relation to the decommissioning of the project. These vessels will be present across the whole site, including each platform and well location.
Collision with static offshore infrastructure	✗	✓	✗	**Operation and Maintenance Phase** Number of platforms: 4 Heights below taken at lowest astronomical tide (LAT). **Douglas OP** Height of main structure: 38.5 m Height of helideck: 46.5 m Height of crane: 62.7 m Length: 76.7 m Width: 45.6 m **Hamilton Main OP** Height: 33.5 m Length: 27.8 m Width: 23.9 m **Hamilton North OP** Height: 33.5 m Length: 27.8 m Width: 23.9 m **Lennox OP** Height: 35.7 m Length: 33.9 m Width: 29.6 m	**Operation and Maintenance Phase** The MDS includes the maximum heights of the operating platforms in relation to the operation and maintenance of the project. These structures present the greatest risk of collision across the site. A reduced number of vessels operating in the area compared to during the construction and decommissioning phases may reduce disturbance levels and increase the number of birds in the area.

Potential Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Indirect impacts to birds from changes in prey availability	✓	✓	✓	**Construction Phase** Disturbance to fish and shellfish from underwater sound and sedimentation leading to possible displacement of prey. Underwater noise caused by cable laying activities may impact prey up to 68 m from activities. Piling activities associated with platform construction have the potential to displace prey. The dredging of West Hoyle Bank to install a cable route will involve dredging a trench 1 km long, 60 m wide and 7 m deep and the Suspended Sediment Concentration (SSC) may lead to possible displacement of prey. The cable laying plough and associated SSCs may lead to possible displacement of prey. **Operation and Maintenance Phase** Disturbance to fish and shellfish from underwater sound leading to possible displacement of prey. **Decommissioning Phase** Disturbance to fish and shellfish from underwater sound and sedimentation leading to possible displacement of prey.	**Construction Phase** The preferred method of laying cables is via plough, likely to generate high vibration levels. The presence of surface vessels and below water construction activity will impact the distribution of prey in the area. Dredging of the West Hoyle Bank and cable route may increase sedimentation **Operation and Maintenance Phase** Routine maintenance and operation will impact prey distribution and many present an injury risk to fish/shellfish through the presence of vessels. Activities such as the removal of marine growth from subsea structures will likely give rise to vibration levels, sediment disturbance and noise resulting in an impact on prey distribution. **Decommissioning Phase** Subsea installations on the seabed that are exposed or at a depth of up to 0.6 m will be removed, this will generate vibration and noise disturbance.
Accidental pollution in the surrounding area	✓	✓	✓	**Construction Phase** Drilling of wells (creation of new and re-directing existing). Cutting of trenches for cable laying. Detonation of UXO along cable route. Presence of vessels involved in construction processes. **Operation and Maintenance Phase** Presence of vessels involved in routine operation and maintenance. **Decommissioning Phase** Presence of vessels involved in decommissioning processes.	**Construction Phase** Vessels associated with the construction process present a risk of fuel run-off. **Operation and Maintenance Phase** Vessels associated with the routine operation and maintenance processes present a risk of fuel run-off. **Decommissioning Phase** Vessels associated with the decommissioning process present a risk of fuel run-off. The cleaning of pipelines during decommissioning present a risk of contamination should leakage occur into the sea.
Creation of roosting and nesting habitats among project infrastructure	✗	✓	✗	**Operation and Maintenance Phase** Number of platforms: 4 Heights below taken at lowest astronomical tide (LAT). **Douglas OP** Height of main structure: 38.5 m Height of helideck: 46.5 m	**Operation and Maintenance Phase** The MDS includes the maximum heights of the operating platforms in relation to the operation and maintenance of the project. These structures provide the only potential

Potential Impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				Height of crane: 62.7 m Length: 76.7 m Width: 45.6 m **Hamilton Main OP** Height: 33.5 m Length: 27.8 m Width: 23.9 m **Hamilton North OP** Height: 33.5 m Length: 27.8 m Width: 23.9 m **Lennox OP** Height: 35.7 m Length: 33.9 m Width: 29.6 m	for offshore roosting and nesting habitat within the project area.

8.8.2 Impacts scoped out of the assessment

On the basis of the baseline environment and the Proposed Development Description outlined in chapter 3 of the Offshore ES, two impacts are proposed to be scoped out of the assessment for Intertidal and Offshore Ornithology. This was either agreed with key stakeholders through consultation as discussed in chapter 5, or otherwise, the impact was proposed to be scoped out in the HyNet Carbon Dioxide transportation and Storage Project – Offshore Scoping Report (*Eni, 2022*) and no concerns were raised by key consultees. These impacts are outl–ned, together with a justification for scoping it out, in Table 8-17.

Table 8-17 Impacts Scoped Out Of The Assessment For Intertidal And Offshore Ornithology (Tick Confirms The Impact Is Scoped Out)

Potential Impact	Phase			Justification
	C	O&M	D	
Operational underwater noise	✗	✓	✗	**Operation and maintenance phase** Underwater noise during the project's ongoing operation is unlikely to result in noise levels that would impact surrounding bird species.
Injury to biodiversity from potential collision with marine vessels	✓	✓	✓	**All phases** The presence of construction, maintenance and decommissioning marine vessels, in addition to increased vessel traffic in the area is unlikely to cause injury to seabirds through vessel strikes and collision risks given the industrialised nature of Liverpool Bay. Shipping and marine traffic is heavily prevalent within Liverpool Bay and seabirds and vessel strikes have not been documented within the area. The majority of seabird strikes is a direct result of attraction and sometimes associated collision with lights (Ronconi *et al*., 2015). Although unpredictable, poor weather, precipitation and cloud cover have been known to exacerbate the effects of nocturnal attraction to lights (Ronconi *et al*., 2015).

8.9 Methodology for assessment of effects

8.9.1 Impact assessment criteria

The offshore ornithology impact assessment has followed the methodology set out in volume 1, chapter 5. Specific to the onshore and intertidal ornithology impact assessment, the following guidance documents have also been considered:

- Guidelines on Ecological Impact Assessment (CIEEM, 2022).

In addition, this chapter has considered the legislative framework as defined by:

- The Conservation of Habitats and Species Regulations 2017 (as amended)
- The Wildlife and Countryside Act 1981 (as amended)
- European Commission ('EC') Directive 2009/147/EC (codified version of 79/409/EC) on the Conservation of Wild Birds (the 'Birds Directive')
- Ramsar Convention on Wetlands of International Importance 1971
- Section 7 of the Environment (Wales) Act 2016

Consideration was also given to those species featuring on the following:

- Species listed as red or amber on the Birds of Conservation Concern 5 (BOCC 5 UK) (Stanbury *et al*., 2021)
- Species listed as red or amber on the Birds of Conservation Concern Wales 4 (BOCC4 Wales) (Johnstone *et al*., 2022).

The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in volume 1, chapter 5. The criteria for defining magnitude in this chapter are outlined below. This set of definitions has been determined on the basis of changes to bird populations.

Table 8-18: Definition Of Terms Relating To The Magnitude Of An Impact

Magnitude of impact	Definition
High	A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that is predicted to irreversibly alter the population in the short to long term and to alter the long-term viability of the population and/or the integrity of the protected site. Impacts felt long-term. Impacts predicted to be reversed in the long-term (i.e. more than five years) following cessation of the project activity.
Medium	A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that occurs in the short and long-term, but which is not predicted to alter the long-term viability of the population and/or the integrity of the protected site. Impacts felt medium to long term. Impacts predicted to be reversed in the medium-term (i.e. no more than five years) following cessation of the project activity.
Low	A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that is sufficiently small-scale or of short duration to cause no long-term harm to the feature/population. Impacts present for a short to medium duration. Impacts predicted to be reversed in the short-term (i.e. no more than one year) following cessation of the project activity.
Negligible	Very slight change from the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site. Impacts present for a short duration Impacts predicted to be reversed rapidly (i.e. no more than circa six months) following cessation of the project related activity.

Magnitude of impact	Definition
No change	No loss or alteration of characteristics, features or elements; no observable impact either adverse or beneficial.

The criteria for defining recoverability and sensitivity in this chapter are outlined below. The definition of sensitivity considers the vulnerability and recoverability of a receptor as well as taking into account the conservation importance of each receptor.

It should be noted that high vulnerability and/or low recoverability are not necessarily linked with high conservation value within a particular impact. A receptor could be categorised as being of high conservation value (e.g. an interest feature of a SPA) but have a low or negligible physical/ecological vulnerability to an effect and vice versa. Determination of sensitivity takes these differing aspects into consideration.

Table 8-19: Definition Of Recoverability

Sensitivity	Definition
High	A species with a low to medium reproductive success and a stable or increasing UK trend in breeding abundance and productivity.
Medium	A species with a low reproductive success and a stable or increasing UK long-term trend in breeding abundance and productivity.
Low	A species with a low reproductive success and a declining UK long-term trend in breeding abundance and productivity or uncertainty regarding the long-term trend (due to data availability).

Table 8-20: Definition Of Conservation Values Relating To The Sensitivity Of The Receptor

Conservation importance	Definition
Very High	Species of international/European importance: • Cited interest feature of SPA or Ramsar • Population present within survey area exceeds 1% threshold of international importance.
High	Species of national importance: • Species listed on Annex 1 of the EU Birds Directive • Species that contribute to the assemblage of a SSSI • Species listed on Schedule 1 of the Wildlife and Countryside Act (1981) as amended • Population present within survey area exceeds 1% threshold of National Importance. • Species listed in Section 7 of the Environment (Wales) Act, 2016
Medium	Species of regional importance: • Species listed on LBAPs for the local area • Species considered to be of regional significance due to population size or distribution restrictions.
Low	Species of local importance: • Species that are of importance on a very local scale (i.e. within the local borough)
Negligible	• All commonly occurring and widespread species

Table 8-21: Definition Of Sensitivity Of The Receptor

Sensitivity	Definition
Very High	Bird species has high conservation value, very high vulnerability to impact and has no ability to recover.
High	Bird species has high conservation value, medium vulnerability to impact and has low recoverability.
	Bird species has medium conservation value, high vulnerability to impact and has low recoverability.
Medium	Bird species has high conservation value, low vulnerability to impact and has medium recoverability.
	Bird species has high conservation value, low vulnerability to impact and has low recoverability.
	Bird species has medium conservation value, high vulnerability to impact and has medium recoverability.
	Bird species has medium conservation value, medium vulnerability to impact and has medium recoverability.
	Bird species has medium conservation value, low vulnerability to impact and has medium recoverability.
Low	Bird species has medium conservation value, medium vulnerability to impact and high recoverability.
	Bird species has low conservation value, medium to high vulnerability to impact and medium to high recoverability.
Negligible	Bird species has low conservation value, low vulnerability to impact and medium to high recoverability.
	Bird species is not vulnerable to impacts.

