Cambois Connection – Marine Scheme

Environmental Statement – Volume 2

ES Chapter 10: Offshore and Intertidal Ornithology

sse Renewables

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Acronyms

Acronym	Description
BBWF	Berwick Bank Wind Farm
BBWFL	Berwick Bank Wind Farm Limited
BDMPS	Biologically Defined Minimum Population Scales
BTO	British Trust for Ornithology
CEA	Cumulative Effects Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ES	Environmental Statement
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Appraisal / Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
INNS	Invasive Non-Nature Species
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate Licensing and Operations Team
MHWS	Mean High Water Springs
MLA	Marine Licence application(s)
MMO	Marine Management Organisation
NCC	Northumberland County Council
PAC	Pre-Application Consultation
RIAA	Report to Inform Appropriate Assessment
SAC	Special area of Conservation
SPA	Special Protection Area
SSER	SSE Renewables
OSA	Ornithology Study Area

Units

Acronym	Description
GW	Gigawatt
nm	Nautical miles
km	Kilometre

10. Offshore and Intertidal Ornithology

10.1. Introduction

1. This chapter presents the assessment of the likely significant effects (as per the Environmental Impact Assessment (EIA) Regulations[1]) arising from the Cambois Connection (hereafter referred to as "the Project") Marine Scheme on offshore and intertidal ornithological receptors. Specifically, this chapter of the Marine Scheme Environmental Statement (ES) considers the potential impact of the Marine Scheme seaward of Mean High Water Springs (MHWS) on ornithological receptors during the construction, operation and maintenance, and decommissioning phases.

2. Many bird species that use the marine environment, especially seabirds, are highly mobile and move across and between their preferred habitats irrespective of the boundaries of designated sites set up for their protection. Many marine and coastal bird species utilise to a greater or lesser extent the sea, intertidal areas and adjacent terrestrial habitats. It should be noted that this chapter considers effects arising from activities and infrastructure associated with the Marine Scheme; effects on birds arising from the Onshore Scheme (as defined) (some of which may extend to birds using areas seaward of MHWS) are presented in the Onshore ES, which covers all aspects of the Project landward of Mean Low Water Springs (MLWS).

3. Some bird species may be designated as a feature of a European Site[2]. In accordance with the Habitats Regulations[3], the Applicant previously carried out an assessment of the potential for the Project to give rise to a Likely Significant Effect (LSE) on a range of European Sites (Berwick Bank Wind Farm Limited (BBWFL), 2023). This assessment of ornithological species and features considered Special Protection Areas (SPAs) which are wholly or partially within the marine environment and migratory terrestrial species which may use land associated with the Onshore Scheme as feeding, roosting or resting ground (constituting 'functionally linked land'). Similarly, the Applicant has carried out an assessment of functionally linked land and the potential for works associated with the Marine Scheme to result in adverse effects on a European site within the Cambois Connection Marine Scheme Report to Inform Appropriate Assessment (RIAA). This is separate document that will be submitted with this ES and other supporting documents as part of the Marine Licence Applications.

4. This assessment is informed by the following technical chapters:

   - Volume 2, Chapter 3: EIA Methodology;
   - Volume 2, Chapter 4: Stakeholder Consultation and Engagement;
   - Volume 2, Chapter 5: Project Description;
   - Volume 2, Chapter 7: Physical Environment and Seabed Conditions;
   - Volume 2, Chapter 8: Benthic Subtidal and Intertidal Ecology; and

[1] For the Marine Scheme, this is The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

[2] Sites comprised of habitats and species of regional, national and European importance which includes: Special Areas of Conservation (SAC); candidate SAC (cSAC); Special Protection Areas (SPA); sites listed as a site of community importance (SCI); possible SACs (pSAC) and potential SPAs (pSPA). Following the UK's exit from the EU (referred to as EU Exit) in January 2020, the UK was no longer part of the Natura 2000 Network. Hereafter, all sites within the UK and the EU are referred to as European Sites, with Natura 2000 Network sites collectively referred to as the UK's 'National Site Network'.

[3] The Habitats Directive and the Birds Directive have been transposed into Scottish and English Law through The Conservation (Natural habitats, &c.) Regulations 1994 (as amended) and The Conservation of Habitats and Species Regulations 2017 respectively. The Conservation of Offshore Marine Habitats and Species Regulations 2017 transpose the Habitats Directive into Scottish and English Law for offshore waters. These regulations are collectively referred to as the 'Habitats Regulations'.

- Volume 2, Chapter 9: Fish and Shellfish Ecology.

5. A Marine Protected Area (MPA) and Marine Conservation Zone (MCZ) Assessment has also been completed and is provided alongside the Marine Licence applications for the Marine Scheme (reference: Marine Scheme MCZ and MPA Assessment). This MPA/MCZ Assessment considers the common eider as a receptor, which is a designated feature of the Berwick to St Mary's MCZ.

6. Unless provided in the text, the scientific names of all bird species mentioned in this chapter are shown in Table 10.6 and Table 10.5.

10.2. Purpose of this Chapter

7. This chapter:

- Presents the existing environmental baseline with respect to offshore and intertidal ornithology interests established from desk studies, site-specific surveys and consultation obtained during technical engagement with stakeholders;
- Identifies any assumptions and limitations associated with the baseline information;
- Lists the potential impacts on ornithological receptors arising from the Marine Scheme;
- Identifies where impacts are relevant to Scottish waters, English waters, or both. Where there is no separation of assessment of impacts, the assessment for the Marine Scheme (as a whole entity) applies to the Marine Scheme in each of Scottish waters and English waters separately;
- Presents a conclusion on the likely significant effects on ornithological receptors based on the assessments undertaken; and
- Identifies any necessary monitoring and/or mitigation measures recommended to prevent, minimise, reduce or offset the likely significant adverse effects of the Marine Scheme on ornithological receptors.

10.3. Study Area

8. For the purpose of the Marine Scheme EIA, the Ornithology Study Area (OSA) (Volume 4, Figure 10.1) is defined as the Marine Scheme plus a 2 km buffer of marine habitat. This is a refinement of the buffer used for identifying relevant ornithology interests in Scoping Report (BBWFL, 2022a) which considered a 10 km buffer of the Marine Scheme. The choice of a 2 km buffer reflects the maximum distance at which some species could plausibly show a disturbance response to project activities within the Marine Scheme.

9. This assessment gives consideration to the spatial distribution of birds likely to be present within the OSA and the potential for works associated with the Marine Scheme to impact these species. The baseline characterisation (section 10.7) describes the geographic scale of birds which rely on the marine environment for at least one stage of their lifecycle, the potential for connectivity between the Marine Scheme, SPA and non-SPA breeding colonies based on foraging ranges published in Woodward *et al*. (2019) and the migratory routes of overwintering (non-breeding) birds.

10. The OSA includes intertidal and onshore areas in the immediate vicinity of the Landfall (as defined in Volume 2, Chapter 1: Introduction). However, given that the Open Cut Trench (OCT) solution for bringing the cables ashore at the Landfall is no longer included as an option for the Project (removed from both the Marine Scheme and the Onshore Scheme) there is very limited potential for any interaction with ornithological receptors in the intertidal area. This is on the basis that all onshore works associated with the trenchless technology solution will be located landward of MHWS and therefore are assessed in the Cambois Connection Onshore Scheme EIA. This includes an assessment of effects of the onshore works (landward of MWHS) on the intertidal area.

The offshore trenchless technology exit pits will be located seaward of MLWS, in the nearshore area.

11. Alongside the OSA, Volume 4, Figure 10.2 presents the key breeding colonies along the east coast of the UK which, whilst outside the OSA, are of potential relevance to the assessment of potential impacts on ornithological receptors on the basis that ornithological features from these sites may at times use the waters within the Marine Scheme for foraging and other behaviours e.g. resting and preening. An assessment of potential effects of the Marine Scheme on SPA breeding colonies has been completed as part of a Habitat Regulations Assessment/Appraisal (HRA) as presented in the Cambois Connection Marine Scheme RIAA.

10.4. Policy and Legislative Context

12. A summary of the policy and legislative provisions relevant to offshore and intertidal ornithology are provided in Table 10.1 and Table 10.2 below.

Table 10.1 Summary of policy relevant to offshore and intertidal ornithology

Relevant Policy	How and Where Considered in the ES
Scotland and English (UK)	
UK Marine Policy Statement (MPS) (HM Government, 2011)	Chapter 3 of the MPS sets out a range of policy objectives for key activities which take place in the marine environment, including cables and renewable energy infrastructure. Whilst there are no specific references to marine birds, the impacts referred to within chapter 3 have adequately been considered (and furthermore, the specific requirements of subsequent marine plans are considered in further detail below).
Overarching National Policy Statement (NPS) for Energy (NP EN-1) (July 2011)[4][5]	Paragraph 5.3.3 states that 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. Paragraph 5.3.4 states that the Applicant should also show how the proposed project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. Paragraph 5.3.18 states that the Applicant should include appropriate mitigation measures as an integral part of the proposed development. An assessment of impacts on ornithological receptors has been carried out by the Applicant within this chapter alongside the Cambois Connection Marine Scheme RIAA.
NPS for Renewable Energy Infrastructure (NPS EN-3) (July 2011)	Paragraph 2.6.64 states that the assessment of offshore ecology and biodiversity should be undertaken by the Applicant for all stages of the lifespan of the proposed offshore windfarm. Paragraph 2.6.102 states that the scope, effort and methods required for ornithological surveys should have been discussed with the relevant statutory advisor.

[4] Whilst it is acknowledged that neither BBWF nor the Marine Scheme comprise or form part of an NSIP (please see Volume 2: Chapter 2: Policy and Legislative Context) , NPSs are however a statement of government intention relating, in this case, to renewable energy projects, therefore can be taken into consideration during the preparation of the Marine Scheme ES

[5] A suite of draft revised Energy NPSs were published and consulted on by the UK Government in March 2023, and consultation closed on 23rd June. The consultation responses will be subject to consideration and the draft revised NPSs may now be revised before the NPSs are formally adopted. There is currently no date for the next stage of the review process and therefore this ES presents the current adopted NPSs which have been considered during the preparation of this ES. It is however noted by the Applicant that the new draft NPSs state that they may be material considerations in other applications which are not considered under the Planning Act (2008), this includes the Marine Scheme. Further detail on the consideration of the draft NPSs in this ES is provided in Volume 2 Chapter 2 Policy and Legislation.

Relevant Policy	How and Where Considered in the ES
	An assessment of impacts on ornithological receptors has been carried out by the Applicant within this chapter alongside the Cambois Connection Marine Scheme RIAA The Applicant has undertaken consultation with various stakeholders as outlined in Table 10.8.
Scotland	
Scottish National Marine Plan (2015) (Scottish Government, 2015)	Policy GEN9 (Natural Heritage) states that development and use of the marine environment must […] comply with legal requirements for protected areas and protected species […] not result in significant impact on the national status of Priority Marine Features [… and] protect and, where appropriate, enhance the health of the marine area'. An assessment of impacts on ornithological receptors has been carried out by the Applicant alongside the Cambois Connection Marine Scheme RIAA.
England	
North East Inshore and North East Offshore Marine Plan (HM Government 2021)	NE-CAB-2 states that 'proposals demonstrating compatibility with existing landfall sites and incorporating measures to enable development of future landfall opportunities should be supported'. The policy goes on to state that 'where this is not possible proposals will, in order of preference: (a) Avoid […] Minimise [… or] Mitigate adverse impacts on existing and potential future landfall sites so they are no longer significant […]. The landfall for the Marine Scheme was selected following a robust route selection and landfall identification process; this is described in full detail within Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives. NE-MPA-1 and NE-MLA-2 relate to supporting the objectives of Marine Protected Areas (MPAs) and ensuring that proposals avoid, minimise or mitigate adverse impacts. The potential impacts of the Marine Scheme on MPAs designated for ornithological species have been considered within chapter and the Cambois Connection Marine Scheme MCZ and MPA Assessment.
East Inshore and East Offshore Marine Plan (HM Government, 2021)	MPA1 states that 'any impacts on the overall Marine Protected Area network must be taken into account of in strategic level measures and assessments, with due regard given to any current agreed advice on an ecologically coherent network'. The potential impacts of the Marine Scheme on MPAs designated for ornithological species have been considered within this chapter (refer to section 10.7.5) and the Cambois Connection Marine Scheme RIAA. CAB1 states that 'Preference should be given to proposals for cable installation where the method of installation is burial. Where burial is not achievable, decisions should take account of protection measures for the cable that may be proposed by the applicant'. As explained in Volume 2, Chapter 5: Project Description, burial is the preferred method of installation with cable protection only used where this cannot be achieved (and at crossings with third party infrastructure).