The conservation value of ornithological receptors is based on the population from which individuals are predicted to be drawn. This reflects current understanding of the movements of species, with site-based protection (e.g. SPAs) generally limited to specific periods of the year (e.g. the breeding season). Therefore, conservation value can vary through the year depending on the relative sizes of the number of individuals predicted to be at risk of impact and the population from which they are estimated to be drawn. Conservation value therefore corresponds to the degree of connectivity which is predicted between the Proposed Development and protected populations. Using this approach, the conservation importance of a species seen at different times of year may fall into any of the defined categories. The significance of the effect upon offshore ornithology is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in. Where a range of significance of effect is presented in, the final assessment for each effect is based upon expert judgement.

For the purposes of this assessment, any effects with a significance level of ‘Moderate’ or ‘Major’ have been concluded to be significant in terms of Environmental Impact Assessment.

Table 8-22: Matrix Used For The Assessment Of The Significance Of The Effect

Sensitivity of Receptor	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major
Very High	No change	Minor	Moderate or Major	Major	Major

8.10 Embedded mitigation

The Applicant is aware of two periods during the year when birds associated with the Dee Estuary SPA and Ramsar site are potentially at their most sensitive to disturbance from cable installation works. The two periods are as follows:

- the two hours either site of a high tide during the overwintering period (September to March inclusive); and
- the little tern breeding season, which runs from mid-April to mid-July.

The Applicant is cognisant of the need to accommodate the seasonal/timing constraints as part of the construction schedule, including balancing conflicting constraints, to avoid/minimise any adverse effects arising from construction. Where avoidance of a recommended seasonal window is not achievable, appropriate alternative mitigation and licensing (where required) will be realised to ensure protection of species and facilitate construction.

Work will be carried out to define the sensitive egg laying and chick rearing period for the Gronant Dunes little tern colony, during which time impacts upon prey availability may lead to a reduction in productivity. This will be used to inform any seasonal limitations that need to be placed upon certain work activities.

The Applicant will continue to engage with NRW and FCC on the protection of sensitive species during the construction period. Pre-commencement ecological surveys will be used as a basis for planning of specific activities. Activities will be timed to reduce impacts on ecological receptors where practicable.

A detailed Method Statement will be produced to outline how impacts on birds will be avoided during the works. This is likely to include planning of the time and duration of activities, toolbox talks for site contractors, and appropriate selection of plant machinery to minimise disturbance. Detailed Method Statements will be prepared by the Construction Contractor for prior approval before commencement of the works. The Method Statements will be developed in collaboration with NRW and shared with NRW-MLT for approval at least three months prior to works commencing.

8.11 Assessment of significance

The impacts of construction, operation and maintenance, and decommissioning phases of the Project have been assessed. The potential impacts arising from these phases are listed in Table 8-16 alongside the maximum design scenario against which each impact has been assessed.

In accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines on Ecological Impact Assessment (CIEEM, 2022), the assessment of the likely ecological effects of the Project and identification of important ecological features has focused on Valued Ornithological Receptors (VORs). VORs are species of high ecological value, present within the offshore and intertidal study areas, that any potential impact upon them as a result of the Project would be considered to be significant.

The species which have been identified as VORs have been grouped into 4 categories, each of which combine species from taxonomic family groups with similar ecological characteristics relevant to their habitat use within the intertidal and offshore study areas. These are:

- non-breeding waterbirds (wildfowl, waders, gulls, herons and rails);
- Non-breeding seaducks, divers, grebes and cormorants;
- Breeding true seabirds; and
- Breeding terns.

8.11.1 The impact of temporary habitat loss leading to displacement and disturbance of birds

The impact of the construction and decommissioning is likely to result in the temporary removal of habitat that supports water birds. The potential impact on receptors is predicted to vary both spatially and temporally across habitats and seasons in which receptors are present in throughout the offshore and intertidal ornithology study area and through which elements of the Proposed Development. The new cable corridor and the associated vessels used during construction are likely to affect receptors utilising the intertidal area for foraging, loafing and roosting. Offshore species may be disturbed and displaced from their foraging grounds due to construction works and the associated vessel traffic. In addition, breeding species may be impacted by the loss of foraging habitat.

8.11.2 Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)

8.11.2.1 Construction and decommissioning phase

The impact of construction and decommissioning is likely to result in the temporary removal of habitats that support foraging and roosting for non-breeding waterbirds (wildfowl, waders, gulls, herons and rails). This group of receptors is most likely to be affected by the construction of the new cable route at the Point of Ayr landfall.

For each of these species the temporary removal of habitats may impact upon the availability of food resources and waterbirds may need to forage elsewhere to meet their daily energy requirement. Displaced birds 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 food resources). Such resulting displacement could ultimately affect their demographic fitness (i.e. survival rates and breeding productivity) as well as potentially impacting on other birds in areas that displaced birds move to. Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

Temporary habitat loss as a result of the construction of offshore power and fibre optic cables connecting the Point of Ayr (PoA) Terminal to Douglas OP (seawards of MHWS) and decommissioning may lead to a temporary avoidance of the affected areas. The two landfall cables have a construction corridor width of 15 m each and will be set 30 m apart, both span the length of the intertidal (approximately 1.5 km in length).

Assuming that waterbirds will not utilise the area within 500m of works (based upon the disturbance distance of non-breeding pink-footed goose as taken from Goodship & Furness, 2022), this equates to an affected area of 1.59 km^2. When compared with similar habitats available in the Dee Estuary this equates to 1.74% of available foraging habitats.

It is anticipated that the effects of the construction phase upon the supporting habitats will be reversible, and as work is expected to take up to 23 days, it is of short-term duration. A detailed Method Statement will be produced to outline how impacts on birds will be avoided during the works. The Method Statements will be developed in collaboration with NRW, and shared with NRW-MLT for approval at least three months prior to works commencing.

As works cover a relatively small area, are of short-term duration, and are reversible the magnitude of impact is deemed to be negligible.

Sensitivity of the receptor

As intertidal habitats are limited in nature, waterbirds and in particular waders are considered to be very vulnerable to the loss of foraging habitats on their wintering grounds (e.g. Burton *et al.,* 2006).

This group of receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds.

Many of the waterbird species recorded during the site-specific surveys are designated features of local SPA, Ramsar and SSSI sites, and are therefore of high to very high conservation value.

Waterbird VORs are deemed to be of high vulnerability, medium recoverability, and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.3 Non-breeding seaducks, divers, grebes and cormorants

The impact of construction and decommissioning is likely to result in the temporary removal of habitats which are used by non-breeding seaducks, divers, grebes and cormorants. This group is most likely to be affected by works occurring in the nearshore waters, i.e. the construction of offshore power and fibre optic cables connecting the PoA Terminal to Douglas OP (seawards of MLWS).

As the result of temporary or permanent habitat loss, the fitness of displaced birds may be affected as birds may move to areas already occupied by birds or into areas of lower quality (e.g. areas of lower prey availability). Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

8.11.3.1 Construction and decommissioning phase

Magnitude of impact

Displacement from disturbance has been fully assessed for species in this group in Appendix K2: Offshore Ornithology Displacement and excess mortality was found to be below the 1% threshold (Table 8-10). The magnitude of impact on this species is therefore deemed negligible.

Sensitivity of the receptor

Both common scoter and red-throated diver are highly susceptible to disturbance often flushing from large distances and relocating even further away from the source of disturbance (Goodship & Furness, 2022). Therefore, they are deemed to have high vulnerability to the impact.

Common scoter and red-throated diver are qualifying features of the Liverpool Bay SPA, while cormorant is a feature of local SPA and Ramsar sites and therefore, these species are of very high conservation value. The majority of the other species in this receptor group are SSSI features with high conservation value.

The receptors are considered to have high recoverability based on an increasing trend in the numbers of wintering birds (Frost *et. Al*., 2021).

Seaducks, divers, grebes and cormorants are deemed to be of high vulnerability, high recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.4 Breeding true seabirds

8.11.4.1 Construction and decommissioning phase

The impact of construction and decommissioning is likely to result in the temporary removal of habitats which are used by breeding true seabirds. True seabirds are most likely to be impacted by disturbance and displacement offshore during the cable works and development of the new Douglas platform, and the associated vessels. As the result of temporary or permanent habitat loss, the fitness of displaced birds may be affected as birds may move to areas already occupied by birds or into areas of lower quality (e.g. areas of lower prey availability). Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

Displacement from disturbance has been fully assessed for species in this group inAppendix K2: Offshore Ornithology Displacement and excess mortality was found to be below the 1% threshold (Table 8-10). In addition, the effects of displacement from this project are very temporary in nature and will only affect birds during a limited number of breeding seasons. The magnitude of impact on this species is therefore deemed negligible.

Sensitivity of the receptor

As pelagic habitats required by this group are large in extent, and as seabirds often have extensive foraging ranges (315 km mean max for northern gannet, as taken from Woodward, *et. Al*., 2019), this group of receptors have low vulnerability to temporary and localised disturbance/displacement.

All receptor species in this group are designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have high recoverability based on upward population trends (JNCC, 2019).

Breeding true seabirds are deemed to be of very high vulnerability, high recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be medium.

8.11.5 Breeding terns

8.11.5.1 Construction and decommissioning phase

The construction and decommissioning phase of the Eni development is likely to result in the temporary loss of habitat that supports breeding terns. The potential impact on receptors is predicted to vary both spatially and temporarily across habitats and seasons in which receptors are present. In relation to breeding terns, the cable installation and platform construction works, and their associated vessel traffic, has the potential to disturb breeding birds and displace them from their regular foraging grounds. This poses a risk if individuals move into areas of lower habitat quality or increased competition, and such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

There are two breeding little tern colonies along the east and west of the shoreline from Point of Ayr. These colonies are likely to be impacted by the installation of the Douglas platform to Point of Ayr cables, as foraging birds may be disturbed and displaced by construction noise and vessel traffic. However, the amount of available foraging that will be affected at any one time will be 0.8% of their available foraging range with increases in mortality of 0.04 – 0.06% above baseline predicted.

There are three common tern colonies near to the Eni Development Area, along the estuaries of the River Dee and River Mersey, and in the Ribble and Alt Estuary. The amount of available foraging area that will be affected at any one time will be 0.16% with increases in mortality of 0.003 – 0.006% above baseline predicted.

Sandwich tern have a foraging range of 34.3 km (Woodward *et al.*, 2019), so no SPA colonies will be directly affected with most affected birds being passage birds, and passage birds are more flexible in their foraging habits than breeding birds which are fixed to a colony.

Therefore, the magnitude of impact upon this species group is considered negligible.

Sensitivity of the receptor

Although terns are flexible in their habitat use during the non-breeding season, the receptors are overall considered to be very vulnerable to the loss of foraging grounds. The terns present within the Proposed Development area have medium (common tern and sandwich tern) to high (little tern) habitat specialisation (Wade *et al.*, 2016) and their foraging ranges vary from 5 km to 34.3 km (Woodward *et al.,* 2019). The maximum vulnerability of this receptor group is considered to be high.

The receptor species in this group are all designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of breeding birds (JNCC, 2019).

Breeding terns are deemed to be of very high vulnerability, medium recoverability and high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.6 Significance of effect

Table 8-23: Summarising The Significance Of Effect For The Impact Of Temporary Habitat Loss Leading To Displacement And Disturbance Of Birds During The Construction And Decommissioning Phases

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding waterbirds (wildfowl, waders, gulls, herons, and rails)	Negligible	High	**Minor**
Non-breeding seaducks, divers, grebes and cormorants	Negligible	High	**Minor**
Breeding true seabirds	Negligible	Medium	**Negligible**
Breeding terns	Negligible	High	**Minor**

8.11.7 The impact of disturbance and displacement from airborne sound and presence of vessels and infrastructure

All phases of the Project involve airborne noise due to the presence of vessels and infrastructure within the site boundary. The potential impact on receptors is predicted to vary both spatially and temporally across habitats and seasons in which receptors are present throughout the offshore and intertidal ornithology study area. The construction of a cable corridor and the associated vessels used during all phases are likely to affect receptors utilising the intertidal area for foraging, loafing and roosting. Offshore species may be disturbed and displaced from their foraging grounds due to noise from works and the presence of associated vessel across all phases.

8.11.8 Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)

8.11.8.1 Construction and decommissioning

This group of receptors is most likely to be affected by vessels associated with the construction of the new cable route at Point of Ayr as there is a high density of intertidal species foraging and roosting here. Gulls may be displaced from foraging habitat in both the intertidal and offshore development areas, depending on the species. For example, little gull which forage offshore in the Liverpool Bay SPA.

For each of these species, noise may cause displacement and the movement of individuals into 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 food resources). Such resulting displacement could ultimately affect their demographic fitness (i.e. survival rates and breeding productivity) as well as potentially impacting on other birds in areas that displaced birds move to.

Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

As the effects of visual disturbance are generally considered to occur to a greater distance than those of noise (Cutts, *et. Al*., 2013) and as the visual effects of disturbance and displacement have already been considered within the impact of temporary habitat loss leading to displacement and disturbance of birds. The magnitude of effect of this impact is deemed to be negligible.

Sensitivity of the receptor

Waterbirds and in particular waders are considered to be vulnerable to noise disturbance (Cutts *et al.*, 2013), this coupled with the limited availability of similar intertidal habitats makes waterbirds vulnerable to this impact.

This group of receptors at the site have a maximum sensitivity of moderate to very high, and they are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds (Frost *et. Al*., 2021).

Many of the waterbird species recorded during the site-specific surveys are designated features of local SPA, Ramsar and SSSI sites, and are therefore of high to very high conservation value.

Waterbird VORs are deemed to be of high vulnerability, medium recoverability and high to very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.8.2 Operation and maintenance

Extra maintenance vessels will not affect this receptor group that depends heavily upon the intertidal.

Magnitude of impact

There will be no extra disturbance to the intertidal zone and therefore the magnitude of impact is no change.

Sensitivity of the receptor

Waterbirds and in particular waders are considered to be vulnerable to noise disturbance (Cutts *et al.*, 2013), this coupled with the limited availability of similar intertidal habitats makes waterbirds vulnerable to this impact.

This group of receptors at the site have a maximum sensitivity of moderate to very high, and they are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds (Frost *et. Al*., 2021).

Many of the waterbird species recorded during the site-specific surveys are designated features of local SPA, Ramsar and SSSI sites, and are therefore of high to very high conservation value.

Waterbird VORs are deemed to be of high vulnerability, medium recoverability and high to very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.9 Non-breeding seaducks, divers, grebes and cormorants

8.11.9.1 Construction and decommissioning

This group of receptors is likely to be disturbed by the presence of vessels within nearshore waters most heavily during the construction phase.

The disturbance generated from the movement of vessels through nearshore waters may lead to birds moving to areas already occupied by birds or into areas of lower quality (e.g. areas of lower prey availability). Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

As the effects of visual disturbance are generally considered to occur to a greater distance than those of noise (Cutts, *et. Al*., 2013) and as the visual effects of disturbance and displacement have already been considered within the impact of temporary habitat loss leading to displacement and disturbance of birds. The magnitude of effect of this impact is deemed to be negligible.

Sensitivity of the receptor

Overall, this group of receptors have a medium to high habitat specialisation and are considered to be very vulnerable to disturbance (Goodship and Furness, 2022).

Common scoter and red-throated diver are qualifying features of the Liverpool Bay SPA, while cormorant is a feature of local SPA and Ramsar sites and therefore, these species are of very high conservation value. The majority of the other species in this receptor group are SSSI features with high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds (Frost *et. Al*., 2021).

Seaducks, divers, grebes and cormorants are deemed to be of high vulnerability, medium recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.9.2 Operation and maintenance

The operation and maintenance phase will involve minimal vessel movements, there is, however, potential for brief localised disturbance events.

Magnitude of impact

Due to the brief and local nature of these disturbance events the magnitude of impact is no change.

Sensitivity of the receptor

Overall, this group of receptors have a medium to high habitat specialisation and are considered to be very vulnerable to disturbance (Goodship and Furness, 2022).

Common scoter and red-throated diver are qualifying features of the Liverpool Bay SPA, while cormorant is a feature of local SPA and Ramsar sites and therefore, these species are of very high conservation value. The majority of the other species in this receptor group are SSSI features with high conservation value.

The receptors are considered to have high recoverability based on an increasing trend in the numbers of wintering birds (Frost *et. Al*., 2021).

Seaducks, divers, grebes and cormorants are deemed to be of high vulnerability, medium recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.11.10 Breeding true seabirds

8.11.10.1 Construction and decommissioning

True seabirds are most likely to be impacted by noise disturbance offshore during the cable works, alterations to existing platforms and wells, and the development of the new Douglas platform, due to the associated vessel traffic, as well as the infrastructure itself. As a result of this disturbance, receptors may be displaced to areas already occupied by birds or into areas of lower quality (e.g. areas of lower prey availability). Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

As the effects of visual disturbance are generally considered to occur to a greater distance than those of noise (Cutts, *et. Al*., 2013), and the visual effects of disturbance and displacement have already been considered within the impact of temporary habitat loss leading to displacement and disturbance of birds. The magnitude of effect of this impact is deemed to be negligible.

Sensitivity of the receptor

The receptors in this group have large foraging ranges and very low habitat specialisation, this makes them of low vulnerability to disturbance by airborne noise and the presence of vessels and infrastructure.

All receptor species in this group are designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds.

Breeding true seabirds are deemed to be of low vulnerability, medium recoverability, and very high conservation importance. The sensitivity of the receptor is therefore, considered to be medium.

8.11.10.2 Operation and maintenance

The operation and maintenance phase will involve minimal vessel movements, there is however potential for brief localised disturbance events.

Magnitude of impact

Due to the brief and local nature of these disturbance events the magnitude of impact is no change.

Sensitivity of the receptor

The receptors in this group have large foraging ranges and very low habitat specialisation, this makes them of low vulnerability to disturbance by airborne noise and the presence of vessels and infrastructure.

All receptor species in this group are designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds.

Breeding true seabirds are deemed to be of low vulnerability, medium recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be medium.

8.11.11 Breeding terns

8.11.11.1 Construction and decommissioning

This group of receptors is likely to be disturbed by the presence of vessels within nearshore waters most heavily during the construction phase.

The disturbance generated from the movement of vessels through nearshore waters may lead to birds moving to areas already occupied by birds or into areas of lower quality (e.g. areas of lower prey availability). Such impacts have the potential to lead to a change in the size or extent of distribution of the biogeographic population or the population that is the interest feature of a specific protected site (e.g. SPA).

Magnitude of impact

As the effects of visual disturbance are generally considered to occur to a greater distance than those of noise (Cutts, *et. Al*., 2013) and as the visual effects of disturbance and displacement have already been considered within the impact of temporary habitat loss leading to displacement and disturbance of birds. The magnitude of effect of this impact is deemed to be negligible.

Sensitivity of the receptor

Terns are generally tolerant of disturbance when they are foraging, with quoted a disturbance by boat distance of 100 m (Goodship & Furness, 2022). This makes them of low vulnerability to disturbance by airborne sound and the presence of vessels and infrastructure.

The receptor species in this group are all designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of breeding birds (JNCC, 2019).

Breeding terns are deemed to be of very low vulnerability, medium recoverability and high conservation importance. The sensitivity of the receptor is therefore, considered to be medium.

8.11.11.2 Operation and maintenance

The operation and maintenance phase will involve minimal vessel movements, there is however potential for brief localised disturbance events.

Magnitude of impact

Due to the brief and localised nature of these disturbance events the magnitude of impact is no change.

Sensitivity of the receptor

Terns are generally tolerant of disturbance when they are foraging, with quoted a disturbance by boat distance of 100 m (Goodship & Furness, 2022). This makes them of low vulnerability to disturbance by airborne sound and the presence of vessels and infrastructure.

The receptor species in this group are all designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of breeding birds.

Breeding terns are deemed to be of very low vulnerability, medium recoverability and high conservation importance. The sensitivity of the receptor is therefore, considered to be medium.

8.11.12 Significance of effect

Table 8-24: Summarising The Significance Of Effect For The Impact Of Disturbance And Displacement From Airborne Sound And Presence Of Vessels And Infrastructure During The Construction And Decommissioning Phases

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)	Negligible	High	**Minor**
Non-breeding seaducks, divers, grebes and cormorants	Negligible	High	**Minor**
Breeding true seabirds	Negligible	Medium	**Negligible**
Breeding terns	Negligible	Medium	**Negligible**

Table 8-25: Summarising The Significance Of Effect For The Impact Of Disturbance And Displacement From Airborne Sound And Presence Of Vessels And Infrastructure During The Operation And Maintenance Phase

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)	No change	High	**No change**
Non-breeding seaducks, divers, grebes and cormorants	No change	High	**No change**
Breeding true seabirds	No change	Medium	**No change**
Breeding terns	No change	Medium	**No change**

8.11.13 The impact of collision with static offshore infrastructure

Collisions of seabirds and/or migratory waterbirds with static offshore structures may result in the death or injury of individuals. Therefore, seabird species which forage within, or commute through, the Proposed Development area may be vulnerable to such effects, as is also the case for migratory waterbirds which transit this area on migration. Risk of collision of seabirds to offshore stationary structures is likely to be restricted to species attracted to lights (such as storm-petrels and shearwaters; Ronconi *et al*., 2015 & Deakin *et al*., 2022) that may become disoriented under specific circumstances or to species attracted to the platform due to potential roosting and nesting opportunities (e.g. gull species; Ronconi *et al*., 2015).