Table 10.2 Summary of legislation relevant to ornithology

Relevant Legislation	How and Where Considered in the ES
The Conservation (Natural Habitats, &c.) Regulations 1994 (Scottish Government, 1994) (as amended)	The Habitats Regulations require that where a plan or project that is not directly connected with, or necessary to the management of a European site, but likely to have a significant effect, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.
The Conservation of Habitats and Species Regulations 2017 (HM Government, 2017) (as amended)	

Relevant Legislation	How and Where Considered in the ES
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019	Likely significant effects on ornithology features of European sites are considered from an EIA perspective within this report. Assessment of the likely significant effects on the qualifying interest features of SPAs, together with assessment on other Natura sites and qualifying interest features (e.g. Special Areas of Conservation (SAC)) from a habitats perspective were considered in an HRA Screening (BBWFL, 2023) and are considered in the Cambois Connection Marine Scheme RIAA.
Conservation of Offshore Marine Habitats and Species Regulations 2017	
Wildlife and Countryside Act 1981 (as amended) (HM Government, 1981)	The primary legislation protecting wild flora and fauna and certain habitats in the UK, including all wild birds and their nests, eggs and chicks
Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009)	Under the MCAA, the licensing authorities must (amongst other things) have regard to the need to protect the environment in determining an application for a marine licence (Section 69) occurring within the UK Marine Area (Section 42). Likely significant effects on ornithology features of European sites are considered from an EIA perspective within this report. Assessment of the likely significant effects on the qualifying interest features of SPAs, together with assessment on other European sites and qualifying interest features were considered in the Cambois Connection Marine Scheme HRA Screening Report (BBWFL, 2023) and the Cambois Connection Marine Scheme RIAA.

10.5. Consultation and Technical Engagement

13. A summary of the key issues raised during consultation and technical engagement undertaken to date specific to offshore and intertidal ornithology is presented in Table 10.3[6], together with how these issues have been considered in the offshore and intertidal ornithology chapter. Further detail is presented within Volume 2, Chapter 4: Stakeholder Engagement and Consultation.

[6] Where scoping comments from stakeholders and consultees has been restated and/or paraphrased by the regulators within Scoping Opinions, this is only referenced with regards to MD-LOT and MMO Scoping Opinions, for brevity and to reduce duplication.

Table 10.3 Summary of key consultation and technical engagement undertaken relevant to offshore and intertidal ornithology

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
Relevant consultation and engagement undertaken to date			
17 March 2022	Natural England – consultation meeting	A meeting was held to introduce the Project, and to discuss a range of topics of relevance to ecology and nature conservation, as well as the intended approach and scope of the ensuing EIA and Habitats Regulations Appraisal / Assessment (HRA). The intended approach to the impact assessment for ornithology was discussed; specifically, this included the Applicant's position that a desk-based approach to offshore ornithology would be followed which was outlined by the Applicant as being proportionate to the scale and nature of a cable project. Natural England were in agreement.	Follow-up meetings were held to agree specifics around ornithology data requirements, as outlined below.
24 April 2022	Natural England – consultation meeting	Discussion around quality and availability of existing baseline ornithology data and best EIA practices for use of the data.	Scheduled additional follow-up meetings and investigated available baseline data (much of which is referenced in section 5.6).
06 July 2022	Natural England – consultation meeting	Discussion of the Applicant's position regarding non-breeding (overwintering) bird surveys. Based on the wealth of existing ornithological data in the area, the Applicant did not propose non-breeding (overwintering) bird surveys; Natural England were accepting of this but suggested it may lead to a risk of seasonal conditions. Natural England explained to the Applicant during the course of the meeting that a potential overwintering condition (interpreted to relate to an effective ban on licensable activities between 01 November and 31 March) would likely negate the need for further non-breeding (overwintering) surveys. However, noting that if flexibility or work within this period may be required, Natural England explained that the Applicant should consider survey requirements further.	A non-breeding bird survey of Cambois coast undertaken over 2022/23 winter. Survey results summarised in section 10.6.2

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		Natural England provided a clear request for non-breeding (winter) bird survey covering coastal habitats if the Applicant were to pursue work during the winter period.	
18 April 2023	MMO: Consultation meeting	Within a consultation meeting it was confirmed with the MMO that in the absence of specific comments on ornithology within the MMO's Scoping Opinion, the advice from Statutory Nature Conservation Bodies will be followed. The MMO confirmed their agreement with this approach.	This chapter follows advice from Statutory Nature Conservation Bodies (SNCBs), NatureScot and Natural England and MD-LOT as relevant.
Consultation on the Marine Scheme: Scoping			
23 February 2023	MD-LOT: Scoping Opinion	The Applicant is further advised to review their proposed list of designated sites and consider whether the Fowlsheugh SPA is within the connectivity range in line with NatureScot comments.	Please refer to the Cambois Connection Marine Scheme RIAA for further details on how this comment is addressed. NatureScot, in their advice on the HRA Screening (dated 05 May 2023), confirmed that they are content for the Fowlsheugh SPA to be screened out of the HRA.
23 February 2023	MD-LOT: Scoping Opinion (*NatureScot*)	Scottish Ministers broadly agree with the data sources set out in the Scoping Report, however highlight additional datasets set out in NatureScot's representation, that should be used to inform that assessment, including tracking data from Forth and Tay regional advisory group studies and relevant information from the Berwick Bank offshore wind farm aerial surveys.	These have been considered as a data source for baseline compilation, as detailed in Table 10.4.
23 February 2023	MD-LOT: Scoping Opinion (*NatureScot*)	In Table 10.2 of the Volume 3, Appendix 3.1 Scoping Report the Applicant summarises the potential impacts to offshore and intertidal ornithology during the different phases of the Proposed Works. The Scottish Ministers are broadly in agreement with this approach, however, advise that the NatureScot representation in relation to scoping of impacts, specifically disturbance and displacement during the operation and maintenance stage of the Proposed Works should be implemented in full by the Applicant, including a qualitative assessment on vessel movements	Further detail regarding disturbance and displacement impacts during O&M is provided in section 10.12.1.2. This is based on the maximum design scenarios relating to the O&M phase presented in Volume 2, Chapter 5: Project Description and the MDS for ornithology presented in section 10.9.1 which includes likely maintenance and repair activities and vessel information.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
23 February 2023	MD-LOT: Scoping Opinion (*NatureScot*)	Scottish Ministers agree with the Scoping In of transboundary impacts.	Noted. Further information relating to transboundary effects is included in section 10.16.
23 February 2023	MD-LOT: Scoping Opinion (*NatureScot*)	The Scottish Ministers further recommend that the Applicant consider collision with lighted vessels as a potential impact pathway and advise that indirect impacts of noise on prey species, particularly from pre-construction activities that can emit significant underwater noise such as UXO clearance and geophysical activities, should be scoped into the EIA Report. This view is supported by the NatureScot representation.	As detailed in Volume 2, Chapter 5 – Project Description; UXO clearance is not anticipated, and this activity is not included in the Marine Scheme. As such UXO clearance has not been considered further as part of this ES. The rationale for this is included in full within Volume 2, Chapter 5: Project Description; in summary: • The exact locations of potential UXO / UXO are not currently known and will not be known until detailed design, as informed by UXO surveys along the route of the Marine Scheme; • The corridor for the Marine Scheme is approximately 1 km wide. A key reason for adopting this corridor is to provide the construction contractor(s) with flexibility to micro-route around potential UXO / UXO; • If at a later stage UXO clearance is required, it will be subject to a robust assessment at the time based on data regarding UXO to enable a meaningful assessment; andIn the event that such an assessment is required, it will be subject to separate marine licensing requirements and European Protected Species licensing requirements.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
			Potential effects of underwater noise from other activities such as geophysical surveys, vessels and construction activities have been considered (section 10.12).
23 February 2023	MD-LOT: Scoping Opinion (*NatureScot*)	With regard to the cumulative impacts on offshore and intertidal ornithology considered by the Applicant […], the Scottish Ministers advise that the cumulative assessment should focus on impacts in combination with the proposed Berwick Bank wind farm and neighbouring (consented) wind farms in the Forth and Tay area, with their associated export cables, and not constrained to those within a 20km buffer. The upcoming Cumulative Effects Framework should be used if available at the time of assessment. The Scottish Ministers also note the representation raised by the RSPB in respect of the potential cumulative impacts of the Proposed Works on ornithology.	Both BBWF and neighbouring wind farms within the defined Ornithology Study Area have been considered within the cumulative assessment (section 10.14). The Cumulative Effects Framework is not available at the time of writing and therefore has not been utilised for this assessment.
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	NS note that the approach to the selection of sites and features as defined […] is not as expected. For SPA connectivity in the breeding season, NS recommend (for the long list) using foraging ranges as published in Woodward *et al*. (2019) to derive connectivity with SPA colonies and with additional colonies that may be used by seabirds foraging within the SPA. The mean-maximum range +1SD should be used. Where such a value exceeds the maximum range recorded, then the maximum figure should be used. Although the 100 km search area approach may reach the same conclusions, NS advise the importance of a standard approach as outlined above to help ensure no sites and features are missed. We also highlight that Fowlsheugh SPA is missing from the list of designated sites and advise this is reviewed to ensure it is beyond the SPA connectivity range.	Comment noted. Please refer to the Cambois Connection Marine Scheme RIAA for further details on how this comment is addressed with regards to the HRA. Further detail on foraging ranges as published in Woodward *et al*. (2019) and how these have been used to identify SPA colonies and other seabird colonies is provided in section 10.7.5.
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for	NS notes the general statement that the study area is 'too deep to provide suitable foraging habitat' for terns. Although terns are not	Arctic tern has been included in this document (see Section 10.12) and has

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
	Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	benthic feeders, this statement ignores that they surface feed over deep water. NS advise the Arctic Tern foraging range is 40.5km, which is presumably beyond the proposed Cambois Connection range. Therefore, this should be the reason given for not considering this species further.	also been included in the Cambois Connection Marine Scheme RIAA as a qualifying feature of SPAs where LSE were identified as part of HRA Screening.
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	Cumulative impacts need to be considered for all features for which a Likely Significant Effect has been identified with respect to the Cambois Connection. These should not be constrained to those within a 20 km buffer. The cumulative assessment should therefore focus on the Cambois Connection in combination with the proposed Berwick Bank wind farm and neighbouring (consented) wind farms in the Forth and Tay area, including all associated export cables. We also highlight the upcoming Cumulative Effects Framework commissioned by Marine Scotland, which is nearing completion and anticipated to be ready for use in assessments by spring 2023.	Cumulative impacts have been considered fully within this document (see section 10.14) and within the Cambois Connection Marine Scheme RIAA. In line with the approach presented within the Applicant's HRA Stage One Screening Report (BBWFL, 2023) which was provided for NatureScot review, the Applicant has carried out an assessment of cumulative effects on European Sites and their designated features. Please refer to the Cambois Connection Marine Scheme RIAA for further details. Both BBWF and neighbouring wind farms within the defined Study Area have been considered within the cumulative assessment (please refer to section 10.14 for further details). The Cumulative Effects Framework is not available at the time of writing and therefore has not been utilised for this assessment.
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	NS anticipate that the main focus of the ornithological assessment will cover impacts to SPA qualifying interests including migratory species and don't envisage that any significant effects normally considered under EIA wouldn't already be reflected within the Habitats Regulations Appraisal (HRA) SPA assessment. It is also noted that the LSE	Noted. Further detail on the bird species included in the EIA is provided in Table 10.6 and Table 10.5.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		Screening Report is an important step to evidencing the process and agreeing key species and SPA colonies/interests to be taken forward in the EIAR and the HRA.	Please refer to the Cambois Connection Marine Scheme RIAA for further details on how this comment with regards to LSE is addressed.
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	Sensitivity assessments for judging plausible impact pathways for entry onto the long list should consider the following: Furness & Wade (2012) and Furness *et al.* (2013).	These documents are referred to in relevant sections discussing species sensitivity (see section 10.10.2).
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	NS highlight collision with lighted vessels as a potential impact pathway.	This pathway has been considered and has been scoped out as a potential impact, as fully detailed in section 10.8.2.
19 December 2022	MD-LOT: Scoping Opinion Appendix I: NatureScot Advice for Berwick Bank Cambois Connection: Appendix A – Ornithological Interests	Overall, NS is content with the approach outlined in Section 10.9 of the Scoping Report for impact assessment and broadly agree with Table 10.2 of the Scoping Report that summarises impacts proposed to be scoped in and out of the assessment.	Noted.
20 January 2023	Natural England: Scoping comments	Different birds use the marine and coastal area at different times. Any mitigation measures designed to protect particular species in a given place and time should be balanced with the potential impacts to other birds.	Further details regarding seasonality and any required mitigation is provided within this report; please refer to section 10.11 where this is discussed in further detail.
20 January 2023	Natural England: Scoping comments	We welcome the inclusion of the broad impacts scoped in and advise the following pressures are assessed in the ES, HRA and MCZ assessments. Abrasion / disturbance of the seabed; changes in suspended solids; penetration and / or disturbance of the substratum below the surface of the seabed, including abrasion; physical change (to another seabed type); physical change (to another sediment type); smothering and siltation rate changes; barrier to species movement; habitat structure changes – removal of substratum; introduction of other substances (solid, liquid or gas); vibration; above water noise and visual disturbance.	This report provides a complete assessment of potential impacts on bird species. The pressures identified in the Scoping Response have been incorporated into the assessment were appropriate e.g. incorporated into assessment of changes to prey availability. The Applicant has also completed an MPA and MCZ Assessment and an HRA (Cambois Connection Marine Scheme RIAA) to support the Marine