Given the offshore location of the Eni Development Area, it is extremely unlikely that any of the migratory waterbird species associated with European sites would make more frequent movements across the Proposed Development area (e.g. when commuting between foraging and roosting sites), and it is considered that collision risk for these species is limited to their migratory movements.

8.11.14 All receptors

8.11.14.1 Operation and maintenance phase

All species groups are migratory to differing degrees and all groups may be present during the passage periods. Those species that are attracted to light are more likely to be affected but during periods of poor visibility all species may be at risk.

Magnitude of impact

Many of the platforms are already *in situ* so impacts may be similar in the future as they currently are, this will certainly be the case for those impacts that occur due to poor visibility. There is one extra platform to be built plus the additional lighting that will be involved when all platforms are fully operational. The impacts are negligible (the area of platforms is low when compared to the area available for migrating birds to pass through and the avoidance rate of birds in ideal conditions is likely to be high), however the duration will be long term and will last for the Project's lifespan and unless the platforms are fully dismantled the effects are not reversable. However, due to the very slight predicted change from the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site, the magnitude of impact is no change.

Sensitivity of the receptor

Although collision with static offshore infrastructure has been recorded, there are not quantitative assessments on which to base judgement. However, when taken at a high level it is likely that in periods of good visibility most birds will avoid static infrastructure. Certain species that are attracted to light may be at higher risk, nonetheless the risks are likely to be negligible at most and are many of the risks will be present whether the platforms are in use or not. All receptors are considered to have a low vulnerability to impacts.

Many of the receptor species are designated features of SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of breeding birds.

As this receptor group has high conservation value, medium recoverability, and low vulnerability to the impact it is of medium sensitivity.

8.11.15 Significance of effect

Table 8-26: Summarising The Significance Of Effect For The Impact Of Collision With Static Offshore Infrastructure During The Operation And Maintenance Phase

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
All receptors	No change	Medium	**No change**

8.11.16 Indirect impacts to birds from changes in prey availability

There is the potential for changes in bird prey (e.g. fish species or intertidal invertebrates) abundance and distribution to arise as a result of construction, operation and maintenance as well as decommissioning activities. Reduction or disruption to prey availability to birds may cause displacement from foraging grounds in the area, or result in reduced energy intake, affecting survival rates or productivity in the population. Changes in prey distribution, availability or abundance in the marine environment due to the presence of offshore infrastructure, and as a result of operation and maintenance activities that increase sedimentation or increase subsea noise levels.

8.11.17 Non-breeding seaducks, divers, grebes and cormorants

There is a potential for disturbance and/or displacement to sensitive fish and shellfish species as a result of underwater noise resulting from construction activities, such as piling, UXO clearance, and vessel noise. In addition increased sedimentation created during the cable laying phase may reduce the ability of birds to locate prey items.

8.11.17.1 All phases

Magnitude of impact

Due to the limited size of the area that will be affected, when compared with species' total foraging ranges, any effects are likely to be localised in nature, up to medium term (construction of the platform will be the longest in duration at 20 months), and reversible in the short-term. In addition, the magnitude of impact caused by changes in prey availability will be similar in nature to displacement which has already been shown to cause less than a 1% increase in additional mortality. Most impacts will occur during the construction phase, therefore the magnitude of impact during this phase is considered negligible.

During the operation and maintenance phase the magnitude of impact is predicted to be no change.

Sensitivity of the receptor

Species in this group include red-throated diver and common scoter which are primary features of the Liverpool Bay SPA they are therefore of very high conservation value. All species in this group show long-term increase or stability in their populations (Austin, *et. Al*., 2023) and are therefore of medium recoverability. All species are of medium vulnerability to local changes in prey availability as they are highly mobile and can follow shifts in prey abundance. This receptor group is of medium sensitivity.

8.11.18 Breeding true seabirds

There is a potential for disturbance and/or displacement to sensitive fish species as a result of underwater noise resulting from construction activities, such as piling, UXO clearance, and vessel noise. In addition increased sedimentation created during the cable burial phase may reduce the ability of birds to locate prey items.

8.11.18.1 All phases

Magnitude of impact

Due to the limited size of the area that will be affected when compared with species total foraging ranges any effects are likely to be localised in nature, up to medium term (construction of the platform will be the longest in duration at 20 months), and reversible in the short-term. In addition, the magnitude of impact caused by changes in prey availability will be similar in nature to displacement which has already been shown to cause less than a 1% increase in additional mortality. Most impacts will occur during the construction phase, therefore the magnitude of impact during this phase is considered negligible.

During the operation and maintenance phase the magnitude of impact is predicted to be no change.

Sensitivity of the receptor

As many species in this group are primary features of SPAs with connectivity to the Proposed Development, and as the UK holds significant proportions of the global populations of species such as Manx shearwater, this receptor group is of very high conservation value. The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds. Due to the limited area that will be affected by this impact (and the medium-term reversible nature of the impact) coupled with the large foraging ranges of this group (315 km mean max for gannet) this receptor group has a low vulnerability to this impact.

Therefore this group is of medium sensitivity.

8.11.19 Breeding terns

There is a potential for disturbance and/or displacement to sensitive fish species as a result of underwater noise resulting from construction activities. In addition, increased sedimentation created during the cable laying phase may reduce the ability of birds to locate prey items.

8.11.19.1 All phases

Magnitude of impact

Although birds in this group will only be directly displaced due to disturbance caused by vessels and movement above water, the underwater effects of noise and sedimentation have the potential to cause displacement of prey items over a wider area.

Displacement of prey due to underwater noise created by cable laying activities has been quantified as affecting between 2.4% and 2.9% of the little tern foraging range (see Little Tern Foraging Distribution Technical Report (volume 3, appendix K4). As common tern have a larger foraging range (18 km from Woodward *et al*., 2014), the area affected will be approx. 0.01% which is negligible.

Displacement caused by sedimentation is harder to quantify due a lack of numerical data in the literature, however dredging works for the West Hoyle Bank will be approx. 1 km across, 60 m in width and 7 m in depth, these will take approx. two to three weeks to complete and may result in average Suspended Sediment Concentration (SSC) values of over 3000 mg/l in shallower waters. In addition, the cable plough itself may result in SSCs of over 1000 g/l in the shallower nearshore waters where the little tern forage (volume 3, appendix H: This is over the 1 g/l that may be harmful to adult fish (Engell-Sørensen and Skyt, 2001), and it would be reasonable to assume that some displacement of fish may occur, although it is not possible to quantify this. Additionally, fish eggs may be smothered and killed which will further reduce the amount of small prey items available for the little tern.

Assuming works were to take place during the breeding season (which for little tern is between April and July), then although the impacts caused by construction may be high in any one year, the impacts will be reversible

causing no long-term effects to the biogeographic populations of little tern and common tern. Taking that into consideration the magnitude of impact during construction is taken as a precautionary 'low'.

Although work is still needed to define the sensitive egg laying and chick rearing period for the Gronant Dunes colony, measures to limit works during the sensitive egg laying and chick rearing period (this chapter) when little tern are concentrated within a small foraging range are to be discussed further with NRW. Works carried out after chick fledging when the little tern are not confined to a small foraging range would have a negligible impact. Therefore, for these receptors the magnitude of impact for construction is presented for both work during the breeding period and for works outside of the breeding period.

During the operation and maintenance phase the magnitude of impact is predicted to be no change.

Sensitivity of the receptor

This receptor group is of high conservation value, as species in this group include little tern and common tern, which are breeding features of two SPAs (the Dee Estuary, and Liverpool Bay) that directly overlap with the Proposed Development. Both little tern and common tern show downward trends in breeding populations (JNCC, 2019) and therefore have a low recoverability. Due to the limited foraging range of little tern (5 km mean max as taken from Woodward, *et. al*., 2019) this species is considered to have high vulnerability to the impact.

8.11.20 Significance of effect

Table 8-27: Summarising The Significance Of Effect For 'Indirect Impacts To Birds From Changes In Prey Availability' For The VORs During The Construction And Decommissioning Phase

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding seaducks, divers, grebes and cormorants	Negligible	Medium	**Negligible**
Breeding true seabirds	Negligible	Medium	**Negligible**
Breeding terns assuming works during the breeding period	Low	High	**Moderate**
Breeding terns assuming works during the non-breeding period	Negligible	High	**Negligible**

Table 8-28: Summarising The Significance Of Effect For 'Indirect Impacts To Birds From Changes In Prey Availability' For The VORs During The Operation And Maintenance Phase

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding seaducks, divers, grebes and cormorants	No change	Medium	**No change**
Breeding true seabirds	No change	Medium	**No change**
Breeding terns	No change	High	**No change**

8.11.21 The impact of accidental pollution in the surrounding area

Although there is a risk of pollution being accidentally released during the construction, operation and maintenance as well as decommissioning phases of the Eni Development Area from sources including vessels/vehicles and equipment/machinery, the likelihood of an accidental release of pollutants is extremely low, but should an event occur, effects would be limited in spatial extent. In addition, it is anticipated that the risk of such events occurring will be managed by the implementation of measures set out in standard industry guidance documents such as ERP, OPEPs and SOPEPs.

8.11.22 All receptors

All species of bird utilising the environment in the vicinity of a pollution incident may be vulnerable to either direct mortality from oil coverage preventing flight for example, or indirectly via a reduction in ability to forage.

8.11.22.1 All phases

Magnitude of impact

Although the likelihood of a pollution event occurring is low, should an event occur, the impact is predicted to be of local spatial extent and short-term duration. In addition, the implementation of measures set out in standard industry guidance documents such as ERP, OPEPs and SOPEPs will aid in limiting the environmental impacts of any releases of contaminants. The magnitude is therefore, considered to be negligible.

Sensitivity of the receptor

Species that spend large amounts of time in the water (e.g. foraging divers and scoters, and pursuit feeders such as auks) or on the sea surface (e.g. seaducks), are considered to be more vulnerable to pollution incidents (such as the accidental release of synthetic compounds, fuels or other substances) than surface feeding species such as gull species. Other receptors such as waders, geese and gulls are deemed to be less vulnerable to pollution incidents although there may be indirect impacts caused by a loss in foraging resources.

The receptors identified are deemed to be of low vulnerability, high recoverability, and high conservation importance. The sensitivity of the receptor is therefore, considered to be medium.