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
			Licence applications. These assessments also consider the pressure listed in the Scoping Response. Please refer to the Cambois Connection Marine Scheme RIAA for further details on how this comment with regards to LSE is addressed.

10.6. Methodology to Inform Baseline

10.6.1. Desk study

14. Information on offshore and intertidal ornithology was collected through a combination of a desktop review of existing studies and datasets, surveys commissioned by the Applicant in support of the separate consent application for the Berwick Bank Wind Farm (BBWF) (BBWFL, 2022b) and non-breeding coastal bird surveys undertaken for the Project (see section 10.6.2). These are summarised in Table 10.4 below.

Table 10.4 Summary of key information sources

Title	Source	Year	Author
Scotland and England (UK)			
BirdLife International Seabird Tracking Database	http://seabirdtracking.org	2014 (2006 – 2014)	BirdLife International
Seabird Monitoring Programme	https://www.bto.org/our-science/projects/seabird-monitoring-programme	2022	JNCC/British Trust for Ornithology (BTO)
Desk-based revision of seabird foraging ranges used for HRA screening	Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, ISBN 978-1-912642-12-0.	2019	Woodward *et al.*
Combining habitat modelling and hotspot analysis to reveal the location of high-density seabird areas across the UK	https://marine.gov.scot/data/combining-habitat-modelling-and-hotspot-analysis-reveal-location-high-density-seabird-areas	2018	Cleasby *et al.*
An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs	JNCC Report No. 431	2010	Kober *et al.*
Waterbirds in the UK 2019/20: The Wetland Bird Survey	British Trust for Ornithology (BTO) Annual Report	2021	Frost *et al.*
Important Bird Areas for seabirds in the North Sea including the Channel and the Kattegat.	BirdLife International	1995	Skov *et al*.
Wetland Bird Survey database	https://bto.org/our-science/projects/wetland-bird-survey	2015 - 2022	British Trust for Ornithology (BTO)
The Migration Atlas: Movements of the Birds of Britain and Ireland	T. & A.D. Poyser, London ISBN: 0-7136-6514-9	2002	Wernham *et al.*
Seabird 2000 National Seabird Census Project	https://jncc.gov.uk/our-work/seabird-censuses/	2015-2022	JNCC
Scotland			
Tracking data from Forth and Tay regional advisory group studies and relevant information from the Berwick BBWF aerial surveys	https://berwickbank-eia.com/	2022	BBWFL, 2022b
SiteLink	https://sitelink.nature.scot/home	2022	NatureScot
Berwick Bank DAS baseline bird surveys	https://berwickbank-eia.com/	2022	BBWFL, 2022b

Title	Source	Year	Author
Seagreen Alpha and Bravo Offshore Wind Farms Environmental Statement Addendum and associated technical reports	https://marine.gov.scot/data/eia-report-technical-chapters-seagreen-alpha-and-bravo-wind-farms	2018	Seagreen Wind Energy Ltd (JV between SSER Fluor).
England			
UK – Norway Electricity Interconnector (NSN Link) Winter and Breeding Bird Survey 2012 – 2014	https://northsealink.com/media/1196/p1568_rn3057-norway-uk-environmental-statement.pdf	2014	National Grid NSN Link Limited
Summary of Natural England's confirmed advice provided to Defra on Marine Conservation Zones to be considered for consultation in 2018	JNCC Publication JP026	2018	JNCC
Unpublished Defra Evidence Review	Defra Evidence Review	2022	Percival
The Common Eider: History of Eiders on the Farne Islands, Northumberland.	Chris Waltho, John Coulson; Bloomsbury Publishing	2015	Waltho *et al*
Wildlife of the Farne Islands (2nd Edition)	Published Paper / Literature	2015	Zibe
Designated Sites View	https://designatedsites.naturalengland.org.uk/	2022	Natural England
Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS)	Natural England Commissioned Reports, Number 164	2015	Furness
Blyth Offshore Demonstrator Project Pre-Construction Bird and Marine Mammal Surveys 2016	MMO public register (pre-application / condition discharge associated with MLA/2012/00122)	2016	EDF Renewables
Blyth Offshore Demonstrator Project Pre-Construction Bird and Marine Mammal Surveys 2018 – Array 3A & 4	MMO public register (pre-application / condition discharge associated with MLA/2012/00122)	2018	EDF Renewables
EDF (2019a) Blyth Offshore Demonstrator Project Post-Construction Bird and Marine Mammal Surveys 2018 – Array 2	MMO public register (variation no. 10 associated with MLA/2012/00122)	2018	EDF Renewables
EDF (2019b) Blyth Offshore Demonstrator Project Post-Construction Bird and Marine Mammal Surveys 2019 – Array 2	MMO public register (variation no. 10 associated with MLA/2012/00122)	2019	EDF Renewables
Blyth Offshore Demonstrator – Phase 2 Works: Phase 2 – Supporting Environmental Information (Report Ref. 1233849)	MMO public register (variation no. 10 associated with MLA/2012/00122)	2020	EDF Renewables
Blyth – Cambois Wader Study – Final Report July 2011	Northumberland County Council	2011	SKM Enviros
Cambois Coast 2022/23 Non-breeding Bird Survey	Baseline survey commissioned by the Applicant	2023	SLR Consulting Ltd.

10.6.2. Field surveys

15. As part of the Scoping Report prepared by the Applicant (BBWFL, 2022a), the Applicant confirmed the intended approach to use desk-based data sources only, including survey effort carried out in support of the BBWF; the MD-LOT Scoping Opinion and supporting NatureScot responses endorse this approach. It is also important to note that the wealth of available ornithological survey data covering the northernmost extent of the Marine Scheme is also far greater than would typically be made available for an EIA associated with a project of the scale and nature of the Marine Scheme.

16. As agreed with Natural England (Table 10.3), no baseline survey was conducted for the entirety of the Marine Scheme specifically however digital aerial survey (DAS) baseline data for BBWF partially covers the extent of the Marine Scheme at the BBWF array area. Surveys of the Marine Scheme were not considered necessary due to the short-term nature of cable installation activities and thus the limited potential for disturbance to marine birds. This was discussed and agreed with Natural England and the Marine Management Organisation (MMO) / Marine Directorate Licensing Operations Team (MD-LOT) during pre-application engagement, further confirmed within the Scoping Report as detailed above (BBWFL, 2022a) and associated MMO / MD-LOT response. However, in order to ensure full flexibility for year-round working, in line with Natural England's advice, a coastal non-breeding (wintering) bird survey was carried out; this is discussed in further detail in section 10.6.2.1 below.

10.6.2.1. CAMBOIS COAST NON-BREEDING BIRD SURVEY

17. To inform the ornithology assessment, a coastal non-breeding bird survey was commissioned by the Applicant as agreed with Natural England during pre-application engagement in 2022. A full report of this survey can be available on request. The survey was undertaken by SLR Consulting and focused on the cable Landfall at Cambois (Volume 4, Figure 10.3). The survey area covered the cable Landfall search area buffered to 500 m. This survey area included the beach foreshore, intertidal and estuarine habitats, and near-shore waters out to approximately 1 km from MHWS. The survey counted birds using a defined survey area using modified BTO Wetland Bird Survey method[7]. To facilitate counting and an appropriate spatial resolution, the survey area was divided into count sections of approximately equal size. The survey area was surveyed at approximately fortnightly intervals from mid-October 2022 to late March 2023. On each visit, the birds were counted in each section on up to six times spread through the day and tidal cycle. The number of each species in a section was recorded together with information on behaviour, habitat use and incidents of disturbance. Three favoured locations were identified: the Wansbeck Estuary mouth at the north of the beach; the sluice pipe at the centre of the survey area near to the originally proposed Landfall site; and 'The Rockers' at the south of the beach, within the original 500 m buffer.

18. The survey results will be fully reported within the Onshore ES. A copy of the Survey Report will be available on request.

[7] This relates to a survey methodology designed to record birds of inland waterbodies, rivers, estuarine and coastal environments during the wintering period. It is based on surveys which have been undertaken since 1947 by volunteers and it is now carried out across the majority of major wetland sites in the UK. The methodology is typically suitable for surveys of areas such as mudflats, sand bars or coastal areas which are proposed for development. Further information regarding the wetland bird survey method can be found on the British Trust for Ornithology website here: https://www.bto.org/our-science/projects/wetland-bird-survey#webs

10.7. Baseline Environment

10.7.1. Overview of Baseline Environment

19. This section describes baseline ornithological conditions in the OSA and evaluates its importance to breeding, migratory and wintering bird receptor populations. Consistent with the approach adopted in the Scoping Report (BBWFL, 2022a), the OSA is considered in three sections:

- An offshore section beyond the 12 nautical mile (NM) limit that includes both Scottish and English offshore waters (approximately 40 km of this route is in Scottish offshore waters and approximately 105 km of this route is in English offshore waters);
- A southern section where the route traverses territorial waters (approximately 35 km of this route is in English territorial waters); and
- A very small nearshore and intertidal section at the proposed Landfall location on the Cambois coastline and corresponding to the last ~1 km section of the cable route in English territorial waters.

20. The baseline ornithological characteristics of each of the study are sections is summarised below.

10.7.2. Offshore Waters Section (beyond 12 NM)

21. The northernmost 100 km (or thereabouts) of the OSA lies between 20 and 50 km off the coast and has seabed depths in excess of 40 m. This part of the OSA is truly offshore from an ornithological perspective and is only likely to be utilised by seabird species that forage in offshore waters. In the breeding season these will mainly comprise species which breed in the region namely fulmar, gannet, kittiwake, common guillemot, razorbill and puffin (Table 10.5). These species all have large breeding season foraging ranges, commonly travelling up to at least 100 km from colonies to offshore foraging grounds (Woodward *et al*., 2019).

22. Based on their mean maximum foraging range distance (Woodward *et al.,* 2019), breeding herring gull, lesser black-backed gull, great black-backed gull, Arctic tern and Sandwich tern could potentially also utilise the offshore waters section for foraging (Table 10.5). However, evidence from tracking studies shows that during the breeding season these species chose territorial waters for foraging and breeding individuals only rarely if ever go beyond the 12 nm limit (BirdLife seabird tracking database; Eglington & Perrow, 2014).

23. The seabirds using the offshore section in the breeding season are likely to be associated with breeding colonies along the coast of south-east Scotland and north-east England. In particular the large colonies on islands associated with the Forth Islands SPA (e.g. the Isle of May and Bass Rock), colonies located on the Berwickshire coast (e.g. associated with the St. Abb's Head to Fast Castle SPA) and colonies associated with the Farne Islands SPA, Coquet Island SPA and Northumberland Marine SPA. Further detail on the breeding seabird interests of these SPAs, and other SPAs with breeding seabird qualifying interests is provided in the Cambois Connection Marine Scheme RIAA.

24. Outside of the breeding season, the offshore section is used by the same seabird species as in the summer, however at this time of year many of the individuals are likely to originate from more distant breeding grounds, including those in the north of Scotland, Scandinavia and Russia. The reason for this is that the seabird species are able to disperse more widely and further offshore as they are no longer required to attend the coastal breeding sites, including those from other breeding colonies. A number of additional seabird species that do not breed in the region (or do so only rarely and in very small numbers) are likely to use the offshore section during migration times. For example, little gull, Manx shearwater, European storm petrel and great skua (Table 10.5). Small

numbers of little auk, a visitor from Arctic breeding grounds, are also likely use the offshore section in winter (Table 10.5).

25. The offshore section of the Marine Scheme will be overflown by large numbers of a wide range of migrating terrestrial bird species including passerines, waders and wildfowl species (Wernham *et al*., 2002). However, it is not likely that these migrant birds would be affected by the Marine Scheme.

26. As described in Volume 2, Chapter 13: Shipping and Navigation, although there are shipping and fishing activities in the offshore section, these generally only occur at a low level.

10.7.3. Territorial Waters

27. The territorial waters section of the Ornithology Study Area is defined as those parts of the Offshore Export Cable Route that lie between 1 km and the 12 nm limit (approximately 20 km) off the coast. This section has relatively shallow waters, with seabed depths mainly between 10 m and 30 m. This section is used by same 'offshore' seabird species discussed above for the offshore section, plus other species that largely confine their foraging to territorial coastal waters (Table 10.5). These include a range of tern and gull species. Arctic tern, common tern, [Redacted]

[Redacted]

28. Those parts of the territorial section where the seabed depth is less than approximately 20 m are also used by diving bird species that forage on or close to the seabed (Table 10.5). These include European shag, cormorant and common eider, species that are present year-round, and other seaduck species (e.g., common scoter and red-breasted merganser), red-throated diver and great northern diver in the winter months. Based on available information in published studies, all these territorial diving species are likely to be present at low density only (Kober *et al*., 2010; Skov *et al*.,1995; Balmer *et al*., 2011).

29. All parts of the territorial water section of the OSA lie outside the breeding season foraging range of the European shags breeding on the Farne Islands, where this species is a qualifying interest Of the Farne Islands SPA. Outside the breeding season shags utilising this part of the OSA are most likely to originate from breeding sites in Northumberland (Farne Islands SPA) and south-east Scotland including the islands of the Forth Islands SPA.

30. The last 3 km (approximately) of the territorial water section of the OSA, as the cable route approaches the coast at Cambois, passes through the Berwick to St Mary's MCZ. Common eider is the single designated feature of this MCZ. The eider utilising the survey area will be part of the common eider population that this MCZ is designed to safeguard.

31. The territorial waters section of the survey area is subject to moderate levels of vessel activity arising from the activity of small-sized vessels used for territorial fisheries and recreation.

10.7.4. Intertidal Section and Near-shore Waters Section

32. The intertidal and near-shore waters section of the OSA has different baseline ornithological characteristics to the other two sections and is much smaller in extent. It covers near-shore marine habitat up to approximately 1 km from the Cambois beach, including intertidal areas seaward of MHWS. It is proposed that the Offshore Export Cable will make Landfall in this section. Although

comparatively small, this section is of particular importance for assessments on account of the large range of species that utilise the area and the potential for Marine Scheme works in the vicinity of the cable Landfall to persist for an extended period compared to locations along the rest of the Offshore Export Cable Route.

33. The description below of the baseline characteristics of this section are primarily based on the results of the Cambois coast survey of non-breeding birds undertaken in 2022/23) (Survey Report is available on request).

34. The intertidal habitats comprise a mixture of intertidal beach sand and shingle and outcropping rocks. These habitats are used by a variety of non-breeding (non-breeding and passage migrant) wader species for feeding and roosting (Table 10.6). These include visitors from Arctic and sub-Arctic breeding grounds such as turnstone, sanderling, purple sandpiper and bar-tailed godwit, and other species such as ringed plover, oystercatcher and curlew that are mostly likely to be from UK breeding grounds. The intertidal beach habitats in this section are also used by a range of gull species for feeding and roosting (Table 10.6).

35. The Cambois beach in the vicinity of the Landfall is not anticipated to have any breeding bird sensitivities. Although the beach habitat (above MHWS) is in parts potentially suitable breeding habitat for ringed plover and oystercatcher, the very high levels of activity by people and dogs along the beach are likely to make breeding by these beach-nesting species untenable[8].

36. The intertidal and near-shore waters section of the OSA overlap a small proportion of the Northumbria Coast SPA, a site designated for overwintering purple sandpiper and turnstone. The turnstone and purple sandpiper that utilise this stretch of coast in the winter months are part of the population that overwinters in the Northumbria Coast SPA. At Cambois Beach, small groups of turnstones were recorded during seven surveys, with 15 sightings noted. Group size was small, with a maximum count of six individuals, and 80% of sightings were noted during the low-mid tidal cycle. Birds were recorded foraging in all but one sighting, where loafing and maintenance behaviours were noted instead. Roosting was also frequently observed (60%) of small numbers of birds. Birds were recorded to the south-east of the survey area. The larger cluster of birds occurred outwith the survey area. At Sleekburn, turnstone was only observed during one survey on the 22 of December with two sightings noted on the Sleekburn and the River Blyth. Individual birds were recorded during the low-mid tidal cycle, with foraging and roosting behaviours noted in both instances.

37. At Cambois Beach, small numbers of purple sandpiper were recorded during four surveys, with a total of ten sightings noted. Between one and three individuals were recorded with all but one sighting observed during the low-mid tidal cycle. Birds were recorded foraging on all sightings and were also noted roosting during 80% of the sightings. Purple sandpiper were noted outwith of the survey area to the south-east where they were noted on 'The Rockers'; a small cluster of rocks available for roosting and feeding during low-mid tidal cycles only. No records were made at Sleekburn.

38. The intertidal and near-shore waters section of the OSA lies within the Berwick to St Mary's MCZ. As for the territorial waters section, all eider utilising this section of the survey area are considered to be part of the common eider population that this MCZ is designed to safeguard.

39. The non-breeding bird survey recorded large number of walkers and many with accompanying dogs using the Cambois beach on every survey visit. Although this activity led to a certain amount of disturbance of birds using the beach (but not apparently to birds on the sea) it was also apparent

[8] As part of overwintering (non-breeding) surveys commissioned by the Applicant, a total of 3,007 potential disturbance events were logged at Cambois Beach over the course of the surveys while 20 disturbance events were recorded at the Sleekburn. At both locations walkers and dogs were the most frequent type of disturbance recorded.

that some individuals at least showed relatively high proximity tolerance to people and dogs that were under close control. The near-shore waters are also subject to moderate levels of vessel disturbance. This arises from the activity of small-sized vessels used for territorial fisheries and recreation.

Table 10.5 Summary of the bird utilisation of the offshore waters and territorial waters sections of the Ornithology Study Area. Based on various data sources including: BBWFL, 2022b; Seagreen Wind Energy Ltd, 2018; Kober *et al*, 2010; Skov *et al*, 1995.

✓ indicates potentially present at low density; ✓✓ indicates potentially present at moderate density

Species	Scientific name	Offshore waters section (beyond 12 NM)			Territorial waters section (inside 12 NM)			Comment on protection and conservation status[1]
		Breeding	Wintering	Passage	Breeding	Wintering	Passage	
Red-throated diver	*Gavia stellata*					✓	✓	S1, A1, Red
Great northern diver	*Gavia immer*					✓	✓	S1, A1, Amber
Fulmar	*Fulmarus glacialis*	✓✓	✓	✓	✓✓	✓	✓	Nearby SPA Amber
Manx shearwater	*Puffinus puffinus*			✓			✓	Amber
European storm petrel	*Hydrobates pelagicus*			✓			✓	A1, Amber
Gannet	*Morus bassanus*	✓✓	✓	✓✓	✓✓	✓	✓✓	Nearby SPA, Amber
European shag	*Gulosus aristotelis*				✓	✓		Nearby SPA, Red
Common eider	*Somateria mollissima*					✓	✓	MCZ, Amber
Long-tailed duck	*Clangula hyemalis*					✓	✓	Red

Species	Scientific name	Offshore waters section (beyond 12 NM)			Territorial waters section (inside 12 NM)			Comment on protection and conservation status[1]
		Breeding	Wintering	Passage	Breeding	Wintering	Passage	
Common scoter	*Melanitta nigra*					✓	✓	Red
Arctic skua	*Stercorarius parasiticus*						✓	Red
Great skua	*Stercorarius skua*			✓			✓	Amber
Little gull	*Hydrocoloeus minutus*						✓	A1, Green
Common gull	*Larus canus*					✓✓	✓	Amber
Lesser black-backed gull	*Larus fuscus*				✓		✓	Nearby SPA, Amber
Herring gull	*Larus argentatus*	✓	✓✓	✓	✓✓	✓✓	✓✓	Nearby SPA, Red
Great black-backed gull	*Larus marinus*	✓	✓✓	✓	✓	✓✓	✓	Amber
Kittiwake	*Rissa tridactyla*	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	Nearby SPA, Red
Sandwich tern	*Sterna sandvicensis*				✓		✓	A1, Nearby SPA, Amber

Species	Scientific name	Offshore waters section (beyond 12 NM)			Territorial waters section (inside 12 NM)			Comment on protection and conservation status[1]
		Breeding	Wintering	Passage	Breeding	Wintering	Passage	
Arctic tern	*Sterna paradisaea*				✓		✓	A1, Nearby SPA, Amber
Common tern	*Sterna hirundo*				✓		✓	A1, Nearby SPA, Amber
Roseate tern	*Sterna dougallii*				✓			S1, A1, Nearby SPA, Red
Guillemot	*Uria aalge*	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	Nearby SPA, Amber
Razorbill	*Alca torda*	✓✓	✓	✓	✓✓	✓	✓	Nearby SPA, Amber
Little auk	*Alle alle*					✓		Green
Puffin	*Fratercula arctica*	✓✓	✓	✓	✓	✓	✓	Nearby SPA, Red

[1] Key to comments: S1 – Wildlife and Countryside Act Schedule 1 species; A1 – EU Birds Directive Annex I species; MCZ – potential for strong connectivity to Berwick to St Mary's Marine Conservation Zone; and Nearby SPA – potential for moderate to strong breeding season connectivity to at least one SPA where a qualifying interest.