8.11.23 Significance of effect

Table 8-29: Summarising The Significance Of Effect For The Impact Of Accidental Pollution In The Surrounding Area During All Phases

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
All receptors	Negligible	Medium	**Negligible**

8.11.24 The impacts of the creation of roosting and nesting habitats among project infrastructure

The introduction of newly refurbished infrastructure and additional components of the Proposed Development has the potential to create new roosting and nesting habitats, which may attract some species of seabirds. The main infrastructure that could potentially serve as roosting and/or nesting habitat within the Proposed Development area would include the reconfigured platforms. Three already existing offshore platforms will be reconfigured with new modules and structures, and one new platform will be built.

8.11.25 Breeding true seabirds

Only certain species of seabird have proven to nest or roost on offshore structures habitually (Dierschke *et al*.. 2016) namely cormorants and gulls (roosting; Burke *et al*., 2012, Hope Jones, 1980, Tasker *et al*., 1986) and kittiwake (nesting).

Nesting bird surveys carried out on the existing platforms in 2022 (LBA Survey Report, 2022) found nesting kittiwake – 493 nests on the Douglas complex, 70 nests on Hamilton, 54 nests on Hamilton Nort, 15 nests on Lennox. Occasional roosting herring gull and cormorant were also noted although these were not quantified.

8.11.25.1 Operation and maintenance phase

Magnitude of impact

As black-legged kittiwake are not an interest feature of any of the designated sites with connectivity, and as the positive impacts upon SPA feature species cormorant and herring gull are not quantified, the magnitude of impact is predicted to be a negligible positive impact.

Sensitivity of the receptor

Of the species that are currently benefitting from the existing platforms, and will see increases in nesting habitat, black-legged kittiwake are of medium conservation value in the Liverpool Bay area. Although there is no connectivity to important breeding populations, this species is red listed in the BOCC 5. They are of medium vulnerability to positive effect caused the creation of new nesting habitat and are of medium recoverability. Therefore, the sensitivity of the receptor is medium.

8.11.26 Significance of effect

Table 8-30: Summarising The Significance Of Effect For The Impacts Of The Creation Of Roosting And Nesting Habitats Among Project Infrastructure For The Operation And Maintenance Phase

Species	Magnitude of impact	Sensitivity of receptor	Significance of effect
Breeding true seabirds	Negligible (positive)	Medium	**Minor (positive)**

8.12 Cumulative effect assessment

8.12.1 Methodology

The Cumulative Effects Assessment (CEA) takes into account the impacts associated with the Project together with other projects and plans. The projects and plans selected as relevant to the CEA present within this chapter are based upon the results of a screening exercise (presented in volume 3, appendix F). Each project has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

The offshore and intertidal ornithology CEA methodology has followed the methodology set out within the Environmental Impact Assessment methodology of the Environmental Statement. As part of the assessment, all projects and plans considered alongside the Project have been allocated into 'tiers' reflecting their current stage within the planning and development process, these are listed below.

A tiered approach to the assessment has been adopted using the following categories:

- Tier 1 - the Project considered alongside projects:

  - under construction;
  - permitted application;
  - submitted application; and
  - those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an evidenced ongoing impact.
- Tier 2 – the Project considered alongside Tier 1 projects, as as projects where the:
  - scoping report has been submitted and is in the public domain.
- Tier 3 – the Project considered alongside Tier 1 and Tier 2 projects as well as projects where the:
  - scoping report has not been submitted;
  - identified in a relevant development plan, and
  - identified in other plans and programmes.

This tiered approach is adopted to provide a clear assessment of the HyNet North West Project alongside other projects, plans and activities.

The specific projects, plans and activities scoped into the CEA are outlined in **Table 8-32**.

Some of the potential impacts considered within the HyNet North West Project alone assessment are specific to a particular phase of the development (e.g. construction, operations and maintenance and decommissioning). Where the potential for cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with the Project during certain phases of development, impacts associated with a certain phase may be omitted from further consideration were no plans or projects have been identified that have the potential for cumulative effects during this period.

Impacts screened out of the CEA are included in Table 8-31 below. As per standard EIA methodology, where the potential significant effect for the Proposed Development alone is assessed as negligible, or where an impact is predicted to be highly localised, these will not be considered within the Proposed Development CEA, as there is not considered to be a potential for cumulative effects with other plans, projects or activities (Volume 1, chapter 5: Environmental Impact Assessment Methodology).

Table 8-31: Impacts Screened Out Of The CEA

Impact	Project phase	Receptor group	Justification
Temporary habitat loss leading to disturbance and displacement of birds	Construction	• Breeding true seabirds	The impact is 'Negligible' in EIA terms (**Table 8-23**)
The impact of disturbance and displacement from airborne sound and presence of vessels and infrastructure	Construction	• Breeding true seabirds • Breeding terns	The impact is 'Negligible' in EIA terms (**Table 8-24**)
	Operation and maintenance	• All receptors	The impact is 'No change' in EIA terms (**Table 8-25**)
Collision with static offshore infrastructure	Operation and maintenance	• All receptors	The impact is 'Negligible' in EIA terms (**Table 8-26**)
Indirect impacts to birds from changes in prey availability	Operation and maintenance	• Non-breeding seaducks, divers, grebes, and cormorants • Breeding true seabirds	The impact is 'Negligible' in EIA terms (**Table 8-27**)
The impact of accidental pollution in the surrounding area	Construction and operation and maintenance	• All receptors	The impact is 'Negligible' in EIA terms (**Table 8-29**)
Creation of roosting and nesting habitats among project infrastructure	Operation and maintenance	• Breeding true seabirds	The impact is positive in EIA terms (**Table 8-30**)

Table 8-32: List Of Other Projects, Plans And Activities Considered Within The CEA

Project/Plan	Status	Distance from the Project (km)	Description of project/plan	Start date of license	Expiration date of license	Overlap with the Project
Tier 1						
Gwynt y Môr	Operational	0	160 3 MW wind turbines. Hub height 98m. Rotor diameter 107m.	03/12/2008	03/12/2033	Spatial and temporal overlap (construction and operation and maintenance phase)
North Hoyle offshore wind farm	Operational	0	30 2 MW wind turbines. Hub height 70m. Rotor diameter 80m.	01/01/2003	01/01/2028	Spatial and temporal overlap (construction phase)
MaresConnect Interconnector	Permitted	0	Proposed 750 MW subsea and underground electricity interconnector system linking the electricity grids in Ireland and Great Britain.	No data	No data	Spatial and temporal overlap (operation and maintenance phase, no data relating to construction phase)
Mostyn Energy Park extension	Applied	4	Proposed extension to the docks at Mostyn energy park.	No data	No data	Temporal overlap (during construction and operation and maintenance phase)
Rhyl Flats wind farm	Operational	31.05	25 3.6 MW wind turbines. Hub height 80m. Rotor diameter 107m.	01/01/2002	01/01/2027	Temporal overlap (construction and operation and maintenance phase)
Morlais renewable energy	No data	72	No data	14/12/2021	13/12/2060	Temporal overlap (construction and operation and maintenance phase)
Dublin Array offshore wind farm	Operational	160	600 MW offshore wind power project. Area of 54 km^2.	23/12/2022	23/12/2067	Temporal overlap (construction and operation and maintenance phase)
North Irish Sea Array wind farm	Operational	160	500 MW capacity.	23/12/2022	23/12/2067	Temporal overlap (construction and operation and maintenance phase)
GE wind farm	Operational	165	No data	2003	No data	Temporal overlap (construction and operation and maintenance phase)
GE wind farm	Operational	165	No data	2002	No data	Temporal overlap (construction and operation and maintenance phase)
Bray offshore wind farm	Applied	165	210 MW offshore wind power project with 70 turbines of a maximum height of 160m and rotor diameter of up to 120m.	No data	No data	Temporal overlap (construction and operation and maintenance phase)
Kish offshore wind farm	Applied	165	225 MW offshore wind farm with 75 turbines of a maximum height of 160 m and rotor diameter of up to 120 m.	No data	No data	Temporal overlap (construction and operation and maintenance phase)

Project/Plan	Status	Distance from the Project (km)	Description of project/plan	Start date of license	Expiration date of license	Overlap with the Project
Oriel offshore wind farm	Active	165	No data	23/12/2022	23/12/2067	Temporal overlap (construction and operation and maintenance phase)
Arklow offshore wind farm	Active	165	No data	23/12/2022	23/12/2067	Temporal overlap (construction and operation and maintenance phase)
Codling offshore wind farm	Active	165	No data	23/12/2022	23/12/2067	Temporal overlap (construction and operation and maintenance phase)
Marine renewable tidal array	Licensed	170	Tidal array of 50 to 100 turbines – 25-year consent	No data	No data	Temporal overlap (construction and operation and maintenance phase)
Ballyhenry Bay Strangford Lough tidal test	Active	170	The project aims to deploy a floating tidal turbine platform moored to the seabed in the QUB tidal test site which has been leased from the Crown Estate. The unique turbine system will experience close to its maximum rated velocity, fully testing the system in a relevant tidal environment.	21/03/2022	20/03/2025	Temporal overlap (construction phase)
Erebus offshore floating windfarm	Licensed	217	The project aims to deploy a fully floating windfarm 45 km off the Pembrokeshire coast	17/02/2023	31/12/2065	Temporal overlap (construction phase)
Awel y Môr	Submitted	1.1	Offshore wind farm to generate in excess of 500 MW.	01/01/2023	01/01/2055	Temporal overlap (construction and operation and maintenance phase)
Tier 2						
Morgan and Morecambe offshore wind farms transmission assets	Pre-application	3	The offshore and onshore assets that will be used to transport electricity from the Morgan and Morecambe Offshore Wind Farms to the National Grid substation at Penwortham	No data	No data	Temporal overlap (construction and operation and maintenance phase)
Morgan offshore wind farm generation assets	Pre-application	7.53	Offshore wind farm with up to 107 turbines with a maximum height of 324 m and maximum rotor diameter of 280 m.	No data	No data	Temporal overlap (construction and operation and maintenance phase)
Morecambe offshore wind farm generation assets	Pre-application	30	Offshore wind farm with a nominal capacity of 480 MW and between 20 and 40 fixed bottom turbines.	01/01/2026	No data	Temporal overlap (construction and operation and maintenance phase)

Project/Plan	Status	Distance from the Project (km)	Description of project/plan	Start date of license	Expiration date of license	Overlap with the Project
Mona offshore wind farm	Pre-application	No data	Offshore wind farm with up to 107 turbines with a maximum height of 324 m and maximum rotor diameter of 280 m, and a total capacity of approximately 1.5 GW.	01/01/2028	31/12/2065	Spatial and temporal overlap (construction and operation and maintenance phase)
Mooir Vannin offshore wind farm	Pre-application	63	Offshore Wind Farm situated off the isle of Man	01/01/2026	01/01/2032	Temporal overlap (construction and maintenance
Fair Head tidal energy park	Planning	205	Phase 1: 10 MW Offshore development tidal array. Phase 2: 90 MW Offshore tidal development.	Ongoing	Ongoing	Temporal overlap (construction and operation and maintenance phase)

The MDSs identified in Table 8-33 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the MDSs relating to the Project alone, presented in Table 8-16 ,due to there being potential for cumulative effects. Effects of greater adverse significance are not predicted to arise should any other development scenario (e.g. different turbine layout), to that assessed here, be taken forward in the final design scheme.