Table 10.6 Summary of the wintering bird utilisation of the coastal and near-shore waters section of the Ornithology Study Area based on the results of the wintering bird survey conducted at the Cambois coast between October 2022 and March 2023

Species	Scientific name	Mean peak count (all visits)	Maximum peak count	Sea, near-shore waters	Beach, intertidal	Fields & flood water	Comment on protection and conservation status[1]
Red-throated diver	*Gavia stellata*	1.8	5	✓			S1, A1, Green
Great northern diver	*Gavia immer*	.2	1	✓			S1, A1, Amber
Cormorant	*Phalacrocorax carbo*	1	3	✓			Green
European shag	*Gulosus aristotelis*	4	15	✓			Red
Guillemot	*Uria aalge*	1.8	7	✓			Amber
Razorbill	*Alca torda*	1	7	✓			Amber
Puffin	*Fratercula arctica*	4	4	✓			Red
Wigeon	*Mareca penelope*	24.8	82			✓	Amber
Teal	*Anas crecca*	8.2	64			✓	Amber
Common eider	*Somateria mollissima*	3.1	5	✓			MCZ, Amber
Common scoter	*Melanitta nigra*	1.4	8	✓			Red
Goldeneye	*Bucephala clangula*	1.0	6	✓			Red
Red-breasted merganser	*Mergus serrator*	2.3	4	✓			Amber
Black-headed gull	*Chroicocephalus ridibundus*	19	80	✓	✓	✓	Amber
Little gull	*Hydrocoloeus minutus*	0.3	3	✓			A1, Green
Common gull	*Larus canus*	6.3	20	✓	✓	✓	Amber

Species	Scientific name	Mean peak count (all visits)	Maximum peak count	Sea, near-shore waters	Beach, intertidal	Fields & flood water	Comment on protection and conservation status[1]
Great black-backed gull	*Larus marinus*	2.9	10	✓	✓		Amber
Herring gull	*Larus argentatus*	17.5	70	✓	✓	✓	Red
Lesser black-backed gull	*Larus fuscus*	0.4	4	✓	✓		Amber
Oystercatcher	*Haematopus ostralegus*	6.6	21	✓	✓		Amber
Curlew	*Numenius arquata*	4.9	12		✓	✓	Red
Bar-tailed Godwit	*Limosa lapponica*	0.8	7		✓		Amber
Turnstone	*Arenaria interpres*	1.9	6		✓		NCSPA, Amber
Sanderling	*Calidris alba*	2.4	11		✓		Green
Purple sandpiper	*Calidris maritima*	0.8	3		✓		NCSPA, Red

[1] Key to comments: S1 – Wildlife and Countryside Act Schedule 1 species; A1 – EU Birds Directive Annex I species; MCZ – qualifying interest of Berwick to St Mary's Marine Conservation Zone; NCSPA – qualifying interest of Northumbria Coast SPA; Red / Amber / Green refers to Birds of Conservation Concern 5 Red /Amber / Green lists (Stanbury *et al*., 2021)

10.7.5. Designated Sites

40. Key sites designated for offshore and intertidal ornithology features that either overlap the Marine Scheme or have connectivity with the Marine Scheme based on the mean maximum + 1 standard deviation (1SD) foraging ranges published by Woodward *et al.,* (2019) are listed in Table 10.7. These include:

41. **Special Protection Areas (SPAs):** SPAs are designated under the Birds Directive for the protection of rare, threatened or vulnerable bird species listed in Annex I of the Birds Directive, and also for regularly occurring migratory species;

42. **Ramsar Sites:** Ramsar sites are designated under the Convention on Wetlands, (the Ramsar Convention) which is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. In England, Ramsar sites are subject to the same strict legal protection as Special Protection Areas and Special Areas of Conservation as a matter of policy and in Scotland Ramsar sites are also SPAs or SSSIs[9].;[10];

- **Sites of Special Scientific Interest (SSSIs):** SSSIs are designated under the Nature Conservation (Scotland) Act 2004 and the Wildlife and Countryside Act for nationally important habitats, species, rocks and landforms, or a combination of such natural features that are considered to best represent the nation's natural heritage; and
- **Marine Conservation Zones (MCZs):** MCZs are designated under the Marine and Coastal Access Act 2009 for the protection of nationally important habitat and species.

Table 10.7 Key Designated Sites for Offshore and Intertidal Ornithological Features

Designated Site	Relevant Qualifying Interest Feature(s)
Scotland	
Outer Firth of Forth and St Andrew's Bay Complex SPA	Arctic tern, common tern, little gull, red-throated diver, Slavonian grebe, gannet, shag, eider, common scoter, velvet scoter, goldeneye, red-breasted merganser, black-headed gull, kittiwake, Manx shearwater, guillemot, razorbill, herring gull, common gull.
St Abb's Head to Fast Castle SPA and SSSI	Guillemot, razorbill, herring gull, kittiwake, shag.
Forth Islands SPA	Arctic tern, common tern, roseate tern, Sandwich tern, gannet, shag, lesser black-backed gull, puffin, guillemot, razorbill, kittiwake, herring gull, cormorant.
Fowlsheugh SPA*	Fulmar, kittiwake, herring gull, guillemot, razorbill.
Buchan Ness to Collieston Coast SPA*	Fulmar, kittiwake, herring gull, guillemot, shag.
England	
Farne Islands SPA	Arctic tern, common tern, roseate tern, kittiwake, guillemot, puffin, shag, cormorant.
Coquet Island SPA	Arctic tern, common tern, roseate tern, Sandwich tern, black-headed gull, lesser black-backed gull, herring gull, kittiwake, fulmar, puffin.
Northumberland Marine SPA	Guillemot, common tern, little tern, Sandwich tern, Arctic tern, roseate tern, puffin, seabird assemblage.
Northumbria Coast SPA/Ramsar	Little tern, turnstone, purple sandpiper, Arctic tern

[9] National Planning Policy Framework (NPPF) in England and National Planning Framework 4 (NPF4) in Scotland.
[10] All Ramsar sites are also protected in the same manner as European sites and included under the HRA process as a result of guidance in the National Planning Policy Framework (NPPF) and National Planning Framework 4 (NPF4).

Designated Site	Relevant Qualifying Interest Feature(s)
Scotland	
Lindisfarne SPA/Ramsar*	Bar-tailed godwit, common scoter, dunlin, eider, golden plover, greylag goose, light-bellied brent goose, little tern, long-tailed duck, red-breasted merganser, redshank, ringed plover, roseate tern, sanderling, shelduck, waterbird assemblage, whooper swan, wigeon.
Flamborough and Filey Coast SPA*	Gannet, kittiwake, herring gull, guillemot, razorbill, puffin, shag, cormorant.
Teesmouth and Cleveland Coast SPA / Ramsar	Avocet, little tern, common tern, knot, sandwich tern, redshank, ruff, waterbird assemblage
Berwick to St Mary's MCZ	Common eider
Northumberland Shore SSSI	Golden plover, purple sandpiper, redshank, ringed plover, sanderling, turnstone
* Sites screened out of the HRA as concluded no LSE. See Cambois Connection Marine Scheme RIAA for further detail.	

43. Potential effects of the Marine Scheme on the SPA/Ramsar sites listed in Table 10.7 are assessed as part of the HRA process, conclusions from which are presented in the Cambois Connection Marine Scheme RIAA.

44. Potential effects of the Marine Scheme on the Berwick to St Mary's MCZ are assessed in the Cambois Connection Marine Scheme MCZ/MPA Assessment.

10.7.6. Future Baseline Scenario

45. The EIA Regulations require that a 'description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without development as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge' be included within EIA.

46. The baseline environment is not constant, it will undergo some degree of natural change over time due to naturally occurring cycles and processes and anthropogenic environmental changes, for example climate change and commercial fishing. The future baseline is also anticipated to potentially change in response to the various energy related developments off the east coast, for example future offshore wind farms and subsea electricity links.

47. UK waters are facing an increase in sea surface temperature. The average rate of sea temperature increase in waters off south-east of Scotland has been greater than 0.5°C per decade, amongst the highest recorded anywhere in the UK (Marine Scotland, 2011). Changes in sea temperature have been implicated in declines in fish prey for seabirds, leading to reduced breeding success and population decline (Carroll, *et al.*, 2015). Continuing sea temperature increases are anticipated for the North Sea over the decades ahead and further prey-mediated adverse impacts on seabird populations are considered likely.

48. The effects of climate change extend globally, with Arctic/sub-Arctic regions particularly severely affected, for example through the extent and prevalence of sea ice and snow cover. Climate change is causing, and is anticipated to continue to cause, profound long-term changes to Arctic/sub-arctic ecosystems. As many of the birds that overwinter in the OSA are from Arctic/sub-arctic breeding grounds there is obvious potential for climate change effects to impact (both negatively and positively) on the future population size and distribution of these species.

49. Highly Pathogenic Avian Influenza (HPAI) has recently caused widespread significant mortality and breeding failure in seabirds. Of particular relevance to the Marine Scheme is the high mortality of adults and low breeding success reported in 2022 for gannets breeding on Bass Rock, (Firth of Forth) and Sandwich terns breeding on Coquet Island. It is not known how long the HPAI current outbreak will persist, nor how long population recovery will take (Pearce-Higgins *et al.*, 2022), and

there is presently no current guidance or advice from SNCBs for cable projects on this topic at the time of writing. For some species at least, it is likely that further HPAI induced population decline is likely, and that population recovery is likely to take at least a decade due to the relatively slow reproductive rates of many seabird species.

50. Changes to anthropogenic activity are anticipated to affect the Northumberland coastline. For example, coastal development and recreational use of the coast and territorial waters. The Site Improvement Plan for the Northumberland Coastal region acknowledges these sources of pressure and potential impact on coastal habitats but encourages proactive regulation, mitigation and research / monitoring to help minimise change (Natural England, 2015).

51. The coastline at Cambois is subject to ongoing coastal erosions which is likely to continue through the lifetime of the Marine Scheme (NCC, 2010). This erosion is exacerbated by sea level rise due to climate change. Coastal erosion has potential to cause loss of intertidal and beach head habitat. It also has potential to effect nearshore marine habitats, for example though suspended sediments. All these changes have potential to cause knock-on effects on habitat suitability for birds.

52. Any changes that may occur during the design life span of the Marine Scheme should be considered in the context of both greater variability and sustained trends occurring on national and international scales in the marine environment.

10.7.7. Data Assumptions and Limitations

53. As part of the development of the survey methodology, extensive literature review work was undertaken to determine the use made by birds of the OSA and wider marine environment.

54. As part of this extensive literature review, a number of sources were compiled and used to inform the assessment. A weight of evidence approach has been followed, whereby all sources have been reviewed and used to support the development of the ornithology baseline, noting that for some sources which are older (i.e., beyond three to four years old), they need to be reviewed sensitively. Data sources beyond three to four years are presented for completeness, but they have been cross-checked against more recent sources to address this potential limitation and where necessary supplemented with project-specific survey data.

55. For the majority of the Marine Scheme, the nature of the activities required means that potential impacts on ornithological receptors are limited (see section 10.8 below and Volume 2, Chapter 5: Project Description for further details). However, in relation to the Landfall, during pre-application engagement Natural England raised queries regarding the ‘shelf life’ of the pre-existing nearshore surveys; as set out in section 10.5, Natural England confirmed their recommendation for further project-specific non-breeding surveys if the Applicant required flexibility for year-round working. Informed by discussions with Natural England during the pre-application period, the Applicant commissioned a programme of non-breeding bird surveys which are presented above in section 10.6.2.1.

56. For the non-breeding surveys specifically, the majority of surveys were undertaken following the low-high tide cycle, nine out of twelve at Cambois Beach and eight out of ten at Sleekburn. This reflects the relatively small number of dates on which survey is possible across a full tidal cycle within daylight hours, particularly during the mid-winter period when day length is shortest, which meant that in some months it was often not possible to survey on an ebbing tide within daylight hours. The bias in the data towards the low-high tide cycle is considered highly unlikely to have significantly affected the survey results but it is presented for completeness.

57. The literature review has been combined with the results of the commissioned wintering bird survey of the Cambois coast resulting in a robust baseline.

58. No data gaps or limitations beyond those addressed above have been outlined.

10.8. Scope of the Assessment

10.8.1. Impacts Scoped into the Assessment

59. The following impact pathways have been scoped into the assessment, as agreed through the Scoping process and follow up consultation with consultees[11]:

- Disturbance and displacement (vessel presence and nearshore area construction activities) (C & D);
- Collision with lighted vessels (C & D)
- Indirect effects on ornithological receptors through effects to prey species (C & D);
- Disturbance and displacement as a result of operation and maintenance activities (vessel presence) (O&M); and
- Indirect effects on ornithological receptors through effects to prey species (O&M).

10.8.2. Impacts Scoped Out of the Assessment

60. Impacts scoped out of the assessment were agreed with key stakeholders through consultation following receipt of the Scoping Opinion from MD-LOT and MMO in February and March 2023 respectively. These are summarised below for completeness:

- Accidental release of contaminants.

10.9. Key Parameters for Assessment

10.9.1. Maximum Design Scenario

61. The maximum design scenario(s) summarised here have been selected as those having the potential to result in the greatest effect on ornithological receptors. These scenarios have been selected from the details provided in the Volume 2, Chapter 5: Project Description. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the PDE (e.g. different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

62. Given that the maximum design scenario is based on the design option (or combination of options) that represents the greatest potential for change, confidence can be had that development of any alternative options within the design parameters will give rise to no worse effects than assessed in this impact assessment. Table 10.8 presents the maximum design scenario for potential impacts on ornithological receptors during construction, operation and maintenance and decommissioning.

63. Site preparation works, in advance of construction, are predicted to commence in Q4 of 2026 and will continue until all installation activities have ceased. Landfall construction is expected to occur between Q4 of 2027 until Q4 of 2028. Export cable installation is expected to begin in Q3 2028 and is expected to last until Q4 of 2029. All activities associated with the Marine Scheme are predicted to conclude by the end of 2029. Until detailed design of the Marine Scheme is progressed and further refined pre-construction, this programme for the Marine Scheme as a whole is indicative

[11] C = Construction, O = Operation, M = maintenance, D = Decommissioning

and is subject to further refinement, but is used to inform assessment of construction phase impacts for the Marine Scheme.

Table 10.8 Maximum design scenario specific to ornithology impact assessment

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
Construction and Decommissioning			
Disturbance and displacement (vessel presence and nearshore construction activity) Collision with lighted vessels	Vessel movements based on: • Up to two pre-construction boulder removal / clearance vessels on site at any one time • Up to two cable construction vessels on site at any one time • Up to 10 guard vessels on site at any one time • Up to two survey / Offshore Construction Vessel (OCV) vessels on site at any one time • Up to two cable protection construction vessels on site at any on time Presence of jack up barge in the nearshore area at Trenchless Technology punch out location for up to 15 months. Construction of the Offshore Export Cable Corridor is expected to take up to 18 months with overall programme of 39 months, including site preparation. **Nearshore:** presence of jack-up barge and guard vessel in the nearshore area at tranchless technology punch out location for up to 15 months. The trenchless technology exit point (punch out location) located seaward of MLWS between 500 m and 2,400 m below MWHS from the trenchless technology entry point. The trenchless technolgy exit pits are expected between the -2.5 m LAT and -10 m LAT. As such, no works are planned to take place in the intertidal zone. Ports used for construction activities within the Marine Scheme are yet to be confirmed, and will be determined as part of competitive	**In Scottish waters:** Vessel movements as per the MDS **In English waters:** Vessel movements as per the MDS Presence of jack up barge in the nearshore area at the landfall for up to 15 months. The trenchless technology exit point (punch out location) located seaward of MLWS between 500 m and 2,400 m below MWHS from the trenchless technology entry point.	Maximum number of vessel movements that could foreseeably cause disturbance / displacement. Maximum duration of construction activities

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
	tendering processes whilst aiming to maximise UK and Scottish content, It is possible that a number of ports in the region may be utilised during construction.		

Indirect effects on ornithological receptors through effects to prey species	**Habitat loss / disturbance**
	• Up to 18 km2 of temporary habitats loss / disturbance during seabed preparation (e.g. boulder clearance, seabed levelling including sandwave clearance), cable installation and protection.
	• Up to 5,000 m2 of disturbance from the temporary placement of up to five jack-up vessel deployments in the nearshore area.
	• Up to five exit pits, each 20 x 5 m, for up to four cable ducts (with one spare) due to trenchless cable installation at the Landfall.
	
	Temporary increases in SSC, associated sediment deposition and potential release of contaminants
	Seabed preparation:
	• Boulder clearance, seabed levelling and sandwave clearance (sandwaves may be cleared to a width of 25 m, average height 5 m and clearance along approximately 20% of the Marine Scheme length (3.6 km2).
	
	Cable installation:
	• Offshore export cables length up to 720 km;
	• Installation using any of the following methods: ploughs (displacement and/or non-displacement), jetting machines, mechanical trenchers, MFE. Of these, MFE has been assumed as the worst case with regards to SSC;
		In Scottish waters:
		• Maximum cable length 160 km;
		  • **Habitat loss and disturbance**: up to 4 km^2 (based on MDS parameters); and
		  • **Increased SSC**: based on MDS parameters.
		
		In English waters:
		• Maximum cable length 560 km;
		• **Habitat loss and disturbance**: up to 14 km^2 (based on MDS parameters); and
		• **Increased SSC**: based on MDS parameters with inclusion of activities at the Landfall (trenchless technology (e.g. HDD) punch out locations and release of drilling fluids.
			Maximum parameters for habitat loss, increased SSC and underwater noise potentially affecting the availability of prey along the Marine Scheme during seabed preparation work and cable installation.
			
			Further details on maximum volumes of sediment expected to be released during seabed preparation and cable installation and associated dispersion / redeposition rates and distances are provided in Volume 2, Chapter 7: Offshore Physical Environment and Seabed Conditions.

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
	• Installation mobilises sediments from a 3 m deep and 2.5 m wide trench; and • Cable installation at the Landfall via trenchless technique with potential for drilling releases associated with HDD. Underwater noise: • Site preparation works expected to take place throughout the entire construction programme (up to 39 months); • Construction of the Offshore Export Cable Corridor is expected to take up to 18 months; • Noise sources include construction activities and geophysical surveys; and • Construction of a maximum of four cables, within a 180 km corridor.		
Operation and Maintenance			
Disturbance and displacement (vessel presence)	Vessels used during routine inspections, repairs and replacement and geophysical surveys; maximum vessles on site at any one time including: • Annual routine inspection survey; • Annual geophysical survey(to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans); and • Up to four repair events and four reburial events of up to 1 km each over the 35 year lifetime. Operation and maintenance phase is expected to be up to 35 years. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed, and will be determined as part of competitive	• Applies to the whole Marine Scheme	• Greatest number of activities associated with the Marine Scheme resulting in the maximum number of vessel movements

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
	tendering processes whilst aiming to maximise UK and Scottish content. • It is possible that a number of ports in the region may be utilised during operation, although it is likely that only a single port such as that at Blyth would be required.		
Indirect effects on ornithological receptors through effects to prey species (including permanent habitat loss)	Up to 1.46 km^2 of permanent habitat loss due to: • Up to 1.41 km^2 of cable protection associated with up to 37.1 km of per cable (154.8 km in total) at a width of up to 9.5 m; • Up to 0.05 km^2 of cable protection for five cable crossings and up to 200 m of cable requiring protection per crossing at a width of up to 12.5 m; and • Operation and maintenance phase of up 35 years	**In Scottish waters:** • Up to 0.23 km^2 of cable protection associated with 6 km per cable (24 km in total). **In English waters:** • Up to 1.18 km^2 of cable protection associated with 31.1 km per cable (124.4 km in total); and • Up to 0.05 km^2 of cable protection for five cable crossings.	Maximum seabed footprint which would be affected during the operation and maintenance phase. The total cable protection area and length for the Marine Scheme exceeds the sum of English and Scottish Waters. This is due to the worst-case for the Marine Scheme as a whole being associated with the eastern option for the Marine Scheme Offshore Export Cable Corridor to avoid double counting of both routes for total length.

10.10. Methodology for Assessment of Effects

10.10.1. Overview

64. The Ornithology assessment of effects has followed the methodology set out in Volume 2, Chapter 3: EIA Methodology. Specific to the assessment of offshore and intertidal ornithology, the following guidance documents have been used to inform the assessment:

- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards (Natural England, 2022b); and
- Phase III: Expectations for data analysis and presentation at examination for offshore wind applications. (Natural England, 2022c).

65. This guidance is focussed on assessment of wind farms but also includes advice on assessment of associated marine export cables where appropriate.

66. A semi-quantitative, evidence-based assessment has been undertaken to consider impacts on ornithological receptors and identify any required mitigation, as agreed with the MMO / MD-LOT and Natural England. The potential for an impact on bird species' is assessed for biogeographically determined receptor population(s). For the Marine Scheme, the appropriate biogeographic populations are considered to be regional breeding populations defined primarily on the basis of breeding season foraging range metric (e.g., as reviewed in Woodward *et al.* 2019), the BDMPS defined non-breeding populations derived in the review by Furness (2015), and qualifying species populations of relevant designated sites.

10.10.2. Impact Assessment Criteria

67. The process for determining the significance of effects is a two-stage process that involves defining the magnitude of the potential impacts and the sensitivity of the receptors.

68. The terms effect and impact are defined below. The definitions are based on the glossary of the Introduction to Environmental Assessment (Highways England, 2019):

- **Impact:** Change that is caused by an action; for example, the laying of an inter-array cable (action) is likely to result in seabed disturbance. Impacts can be defined as direct, indirect, temporary, irreversible, secondary, cumulative and inter-related. They can also be either positive or negative, although the relationship between them is not always straightforward; and
- **Effect:** Term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact to the sensitivity of the receptor or resource in accordance with defined significance criteria.

69. 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 2, Chapter 3: EIA Methodology.

70. The criteria for defining magnitude levels for ornithological receptors in this chapter are outlined in Table 10.9 below. This set of criteria has been determined on the basis of changes to bird population receptors.

Table 10.9 Definition of terms relating to the magnitude of an impacts

Magnitude of Impact	Definition
High	**The Marine Scheme would affect the conservation status of receptor population.** 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. Recovery from that change predicted to be achieved in the long-term or irreversible following cessation of the Marine Scheme activity. Guide: Predicted increase to baseline mortality rate is above 10%.
Medium	**Conservation status would not be affected, but the impact is likely to be significant in terms of ecological objectives or populations.** 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. Recovery from that change predicted to be achieved in the medium-term (i.e. no more than five years) following cessation of the Marine Scheme activity. Guide: Predicted increase to baseline mortality rate is above 5%.
Low	**Minor shift away from baseline but the impact is of limited temporal or spatial extent.** 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. Recovery from that change predicted to be achieved in the short-term (i.e. no more than one year) following cessation of the Marine Scheme activity. Guide: Predicted increase to baseline mortality rate is between 1% and 5%
Negligible	**Very slight change from baseline condition, impact is highly localised / short term and any recovery expected to be rapid following cessation of activity**. Very minor 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. Recovery from that change predicted to be rapid (i.e. no more than circa six months) following cessation of the Marine Scheme related activity. Guide: Predicted increase to baseline adult mortality rate is less than 1%.

71. The criteria for defining sensitivity in this chapter are outlined in Table 10.10 below. The definitions of receptor sensitivity for ornithology attempts to define the overall sensitivity of a receptor to a potential impact and takes into consideration a number of factors. These include the susceptibility of individuals to a potential effect (e.g. as reviewed in Furness and Wade, 2013), the availability of alternative habitat and the value and conservation status of the receptor population. In determining the sensitivity of ornithological receptors it is important to remember that the receptors considered in the assessment are defined populations of a species and not just the individuals that may be affected by the Marine Scheme.

Table 10.10 Definition of terms relating to the sensitivity of the receptor

Sensitivity of the Receptor	Description
Very High	Species receptor population has very limited tolerance of the effect under consideration, with individuals showing strong response, or subject to a very high likelihood of experiencing serious harm (e.g. injury or mortality). For effects that may extend beyond the source location (e.g. disturbance), individuals may show a response at distance greater than 1 km of the source. Small population size, low reproductive rate and unfavourable conservation status all increase a receptor's sensitivity.
High	Species receptor population has low tolerance of the effect under consideration, with individuals showing fairy strong response, or subject to a high likelihood of experiencing serious harm (e.g. mortality). For effects that may extend beyond the source location (e.g. disturbance), individuals within *ca*. 1 km of the source are likely to show a response. Small population size, low reproductive rate and unfavourable conservation status all increase a receptor's sensitivity.

Sensitivity of the Receptor	Description
Medium	Species receptor population has moderate tolerance of the effect under consideration, with individuals showing moderate response, or subject to a moderate likelihood of experiencing serious harm (e.g. mortality). For effects that may extend beyond the source location (e.g. disturbance), individuals in the close vicinity (within *ca*. 300 m) of the source are likely to show a response. Small population size, low reproductive rate and unfavourable conservation status all increase a receptor's sensitivity.
Low	Species receptor population has high tolerance of the effect under consideration, with individuals showing a weak response, or subject to a low likelihood of experiencing serious harm (e.g. mortality). For effects that may extend beyond the source location (e.g. disturbance), only individuals in the very close vicinity (within *ca*. 100 m) of the source are likely to show a response. Small population size, low reproductive rate and unfavourable conservation status all increase a receptor's sensitivity.
Negligible	Species receptor population has very high tolerance of the effect under consideration, with individuals showing either no or negligible response, or subject to no or negligible likelihood of experiencing serious harm. Small population size, low reproductive rate and unfavourable conservation status all increase a receptor's sensitivity.