Table 8-33: Maximum Design Scenario Considered For The Assessment Of Potential Cumulative Effects On Offshore Ornithology

a C=construction, O=operation and maintenance, D=decommissioning

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
Temporary habitat loss leading to disturbance and displacement of birds	✓	×	✓	MDS as described for the Project (Table 8-16) assessed cumulatively with the following wind farms: **Construction** **Tier 1** • Gwynt y Môr • North Hoyle wind farm • MaresConnect • Mostyn Energy Park extension • Rhyl Flats wind farm • Morlais • Dublin Array • North Irish Sea Array • GE wind farm (2003) • GE wind farm (2002) • Bray offshore wind farm • Kish offshore wind farm • Oriel offshore wind farm • Arklow offshore wind farm • Codling offshore wind farm • Marine renewable tidal array • Ballyhenry Bay Strangford Lough tidal test • Erebus offshore wind farm • Awel y Môr **Tier 2** • Morgan offshore wind farm generation assets • Morecambe offshore wind farm generation assets • Mona offshore wind farm • Mooir Vannin offshore wind farm • Fair Head tidal energy park **Decommissioning** • Expected end of lifetime 2050.	There is a possibility that construction could overlap spatially with North Hoyle and Gwynt y Môr, and temporally with all Tier 1 and Tier 2 projects listed within the MDS column. There is a possibility that the decommissioning phase of the Project could overlap temporally with several projects. The maximum design would include those projects listed during the construction phase excluding: • North Hoyle wind farm • Rhyl Flats wind farm • Ballyhenry Bay Strangford Lough tidal test
Disturbance and displacement	✓	✓	✓	MDS as described for the Project (Table 8-16) assessed cumulatively with the following wind farms:	There is a possibility that construction could overlap spatially with North Hoyle and Gwynt

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
from airborne sound and presence of vessels and infrastructure				**Construction** **Tier 1** • Gwynt y Môr • North Hoyle wind farm • MaresConnect • Mostyn Energy Park extension • Rhyl Flats wind farm • Morlais • Dublin Array • North Irish Sea Array • GE wind farm (2003) • GE wind farm (2002) • Bray offshore wind farm • Kish offshore wind farm • Oriel offshore wind farm • Arklow offshore wind farm • Codling offshore wind farm • Marine renewable tidal array • Ballyhenry Bay Strangford Lough tidal test • Erebus offshore wind farm • Awel y Môr **Tier 2** • Morgan offshore wind farm generation assets • Morecambe offshore wind farm generation assets • Mona offshore wind farm • Mooir Vannin offshore wind farm • Fair Head tidal energy park **Operation and Maintenance** **Tier 1** • Gwynt y Môr • Rhyl Flats wind farm • MaresConnect • Mostyn Energy Park extension • Morlais • Dublin Array • North Irish Sea Array • GE wind farm (2003) • GE wind farm (2002) • Bray offshore wind farm • Kish offshore wind farm • Oriel offshore wind farm • Arklow offshore wind farm • Codling offshore wind farm • Marine renewable tidal array	y Môr, and temporally with all Tier 1 and Tier 2 projects listed within the MDS column. There is potential for a cumulative effect from the construction and operation and maintenance activities associated with the listed projects, and so a quantitative cumulative effect assessment is required. There is a possibility that the decommissioning phase of the Project could overlap temporally with several projects. The maximum design would include those projects listed during the construction phase excluding: • North Hoyle wind farm • Rhyl Flats wind farm • Ballyhenry Bay Strangford Lough tidal test

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Erebus offshore wind farm • Awel y Môr **Tier 2** • Morgan offshore wind farm generation assets • Morecambe offshore wind farm generation assets • Mona offshore wind farm • Mooir Vannin offshore wind farm • Fair Head tidal energy park **Decommissioning** • Expected end of lifetime 2050.	
Indirect impacts to birds from changes to prey availability	✓	✓	✓	MDS as described for the Project (Table 8-16) assessed cumulatively with the following wind farms: **Construction** **Tier 1** • Gwynt y Môr • North Hoyle wind farm • MaresConnect • Mostyn Energy Park extension • Rhyl Flats wind farm • Morlais • Dublin Array • North Irish Sea Array • GE wind farm (2003) • GE wind farm (2002) • Bray offshore wind farm • Kish offshore wind farm • Oriel offshore wind farm • Arklow offshore wind farm • Codling offshore wind farm • Marine renewable tidal array • Ballyhenry Bay Strangford Lough tidal test • Erebus offshore wind farm • Awel y Môr **Tier 2** • Morgan and Morecambe offshore windfarm transmission assets • Morgan offshore wind farm generation assets • Morecambe offshore wind farm generation assets • Mona offshore wind farm • Mooir Vannin offshore wind farm • Fair Head tidal energy park **Operation and Maintenance**	There is a possibility that construction could overlap spatially with North Hoyle and Gwynt y Môr, and temporally with all Tier 1 and Tier 2 projects listed within the MDS column. There is potential for a cumulative effect from the construction and operation and maintenance activities associated with the listed projects, and so a quantitative cumulative effect assessment is required. There is a possibility that the decommissioning phase of the Project could overlap temporally with several projects. The maximum design would include those projects listed during the construction phase excluding: • North Hoyle wind farm • Rhyl Flats wind farm • Ballyhenry Bay Strangford Lough tidal test

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				Tier 1 • Gwynt y Môr • Rhyl Flats wind farm • Morlais • Mostyn Energy Park extension • Dublin Array • North Irish Sea Array • GE wind farm (2003) • GE wind farm (2002) • Bray offshore wind farm • Kish offshore wind farm • Oriel offshore wind farm • Arklow offshore wind farm • Codling offshore wind farm • Marine renewable tidal array • Erebus offshore wind farm • Awel y Môr **Tier 2** • Morgan and Morecambe offshore windfarm transmission assets • Morgan offshore wind farm generation assets • Morecambe offshore wind farm generation assets • Mona offshore wind farm • Mooir Vannin offshore wind farm • Fair Head tidal energy park **Decommissioning** **Tier 1** • Gwynt y Môr • North Hoyle wind farm • Rhyl Flats • Ballyhenry Bay Strangford Lough tidal test	

8.13 Cumulative effects impact assessment

A description of the significance of cumulative effects upon offshore ornithology receptors arising from each identified impact is given below.

The CEA is limited by the data available upon which to base the assessment. Due to the age of developments in the Irish Sea and surrounding areas which heave the potential to contribute to a cumulative impact upon receptors, few have comparable datasets upon which to base an assessment.

Additionally, older developments did not carry out certain impact assessments (e.g. displacement and/or collision risk) for species such as black-legged kittiwake, northern gannet, northern fulmar, Manx shearwater and gull species (herring gull, great black-backed gull and lesser black-backed gull) due to limited data at the time of assessment on the species' behavioural response to the presence of offshore wind turbines. As such the CEA is carried out using data from projects with available species data to do so. For projects in early stages

(i.e. Tier 3) there was insufficient project information in the public domain to allow the effects to be reasonably understood and a cumulative assessment undertaken. Tier 3 projects therefore at this time have not been included in the cumulative assessment below.

For the cumulative assessment, impacts from Tier 1 and Tier 2 projects have been assessed together where applicable.

Table 8-34: Summarising the available data for the CEA

Project	Impacts assessed	Data available
Gwynt y Mor offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available, windfarm has been in operation since 2008 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
North Hoyle offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available, windfarm has been in operation since 2003 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Mares Connect	Temporary habitat loss leading to disturbance and displacement of birds	No data available.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Mostyn Energy Park extension	Temporary habitat loss leading to disturbance and displacement of birds	No, qualitative assessment only. The project determined a moderate adverse effect on intertidal waterbirds which was reduced to **minor** through the implementation of construction measures.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	No, qualitative assessment only. The project determined a moderate adverse effect on intertidal waterbirds which was reduced to **minor** through the implementation of construction measures.
	Indirect impacts to birds from changes to prey availability	No, qualitative assessment only. The project determined an insignificant to **minor** adverse effect on fish and shellfish.
Rhyll Flats offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available, windfarm has been in operation since 2003 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Morlais	Temporary habitat loss leading to disturbance and displacement of birds	Yes, quantitative data available.

Project	Impacts assessed	Data available
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	Yes, quantitative data available.
	Indirect impacts to birds from changes to prey availability	No, qualitative assessment only. The project determined a **negligible** impact significance.
Dublin Array offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
North Irish Sea Array offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
GE offshore wind farm (2002)	Temporary habitat loss leading to disturbance and displacement of birds	No data available, windfarm has been in operation since 2002 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
GE offshore wind farm (2003)	Temporary habitat loss leading to disturbance and displacement of birds	No data available, windfarm has been in operation since 2003 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Bray offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	Qualitative assessment only. The project determined a **negligible** impact significance. Windfarm has been in operation since 2003 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	Qualitative assessment only. The project determined a **negligible** impact significance. Windfarm has been in operation since 2003 and is thus considered as background impacts.
	Indirect impacts to birds from changes to prey availability	Qualitative assessment only. The project determined a **negligible** impact significance. Windfarm has been in operation since 2003 and is thus considered as background impacts.
Kish offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	Qualitative assessment only. The project determined a **negligible** impact significance. Windfarm has been in operation since 2003 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	Qualitative assessment only. The project determined a **negligible** impact significance. Windfarm has been in operation since 2003 and is thus considered as background impacts.
	Indirect impacts to birds from changes to prey availability	Qualitative assessment only. The project determined a **negligible** impact significance.

Project	Impacts assessed	Data available
		Windfarm has been in operation since 2003 and is thus considered as background impacts.
Oriel offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Arklow offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Codling offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available, windfarm has been in operation since 2005 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Marine renewable tidal array	Temporary habitat loss leading to disturbance and displacement of birds	No data available, project has been in operation since 2015 and is thus considered as background impacts.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Ballyhenry Bay Strangford Lough tidal test	Temporary habitat loss leading to disturbance and displacement of birds	No data available
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Erebus floating offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available, Erebus did not assess this impact for any of the receptors likely to be impacted by the project.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	No quantitative data available, qualitative assessment only. Erebus determined a **negligible** impact.
Awel y Mor offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	Yes, quantitative data available.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	Yes, quantitative data available.
	Indirect impacts to birds from changes to prey availability	Yes, quantitative data available.