72. The significance of the effect upon ornithological receptors is determined by combining the magnitude of the impact and the sensitivity of the receptor, as outlined in Table 10.11 below.

Table 10.11 Matrix used for the assessment of the significance of the effect

		Magnitude of Impact			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of Receptor	**Negligible**	Negligible	Negligible to Minor	Negligible to Minor	Minor
	Low	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate
	Medium	Negligible to Minor	Minor	Moderate	Moderate to Major
	High	Minor	Minor to Moderate	Moderate to Major	Major
	Very High	Minor	Moderate to Major	Major	Major

10.11. Designed in Mitigation

73. As part of the project design process, a number of measures have been proposed to reduce the potential for impacts on shipping and navigation (see Table 10.12). These include measures which have been incorporated as part of the Marine Scheme's design (referred to as 'designed in measures') and measures which will be implemented regardless of the impact assessment (referred to as 'tertiary mitigation') and the effects of which are well known and established. As there is a commitment to implementing these measures, they are considered inherently part of the

design of the Marine Scheme and have therefore been considered in the assessment presented below (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development.

Table 10.12 Measures adopted as part of the Marine Scheme (designed in measures & tertiary mitigation)

Mitigation Measure	Justification	Applicable Jurisdication
Route Selection and Avoidance.	The Marine Scheme has been specifically refined to avoid interactions with key designations, environmental sensitivities, and notable inshore fishing grounds as far as reasonably practicable. On the approach to the Landfall at Cambois, the route has been selected to minimise the footprint within European Sites. Nearshore routes with greater levels of interactivity with European Sites along the English and Scottish coast have been de-selected. Further detail on this is provided in Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives	Scottish and English waters
Micro-routeing within the Marine Scheme.	Micro-siting within the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints identified during pre-construction surveys.	Scottish and English waters
Landfall construction.	Trenchless techniques, such as Horizontal Directional Drilling (HDD) will be used at the Landfall for the construction of the Marine Scheme. Works associated with Landfall construction activities will avoid any works in the intertidal environment and will reduce the potential for sediment disturbance.	English waters only
Pose Little or No Risk (PLONOR) substances.	During trenchless installation activities at Landfall, there will be an interface between the sea and the drilling fluids used to create the exit pits at the breakouts. Small quantities of drilling fluids may be discharged to the marine environment, however best practice mitigation will be implemented to reduce the amount of drill mud / cuttings released in the event of a release. To limit environmental damage, only biologically inert PLONOR listed drilling fluid will be used.	English waters only
Vessel lighting.	Vessel deck lighting will be directed towards working areas only and kept to the minimum level required to facilitate safe operations. This is to reduce disturbance to seabirds.	Scottish and English waters
Adherence to Scottish Marine Wildlife watching code.	Project vessels (in both Scottish and English waters) will adhere to the protocols supplied in the Scottish Marine Wildlife Watching Code and will protect and reduce the risk of direct interactions and disturbance to marine wildlife, including marine mammals, seabirds and waterfowl.	Scottish and English waters
Shipboard Oil Pollution Emergency Plan (SOPEP).	All vessels to be used as part of any phase of the Project will adopt a waste management plan in line with the requirements set out as part of the International Convention for the Prevention of Pollution from Ships (MARPOL) and the SOPEP.	Scottish and English waters

Mitigation Measure	Justification	Applicable Jurisdication
Vessel best-practice / MARPOL.	Compliance with MARPOL regulations and best-practice protocols to prevent and manage incidents of accidental release of marine contaminants.	Scottish and English waters
Environmental Management Plan (EMP).	An EMP will be developed and employed to ensure potential release for pollutants will be reduced as far as practicable. This will include a Marine Pollution Contingency and Control Plan (MPCCP) and an Invasive and Non-Native Species Management Plan (INNSMP). An outline EMP has been provided as part of this application (Volume 5, Appendix 5.1) and will be updated for submission to MMO and MD-LOT prior to construction.	Scottish and English waters

10.12. Assessment of Impacts

74. The potential impacts arising from the construction, operation and maintenance, and decommissioning phases of the Marine Scheme are listed in Table 10.8 along with the maximum design scenario against which each impact has been assessed.

10.12.1. Potential Effects During Construction

10.12.1.1. COLLISION WITH LIGHTED VESSELS

75. The Scoping Opinion received from MD-LOT also requested that consideration be given to the potential for an impact pathway to ornithological receptors to arise from collision with lighted vessels. Further consideration of this impact is provided below.

76. For seabird species reports of vessel lighting giving rise to a collision risk is limited to shearwater and petrel species at the time when fledglings leave their nest sites (at night) and head out to sea. At this time bright lights on vessels such as work lights can cause disorientation of fledglings in the vicinity of breeding colonies (up to approximately 10 km), leading to mortality through collision and predation (Rodriguez *et al.*, 2017). There are no breeding colonies of these lighting-vulnerable seabird species in the region that could be affected by the Marine Scheme. Therefore, it is determined there is no impact pathway for vessel lighting to adversely effect seabird species.

77. Nocturnally migrating land birds can be attracted to bright lighting such as lighthouses leading to disorientation and risk of mortality through collision. The potential for this impact is most pronounced in the autumn migration during low-visibility weather conditions, such as fog (Rebke *et al.*, 2019; Gauthreaux, 2006). Construction vessel work lights are likely to be one or two orders of magnitude less powerful than that lighthouses and is therefore considered unlikely to pose a serious risk to birds (Furness, 2018). Embedded mitigation for vessel work lighting deployment (Table 10.12) will ensure that lights are no brighter than required, turned off when not required and orientated to minimise light spillage away from the illuminated work area. In view of the designed-in mitigation and the highly localised nature of any bright lighting required, it is not plausible that collision impacts on migrating land ornithological receptors could be of more than a negligible magnitude. Therefore, the potential for construction vessel lighting to affect migrant land birds due to lighting are not considered further. Vessel navigation lights are not likely to give rise to a collision risk to migrant land birds as these are relatively low intensity and are not reported to be a hazard.

78. Based on the information above it is concluded that there is no risk of collision to seabirds on the basis that there is no impact pathway. The potential impacts on nocturnal migratory land birds are negligible and would not be significant in EIA terms.

10.12.1.2. DISTURBANCE AND DISPLACEMENT

79. Construction phase activity has the potential to affect ornithological receptors through disturbance which in turn may lead to displacement of birds from the vicinity of construction activities (Furness *et al.*, 2013). Displacement from areas that birds would otherwise use, for example for foraging, is akin to habitat loss.

80. Disturbance could arise from the operation of construction vessels and associated onboard activities of construction personnel and machinery, noise and lighting. The construction activity is scheduled to take place between Q4 2027 to Q4 2031 (including site preparation) during which vessel movements and other construction activity could occur at all times of day. The location of construction activity would change as cable laying progresses along the Offshore Export Cable Corridor. In addition to cable laying operations themselves it is anticipated that there will be a small amount of vessel activity along the cable route beforehand connected with preparatory works such seabed survey, boulder clearance and seabed levelling activities (Table 10.8). The duration of

construction activity visits at any one location (and at any one time) along the cable route will typically be relatively short (less than one day). Longer periods of activity (up to a few weeks) are anticipated at the end locations of the Offshore Export Cable Corridor, where work will be required to connect the Offshore Export Cables into the Offshore Convertor Station Platforms within the BBWF array area, and at the Landfall.

81. At the Landfall, as detailed above, a range of nearshore construction and installation activity is anticipated to be required in order to bring the Offshore Export Cables to shore. Based on the maximum design scenario for the Marine Scheme, trenchless technology (such as HDD) will be used to bring the Offshore Export Cables ashore via underground ducts which will extend from a location onshore (landward of MHWS) to exit pits in the nearshore area. For further details, please refer to Volume 2, Chapter 5: Project Description. The vessel-based works at the Landfall are likely to involve the use of a jack-up barge in the nearshore area and together with support vessels transiting to and from this to local ports. These vessels will be present for the time it takes to install the HDD ducts, which is anticipated to take up to 18 months.

82. It is anticipated that the Marine Scheme vessel-based construction activity will approach no closer than approximately 250 m seaward of MLWS and that therefore the potential for disturbance to birds, such as wader species, using intertidal habitats is negligible. This conclusion is reached in light of the findings of the commissioned Cambois Coast non-breeding season survey (Volume 3, Appendix 10.1). In particular it is relevant to note that the intertidal habitat in the vicinity of the Landfall is subject to high baseline levels of disturbance (e.g. by recreational beach users) and has low importance for feeding and roosting waders. For the reasons discussed above, disturbance effects on birds using intertidal habitats in the vicinity of the Landfall are not considered further.

83. Construction phase disturbance of birds could also occur along transit routes used by project vessels (including supply and crew transfer vessels) operating between local ports and the construction site. Vessels travelling in the near vicinity of seabird colonies during the breeding season (March to September) generally have greater potential for disturbing seabirds than when operating further from colonies. This is because many seabirds, especially auk species, tend to congregate on the sea near their colony. For practical purposes the zone of greater sensitivity next to colonies can be defined by a 2 km buffer seaward of the colony.

84. Disturbance to birds along the cable route would last only for the duration of construction work i.e., whilst project vessels are present, after which bird utilisation at the locality is expected to quickly return (within hours) to baseline conditions. Thus, whereas the construction phase as a whole is categorised as lasting over the medium-term (39 months maximum), at any one location along the cable route the construction disturbance would be a short-term, temporary and reversible effect.

85. There is a good understanding of the disturbance response likely to be shown by seabird species that utilise the OSA (see Table 10.5) to vessel based disturbance. Published studies show that species vary greatly in their response (or lack of it) to vessels and associated onboard activity (Garthe & Hüppop, 2004; Schwemmer *et al.,* 2011; Furness *et al*., 2013; Jarrett *et al*., 2018).

86. Garthe and Hüppop (2004) developed a scoring system for disturbance factors which they applied to seabird species in German sectors of the North Sea. This was refined by Furness and Wade (2012) and Furness *et al*. (2013) with a focus on seabirds using Scottish offshore waters. The approach uses information in the scientific and 'grey' literature, as well as expert opinion to identify disturbance ratings for individual species, alongside scores for habitat flexibility and conservation importance. These factors were used to define an index value that highlights the sensitivity of a species to disturbance and displacement. The disturbance/displacement scoring develop by Furness is considered relevant to the assessment presented below. Additional more recent information on the vulnerability of seaduck and diver species to vessel disturbance is also taken into consideration when judging the magnitude of disturbance impacts (Jarrett *et al.*, 2018; Mendell *et al*., 2019).

87. There is also a good understanding of how birds such a waders and wildfowl species that use intertidal habitats and near-shore waters are likely to respond to potential disturbance sources from

construction activities (Goodship & Furness, 2019; Livezey *et al.,* 2016; Laursen *et al.*, 2017; Cutts *et al.*, 2013).

88. Subsea noise from vessels is not considered a risk factor of importance for diving birds, for example it is not listed as a potential offshore windfarm impacts in the reviews by Garthe,and Hüppop (2004) and Furness *et al.* (2013). Above water noise disturbance from construction activities is not considered in isolation as a risk factor for birds. Rather, noise disturbance is considered to be an integral element of the combined overall disturbance stimulus, together with visual stimuli of vessels and onboard activities that may cause birds to show a behavioural disturbance response.

10.12.1.2.1. MAGNITUDE OF IMPACT

89. As set out in the MDS (Table 10.8) it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months. The maximum number of construction vessels that will be present on site at any one time is 20. This includes two pre-construction vessels required for seabed preparation such as seabed levelling and boulder clearance, two cable installation vessels and two cable protection vessels. Whilst the site preparation works will occur for the duration of the construction phase, these will not be continuous. As up to four Offshore Export Cables are to be installed, there are expected to be periods when some site preparation, landfall and cable installation works occur concurrently. A further 10 guard vessels may also be required throughout the construction period. There may also be a requirement for up to two survey/OCV vessels, and two CTVs to be present within the Marine Scheme at any one time. Due to the linear nature of the Marine Scheme, it is expected that the vessels will be moving continuously along the Offshore Export Cable Routes, and therefore will only be present in specific locations for short periods of time (hours to days).