Project	Impacts assessed	Data available
Morgan offshore wind farm generation	Temporary habitat loss leading to disturbance and displacement of birds	No, Morgan did not assess this impact for any of the receptors likely to be impacted by the project.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	No, Morgan did not assess this impact for any of the receptors likely to be impacted by the project.
	Indirect impacts to birds from changes to prey availability	No, a qualitative assessment was made only for razorbill which was determined to be a **minor** impact. All other receptors were screened out of this impact based upon habitat specialisation scores from Wade *et al.* (2016).
Morecambe offshore wind farm generation	Temporary habitat loss leading to disturbance and displacement of birds	Yes, quantitative data available.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	Yes, quantitative data available.
	Indirect impacts to birds from changes to prey availability	No quantitative data available, a qualitative assessment was made. Morecambe determined a **minor** effect on the affected receptors.
Mona offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No quantitative data available, a qualitative assessment was made. Mona determined a **minor** effect on the affected receptors.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	No quantitative data available, a qualitative assessment was made. Mona determined a **minor** effect on the affected receptors.
	Indirect impacts to birds from changes to prey availability	A qualitative assessment was made only for guillemot, Atlantic puffin, and razorbill which was determined to be a **minor** impact. All other receptors were screened out of this impact based upon habitat specialisation scores from Wade *et al*. (2016).
Mooir Vannin offshore wind farm	Temporary habitat loss leading to disturbance and displacement of birds	No data available. Scoping report only although red-throated diver may be present in high enough numbers for displacement effects.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	
	Indirect impacts to birds from changes to prey availability	
Morgan/Morecambe offshore wind farm transmission	Temporary habitat loss leading to disturbance and displacement of birds	Yes, quantitative data available.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	Yes, quantitative data available.
	Indirect impacts to birds from changes to prey availability	
Fairhead tidal park	Temporary habitat loss leading to disturbance and displacement of birds	No quantitative data available, qualitative assessment only. The project determined a **negligible** impact significance.
	Disturbance and displacement from airborne sound and presence of vessels and infrastructure	No quantitative data available, qualitative assessment only. The project determined a **negligible** impact significance.
	Indirect impacts to birds from changes to prey availability	No quantitative data available, qualitative assessment only. The project determined a **negligible** impact significance.

8.13.1 The impact of temporary habitat loss leading to displacement and disturbance of birds

There is potential for cumulative displacement as a result of construction and decommissioning associated with the Proposed Development in combination with other developments.

Disturbance and subsequent displacement of seabirds during the construction phase is primarily centred around where construction vessels and piling activities are occurring. The activities may displace individuals that would normally reside within and around the area of sea where the Proposed Development is located. This represents habitat loss, which will potentially reduce the area available to those seabirds to forage, loaf and/or moult.

Table 8-35: Summarising the quantitative data available for cumulative displacement (B – Breeding, NB – Non-breeding).

Species	Developments with quantitative displacement data											
	Proposed Development		Morlais		Morecambe		Awel y Mor		Morgan/Morecambe transmission		Total	
	B	NB	B	NB	B	NB	B	NB	B	NB	**B**	**NB**
Common scoter	-	0.49 – 0.98	-	-	-	-	-	0 – 0.007	-	0.09 – 0.98	**-**	**0.58 – 1.967**
Red-throated diver	-	02 – 0.89	-	0.1	-	0.01	-	0 – 0.582	-	0.03 – 0.35	**-**	**0.16 – 1.932**
Great cormorant	-	0.02 – 0.04	-	-	-	-	-	-	-	-	**-**	**0.02 – 0.04**
Sandwich tern	-	0.167 – 0.837	-	-	-	-	-	-	-	-	**-**	**0.167 – 0.837**
Little tern	0.02 – 0.04	-	-	-	-	-	-	-	-	-	**0.02 – 0.04**	**-**
Common tern	0.003 – 0.006	-	-	-	-	-	-	-	-	-	**0.003 – 0.006**	**-**

8.13.2 Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)

8.13.2.1 Construction and decommissioning phase

Although there is a potential for cumulative effects arising from multiple projects, the area of the Proposed Development where there are likely to be negative impacts is confined to the landfall plus 500 m buffer. Connectivity for the intertidal waterbirds is accepted to be 20 km (core foraging range for pink-footed goose – NatureScot, 2016). The only additional projects that have impacts upon the intertidal zone within 20 km of the Proposed Development are Awel Y Mor, specifically where their cable makes landfall at Y Ffrith, and Mostyn Energy Park extension.

Cumulative magnitude of impact

The magnitude of impact from the assessment of the Proposed Development is negligible. The Awel y Mor ES found that after proposed mitigation measures there was no significant effect.

The Mostyn Energy Park extension used the following measures to reduce the impact to minor:

- Soft starts;
- Cold weather construction restriction;
- Screening; and,
- Noise suppression system.

In addition, a detailed Method Statement will be produced to outline how impacts on birds will be avoided during the works at the Proposed Development. The Method Statements will be developed in collaboration with NRW, and shared with NRW-MLT for approval at least three months prior to works commencing. (see 8.10). The addition of Mostyn Energy Park extension and Awel y Mor landfall increase the magnitude of impact to low.

Sensitivity of the receptor

Waterbird and in particular waders are considered to be very vulnerable to the loss of foraging habitats on their wintering grounds (e.g. Burton *et al*., 2006).

This group of receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds.

Many of the waterbird species recorded during the site-specific surveys are designated features of local SPA, Ramsar and SSSI sites, and are therefore of high to very high conservation value.

Waterbird VORs are deemed to be of high vulnerability, medium recoverability, and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.13.3 Non-breeding seaducks, divers, grebes and cormorants

8.13.3.1 Construction and decommissioning phase

There is potential for cumulative impacts for this receptor group. Connectivity for this group is limited to the Liverpool Bay with the most disturbance sensitive species (and those of highest conservation concern) being red-throated diver and common scoter. Appendix K1: Offshore Ornithology Baseline presents evidence from HiDef Aerial Surveying Limited (2023); Lawson *et al.* (2016); Bradbury *et al.* (2014); and Waggit *et al.* (2022), who all found that these species were concentrated in the nearshore waters.

As this receptor group is found in the nearshore waters, they are unaffected by the generation aspects of many of the OWF which are situated beyond their range, in addition, for those projects that are closer in to shore but are operational, no additional displacement can be expected as displacement has already occurred. Table 8-35 summarises the available displacement data available for this group of receptors.

Cumulative magnitude of impact

Table 8-35 sums the quantitative data available for species within this group, namely common scoter and red-throated diver. For common scoter the cumulative displacement is between 0.58% and 1.967% excess mortality above the environmental baseline. For red-throated diver this is between 0.16% and 1.932% excess mortality above the environmental baseline. The upper limits of these estimates are above the 1% threshold.

However, as all of these works are due to be short-term and reversible in nature, and permanent displacement for this receptor group is not expected during operation and maintenance, the cumulative magnitude of impact is deemed to be low.

Sensitivity of the receptor

Both common scoter and red-throated diver are highly susceptible to disturbance often flushing from large distances and relocating even further away from the source of disturbance. Therefore, they are deemed to have high vulnerability to the impact.

Common scoter and red-throated diver are qualifying features of the Liverpool Bay SPA, while cormorant is a feature of local SPA and Ramsar sites and therefore, these species are of very high conservation value. The majority of the other species in this receptor group are SSSI features with high conservation value.

The receptors are considered to have high recoverability based on an increasing trend in the numbers of wintering birds (Frost, *et. al*., 2021).

Seaducks, divers, grebes and cormorants are deemed to be of high vulnerability, high recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.13.4 Breeding terns

8.13.4.1 Construction and decommissioning phase

There is potential for cumulative impacts, although this is limited to the foraging ranges of common and little tern.

Cumulative magnitude of impact

The magnitude of impact for the Proposed Development is negligible, and as there are no additional projects that will impact the little tern foraging range, and no available data for projects that will impact the common tern foraging range the cumulative magnitude of impact for this receptor group remains negligible.

Sensitivity of the receptor

Although terns are flexible in their habitat use during the non-breeding season, the receptors are overall considered to be very vulnerable to the loss of foraging grounds. The terns present within the Proposed Development area have medium (common tern and sandwich tern) to high (little tern) habitat specialisation (Wade *et al.*, 2016) and their foraging ranges vary from 5 km to 34.3 km (Woodward *et al.,* 2019). The maximum sensitivity of this receptor group is considered to be very high.

The receptor species in this group are all designated features of local SPAs, and therefore of very high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of breeding birds (JNCC, 2019).

Breeding terns are deemed to be of very high vulnerability, medium recoverability and high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.13.5 Cumulative significance of effect

Table 8-36: Summarising The Cumulative Significance Of Effect For The Impact Of Temporary Habitat Loss Leading To Displacement And Disturbance Of Birds During The Construction And Decommissioning Phases

Species	Cumulative magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)	Low	High	**Minor**
Non-breeding seaducks, divers, grebes and cormorants	Low	High	**Minor**
Breeding terns	Negligible	High	**Minor**

8.13.6 The impact of disturbance and displacement from airborne sound and presence of vessels and infrastructure

There is potential for cumulative displacement as a result of construction and decommissioning associated with the Proposed Development in combination with other developments.

Disturbance and subsequent displacement of birds during the construction phase is primarily centred around where construction vessels and piling activities are occurring. The activities may displace individuals that would normally reside within and around the area of sea where the Proposed Development is located. This in effect represents indirect habitat loss, which will potentially reduce the area available to those birds to forage, loaf and/or moult. Cumulative displacement is summarised in Table 8-35.

8.13.7 Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)

8.13.7.1 Construction and decommissioning phases

Although there is potential for cumulative effects arising from multiple projects, the area of the Proposed Development where there are likely to be negative impacts is confined to the landfall plus 500 m buffer. Connectivity for the intertidal waterbirds is accepted to be 20 km (core foraging range for pink-footed goose – NatureScot, 2016). The only additional project that has impacts upon the intertidal zone within 20 km of the Proposed Development is Awel Y Mor, specifically where their cable makes landfall at Y Ffrith.

Cumulative magnitude of impact

The magnitude of impact for this receptor group during the construction and decommissioning phases is deemed to be similar to those from 'the impact of temporary habitat loss leading to displacement and disturbance of birds' and is therefore low.

Sensitivity of the receptor

Waterbird and in particular waders are considered to be very vulnerable to the loss of foraging habitats on their wintering grounds (e.g. Burton *et al.,* 2006).

This group of receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds.

Many of the waterbird species recorded during the site-specific surveys are designated features of local SPA, Ramsar and SSSI sites, and are therefore of high to very high conservation value.

Waterbird VORs are deemed to be of high vulnerability, medium recoverability, and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.13.8 Non-breeding seaducks, divers, grebes and cormorants

8.13.8.1 Construction and decommissioning phases

There is potential for cumulative impacts for this receptor group. Connectivity for this group is limited to the Liverpool Bay with the most disturbance sensitive species (and also those of highest conservation concern) being red-throated diver and common scoter. Offshore Ornithology Baseline (RPS Group, 2024a) presents evidence from HiDef Aerial Surveying Limited (2023); Lawson *et al.* (2016); Bradbury *et. al*. (2014); and Waggit *et al*. (2022), who all found that these species were concentrated in the nearshore waters.

As this receptor group is found in the nearshore waters, they are unaffected by the generation aspects of many of the OWF which are situated beyond their range, in addition, for those projects that are closer in to shore but are operational, no additional displacement can be expected as displacement has already occurred. The projects with additional impacts are summarised in Table 8-35.

Cumulative magnitude of impact

The magnitude of impact for this receptor group during the construction and decommissioning phases is deemed to be similar to those from 'the impact of temporary habitat loss leading to displacement and disturbance of birds' and is therefore low.

Sensitivity of the receptor

Overall, this group of receptors have a medium to high habitat specialisation and are considered to be very vulnerable to disturbance (Goodship and Furness, 2022).

Common scoter and red-throated diver are qualifying features of the Liverpool Bay SPA, while cormorant is a feature of local SPA and Ramsar sites and therefore, these species are of very high conservation value. The majority of the other species in this receptor group are SSSI features with high conservation value.

The receptors are considered to have medium recoverability based on their relatively low reproductive success and a stable or slightly decreasing trend in the numbers of wintering birds (Frost *et al.*, 2021).

Seaducks, divers, grebes and cormorants are deemed to be of high vulnerability, medium recoverability and very high conservation importance. The sensitivity of the receptor is therefore, considered to be high.

8.13.9 Cumulative significance of effect

Table 8-37: Summarising The Cumulative Significance Of Effect For The Impact Of Disturbance And Displacement From Airborne Sound And Presence Of Vessels And Infrastructure For The Construction And Decommissioning Phases

Species	Cumulative magnitude of impact	Sensitivity of receptor	Significance of effect
Non-breeding waterbirds (wildfowl, waders, gulls, herons and rails)	Low	High	**Minor**
Non-breeding seaducks, divers, grebes and cormorants	Low	High	**Minor**

8.13.10 Indirect impacts to birds from changes in prey availability

There is potential for cumulative impacts as a result of construction, operation, and decommissioning, associated with the Proposed Development in combination with other developments.

8.13.11 Breeding terns

8.13.11.1 All phases

There is potential for cumulative impacts, although this is limited to the foraging ranges of common and little tern.

Cumulative magnitude of impact

The magnitude of impact for the Proposed Development alone is low during the sensitive egg laying and chick rearing period and negligible outside of this period, and as there are no additional projects that will impact the little tern foraging range, and no available data for projects that will impact the common tern foraging range the cumulative magnitude of impact for this receptor group remains low.

Sensitivity of the receptor

This receptor group is of high conservation value as species in this group include little tern and common tern which are breeding features of two SPAs (the Dee Estuary, and Liverpool Bay) that directly overlap with the Proposed Development. Both little tern and common tern show downward trends in breeding populations (JNCC, 2019) and are therefore of low recoverability. Due to the limited foraging range of little tern (5 km mean max as taken from Woodward, *et. al*., 2019) this species group is considered to have high vulnerability to the impact.

8.13.12 Cumulative significance of effect

Table 8-38: Summarising The Cumulative Significance Of Effect For The Indirect Impacts To Birds From Changes In Prey Availability For All Phases

Species	Cumulative magnitude of impact	Sensitivity of receptor	Significance of effect
Breeding terns assuming works during the breeding period	Low	High	**Moderate**
Breeding terns assuming works during the non-breeding period	Negligible	High	**Negligible**

8.14 Transboundary effects

A screening of transboundary impacts has been carried out and has identified that there are no potential significant effects with regard to offshore and intertidal ornithology from the HyNet North-West Project upon the interests of other states.

8.15 Inter-related effects

Inter-relationships are the impacts and associated effects of different aspects of the Project on the same receptor. These are as follows.

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Project (construction, operation and maintenance and decommissioning), to interact and potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g. construction noise effects from drilling, operational noise from transport vessels and decommissioning disturbance).
- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on offshore ornithology, such as displacement/disturbance, collision and increased concentrations of suspended sediments, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

8.16 Conclusion

- Information on offshore ornithology within the Proposed Development area was collected through review of available literature, other offshore wind farm assessments, UK statutory guidance, and detailed analysis of data collected during the site-specific intertidal surveys.
- Table 8-39 presents a summary of the impacts in respect to offshore ornithology.

- For breeding terns, it is concluded that there will be moderate adverse significant effects arising from the Proposed Development during the construction and decommissioning phases due to indirect impacts upon prey availability assuming that works are timed to coincide with the breeding period.
- If mitigation measures limiting works during the breeding period are taken then the residual effects will be negligible during construction and decommissioning phases due to indirect impacts upon prey availability.
- For all other species it is concluded that there will be no significant impacts from the Proposed Development during the construction, operation, and decommissioning phases.
- Table 8-40 presents a summary of the cumulative impacts. Overall, it is concluded that there are no additional significant cumulative effects to any species from other projects.
- There will be no significant effects, either alone or cumulatively, during the operational phase of the project.
- The only significant effects, either alone or cumulatively, occur during the construction/decommissioning phase.
- No transboundary impacts have been identified in relation to offshore ornithology. Overall, it is concluded that there will be no significant transboundary effects arising from the Proposed Development.

Table 8-39: Summary Of The Impacts In Relation To Offshore Ornithology

Description of impact	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect
	C	O	D			
Temporary habitat loss leading to displacement/disturbance of birds	✓	×	✓	**Non-breeding waterbirds** C: Negligible D: Negligible **Non-breeding seaducks** C: Negligible D: Negligible **Breeding seabirds** C: Negligible D: Negligible **Breeding terns** C: Negligible D: Negligible	**Non-breeding waterbirds** C: High D: High **Non-breeding seaducks** C: High D: High **Breeding seabirds** C: Medium D: Medium **Breeding terns** C: High D: High	**Non-breeding waterbirds** C: Minor D: Minor **Non-breeding seaducks** C: Minor D: Minor **Breeding seabirds** C: Negligible D: Negligible **Breeding terns** C: Minor D: Minor
Disturbance and displacement from airborne sound and presence of vessels and infrastructure	✓	✓	✓	**Non-breeding waterbirds** C: Negligible O: No change D: Negligible **Non-breeding seaducks** C: Negligible O: No change D: Negligible **Breeding seabirds**	**Non-breeding waterbirds** C: High O: High D: High **Non-breeding seaducks** C: High O: High D: High **Breeding seabirds**	**Non-breeding waterbirds** C: Minor O: No change D: Minor **Non-breeding seaducks** C: Minor O: No change D: Minor **Breeding seabirds**

Description of impact	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect
	C	O	D			
				C: Negligible O: No change D: Negligible **Breeding terns** C: Negligible O: No change D: Negligible	C: Medium O: Medium D: Medium **Breeding terns** C: Medium O: Medium D: Medium	C: Negligible O: No change D: Negligible **Breeding terns** C: Negligible O: No change D: Negligible
Collision with static offshore infrastructure	×	✓	×	**All receptors** O: No change	**All receptors** O: Medium	**All receptors** O: No change
Indirect impacts to birds from changes in prey availability	✓	✓	✓	**Non-breeding seaducks** C: Negligible O: No change D: Negligible **Breeding seabirds** C: Negligible O: No change D: Negligible **Breeding terns with construction during the breeding season** C: Low O: No change D: Low **Breeding terns with construction during the non-breeding season** C: Negligible O: No change D: Negligible	**Non-breeding seaducks** C: Medium O: Medium D: Medium **Breeding seabirds** C: Medium O: Medium D: Medium **Breeding terns with construction during the breeding season** C: High O: High D: High **Breeding terns with construction during the non-breeding season** C: High O: High D: High	**Non-breeding seaducks** C: Negligible O: No change D: Negligible **Breeding seabirds** C: Negligible O: No change D: Negligible **Breeding terns with construction during the breeding season** C: Moderate O: No change D: Moderate **Breeding terns with construction during the non-breeding season** C: Negligible O: No change D: Negligible
Accidental pollution in the surrounding area	✓	✓	✓	**All receptors** A: Negligible	**All receptors** A: Medium	**All receptors** A: Negligible
Creation of roosting and nesting habitats among project infrastructure	×	✓	×	**Breeding seabirds** O: Negligible (positive)	**Breeding seabirds** O: Medium	**Breeding seabirds** O: Minor (positive)

C=construction, O=operational and maintenance, D=decommissioning, A=all phases

Table 8-40: Summary Of The Cumulative Impacts In Relation To Offshore Ornithology

Description of impact	Phase[a]			Cumulative magnitude of impact	Sensitivity of the receptor	Cumulative significance of effect
	C	O	D			
Temporary habitat loss leading to displacement/disturbance of birds	✓	×	✓	**Non-breeding waterbirds** C: Low D: Negligible **Non-breeding seaducks** C: Low D: Low **Breeding terns** C: Negligible D: Negligible	**Non-breeding waterbirds** C: High D: High **Non-breeding seaducks** C: High D: High **Breeding terns** C: High D: High	**Non-breeding waterbirds** C: Minor D: Minor **Non-breeding seaducks** C: Minor D: Minor **Breeding terns** C: Minor D: Minor
Disturbance and displacement from airborne sound and presence of vessels and infrastructure	✓	×	✓	**Non-breeding waterbirds** C: Low D: Negligible **Non-breeding seaducks** C: Low D: Low	**Non-breeding waterbirds** C: High D: High **Non-breeding seaducks** C: High D: High	**Non-breeding seaducks** C: Minor D: Minor **Breeding terns** C: Minor D: Minor
Indirect impacts to birds from changes in prey availability	✓	×	✓	**Breeding terns with construction during the breeding season** C: Low O: No change D: Low **Breeding terns with construction during the non-breeding season** C: Negligible O: No change D: Negligible	**Breeding terns with construction during the breeding season** C: High O: High D: High **Breeding terns with construction during the non-breeding season** C: High O: High D: High	**Breeding terns with construction during the breeding season** C: Moderate O: No change D: Moderate **Breeding terns with construction during the non-breeding season** C: Negligible O: No change D: Negligible

C=construction, O=operational and maintenance, D=decommissioning, A=all phases

8.17 References

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