90. Disturbance to birds by construction activity would be a direct effect, with individual birds using the OSA showing some form of behavioural response. This could be a very mild response such an increase in vigilance, or a stronger response such as moving away from the source of disturbance, resulting in displacement to a new location. Some species, in particular gull species, may be attracted to the vicinity of vessel activity, for example because they have learnt to associated vessels with enhanced feeding opportunities.

91. Disturbance to birds along the cable route would be a reversible effect that would last only for the duration of construction work i.e., whilst project vessels are present, after which bird utilisation at the locality is expected to quickly return (within hours) to baseline conditions. Thus, whereas the construction phase as a whole is categorised as lasting over the medium-term (up to 39 months), at any one location along the cable route it would be short-term. Construction disturbance would occur intermittently at any one location within the construction site, as it would only occur in response to construction activity at the location.

92. With the exceptions of red-throated diver, a species that has particularly high vulnerability to disturbance (Furness *et al.*, 2013), the potential for cable laying activities to disturb seabirds is likely to extend no more than approximately 500 metres from the cable laying vessel (representative of the potential range of distances needed to protect birds from human disturbance; Goodship and Furness 2022). Although the location where such disturbance would occur will move as construction work proceeds. The area over which seabirds would potentially be affected by one single vessel at any one time would be 0.78 km^2. On this basis a theoretical maximum area of disturbance of up to 15.6 km^2 could occur across the entire 720 km long Marine Scheme if all 20 vessels were operating simultaneously. 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 smaller. For all species potentially affected, an area of this magnitude is extremely small in the context of the areas of marine habitat used by the various receptor populations assessed, (these extend over 100s to 10,000s km^2, depending on the species).

93. In the case of red-throated diver, the potential for cable laying activities to cause disturbance could extend up to approximately 1 to 2 km from the cable laying vessel (the proximity tolerance to vessels is likely to be inversely related vessel speed, which in this case would usually be very low). Thus for these species, at any one time cable laying activities could potentially disturb individuals over an area in the order of 3 to 10 km^2. Areas of this size are very small in the context of the areas used by the (BDMPS) receptor populations of these species. The relevant BDMPS population of wintering red-throated divers is defined as the birds wintering in the South West North Sea (Furness, 2015). This area encompasses the territorial waters from Northumberland to Kent, covers an area well in excess of 1000 km^2 and supports a wintering red-throated diver population estimated at approximately 10,000 individuals (Furness, 2015).

94. The spatial magnitude of the potential disturbance impact on seabirds along the Offshore Export Cable Route is determined by considering the typical densities, season by season, reported for areas within the OSA (Kober *et al*. 2010; Skov *et al*. 1995; Balmer *et al*. 2013), baseline levels of disturbance in the OSA, and the proximity tolerance of a species to vessel-based disturbance, as presented in Table 10.13 (i.e., the disturbance susceptibility category shown in this table). This information, set in the context of a receptor population's size and the extent of the marine area it regularly utilises, gives an indication of the proportion of individuals in a receptor population potentially affected by the Marine Scheme.

95. For assessment purposes the regional breeding populations of receptor seabird species is defined as the birds breeding in south-east Scotland and Northumberland. For most seabird species this gives is a more geographically restricted definition than one based on the species breeding season foraging ranges (Woodward *et al*. 2019), and therefore provides for more cautious assessment conclusions (it should be noted that assessment conclusions would be the same were seabird receptor regional breeding populations to be defined on the basis of mean maximum foraging ranges). For breeding common eider, it is considered that the Northumberland breeding population (Natural England, 2019) is the appropriate definition of the regional population for assessment purposes.

96. The reviews referred to above were used to inform the disturbance susceptibility of birds using the OSA to construction activity (Table 10.13). In the categories of disturbance susceptibility consider the likely proximity tolerance and behavioural response of individuals using the OSA, and are used, alongside other information, to inform the determination of the spatial magnitude of disturbance effects on ornithological receptors. It should be noted that susceptibility to disturbance in Table 10.13 is a characteristic of the individuals and is not the same as the categories of sensitivity for species receptor populations defined in Table 10.10, though for most species the two are strongly positively correlated. The negligible susceptibility category is used for bird that are likely to show no response to vessels and onboard activity, indeed some species in this category might be attracted to the vicinity of vessels. The low susceptibility category are birds that are likely to show only a small response in which some or all individuals within approximately 100 m of a disturbance source (e.g., a project vessel) would temporarily move away from the disturbance source and quickly (within a few minutes) resettle and resume their initial behaviour in nearby habitat. The medium susceptibility category (Table 10.13) is used for birds that would be expected to show a similar disturbance response but with lower proximity tolerance, with individuals up to approximately 250 m from the disturbance source potentially respond by temporarily moving away from the source, and quickly resume their original activity in nearby habitat a few hundred metres away. Similarly, the individuals of species in the high susceptibility category are likely to show a disturbance response up to approximately 500 m from the disturbance source and are also likely to move to a nearby location and quickly resume their original activity. The very high susceptibility category (Table 10.13) is used for the few species (e.g. red-throated diver species) that use the OSA that are likely to have low tolerance of vessel activity. These species may show disturbance response up to at least 1 km from operating vessels, with birds flushing and flying to alternative nearby habitat. Consideration of the proximity tolerance distance to vessels provides a means to roughly estimate the size of the area potentially affected by disturbance.

97. A species' vulnerability to vessel disturbance and sensitivity to its effects may change seasonally due to changes in their food requirements and mobility. For example, breeding birds provisioning chicks, have greater feeding requirements compared to non-breeding birds and therefore have greater sensitivity to disturbance. Some seabirds, such as auk species, become temporarily flightless during their annual flight feather moult and these moulting birds will have reduced ability to move away from approaching vessels. Common guillemot and razorbill partly rear their chicks on the sea (mainly in July and August) after they depart their breeding colony; chicks are flightless and thus also have limited ability to move away from approaching vessels. There could be potential for collision risk if seabirds sitting on the sea have sufficient time to take effective avoidance behaviour from approaching fast moving vessels. Information on a species' disturbance susceptibility and its occurrence in the OSA (Table 10.13) together with published information of receptor population size and distribution (e.g., Balmer *et al.*, 2011; Mitchell *et al.*, 2004; Furness, 2015; Frost *et al.*, 2021; Forrester and Andrews, 2007) were combined to define the spatial magnitude of construction disturbance (Table 10.13). For all species, the number of individuals anticipated to experience disturbance from construction activity is negligible in the context of the size of the receptor population. Also, for all species, the area over which individuals are anticipated to experience construction disturbance are negligible in the context of the area of habitat utilised by the receptor population (well below 1%). It is concluded that the spatial magnitude of construction disturbance is negligible for all bird species.

98. As, determined at the start of this section, construction disturbance is characterised as a direct short-term, reversible effect. The overall magnitude of disturbance on all ornithological receptors is determined to be negligible.

99. To confirm, all species listed in Table 10.13 are present in both Scottish and English waters, with the exception of common eider which is present in English waters only.

Table 10.13. Summary of determination of spatial magnitude of potential construction disturbance impacts on birds.

Species	Disturbance susceptibility category	Disturbance susceptibility category source information	Receptor population(s) considered	Occurrence in OSA	Disturbance spatial magnitude (see Table 10.9)
Red-throated diver	Very high	Furness *et al*., 2012[12]	Non-breeding BDMPS	Territorial and near-shore waters, winter, regularly present in very low numbers	Negligible
Great northern diver	Very high	Furness *et al*., 2012[4]	Non-breeding BDMPS	Territorial and near-shore waters, winter, occasionally present in very low numbers	Negligible
Fulmar	Negligible	Furness *et al*., 2012[4]	Breeding regional, & Non-breeding BDMPS	Offshore and territorial waters, year-round, common	Negligible
Manx shearwater	Negligible	Furness *et al*., 2012[4]	Passage BDMPS	Offshore and territorial waters, passage, scarce	Negligible
European storm petrel	Negligible	Furness *et al*., 2012[4]	Passage BDMPS	Offshore and territorial waters, passage, scarce	Negligible
Gannet	Low	Furness *et al*., 2012[4]	Breeding regional, & Non-breeding BDMPS	Offshore and territorial waters, year-round, very common	Negligible
Cormorant	High	Furness *et al*., 2012[4]	Breeding regional, & Non-breeding BDMPS	Near-shore waters, occasionally present, especially in winter, in very low numbers (maximum 3)	Negligible
European shag	High	Furness *et al*., 2012[4]	Breeding regional	Territorial and near-shore waters, regularly present, especially in	Negligible

[12] From Furness *et al.* 2012 Supplementary Information Table 7, with disturbance susceptibility scores translated as follows: 1, Negligible; 2, Low, 3, Medium, 4, High; and, 5, Very high.

Species	Disturbance susceptibility category	Disturbance susceptibility category source information	Receptor population(s) considered	Occurrence in OSA	Disturbance spatial magnitude (see Table 10.9)
				winter, in low numbers (maximum 15)	
Common eider	Medium	Furness *et al.*, 2012[4]	Breeding regional	Territorial and near-shore waters, regularly present in winter in low numbers (maximum 5)	Negligible
Common scoter	Very high	Furness *et al.*, 2012[4]	Non-breeding BDMPS	Territorial and near-shore waters, occasionally present in winter in low numbers (maximum 8)	Negligible
Red-breasted merganser	Medium	Goodship & Furness, 2019	Non-breeding BDMPS	Near-shore waters regularly present in winter in low numbers (maximum 4)	Negligible
Goldeneye	High	Furness *et al.*, 2012[4]	Non-breeding BDMPS	Near-shore waters, winter and passage, occasionally present in winter in low numbers (maximum 6)	Negligible
Arctic skua	Negligible	Furness *et al.*, 2012[4]	Passage BDMPS	Territorial and near shore waters, passage, very scarce	Negligible
Great skua	Negligible	Furness *et al.*, 2012[4]	Passage BDMPS	Offshore and territorial waters, passage, scarce	Negligible
Little gull	Assumed low	This species is not considered by any review	Passage BDMPS	Offshore and territorial waters, passage, scarce	Negligible
Black-headed gull	Negligible	Furness *et al.*, 2012[4]	Non-breeding BDMPS	Near-shore waters and intertidal, winter, common	Negligible
Common gull	Low	Furness *et al.*, 2012[4]	Non-breeding BDMPS	Near-shore waters and intertidal, winter, common	Negligible

Species	Disturbance susceptibility category	Disturbance susceptibility category source information	Receptor population(s) considered	Occurrence in OSA	Disturbance spatial magnitude (see Table 10.9)
Lesser black-backed gull	Low	Furness *et al.*, 2012[4]	Breeding regional, & Non-breeding BDMPS	All parts of OSA, breeding and passage, common	Negligible
Herring gull	Low	Furness *et al.*, 2012[4]	Breeding regional, & Non-breeding BDMPS	All parts of OSA, year-round, very common	Negligible
Great black-backed gull	Low	Furness *et al.*, 2012[4]	Breeding regional, & Non-breeding BDMPS	All parts of OSA, year-round especially winter, common	Negligible
Kittiwake	Low	Furness *et al.*, 2012[4]	Breeding regional, & Non-breeding BDMPS	Offshore and territorial waters, year-round, very common	Negligible
Sandwich tern	Low	Furness *et al.*, 2012[4]	Breeding regional	Territorial and near-shore waters, breeding and passage, common	Negligible
Arctic tern	Low	Furness *et al.*, 2012[4]	Breeding regional	Territorial and near-shore waters, breeding and passage, common	Negligible
Common tern	Low	Furness *et al.*, 2012[4]	Breeding regional [Redacted]	Territorial and near-shore waters, breeding and passage, common	Negligible
Guillemot	Medium	Furness *et al.*, 2012[4]	Breeding regional	Offshore and territorial waters, year-round, very common	Negligible
Razorbill	Medium	Furness *et al.*, 2012[4]	Breeding regional	Offshore and territorial waters, year-round, very common	Negligible
Little auk	Low	Furness *et al.*, 2012[4]	Non-breeding BDMPS	Offshore and territorial waters, winter, scarce	Negligible
Puffin	Low	Furness *et al.*, 2012[4]	Breeding regional, & Non-breeding BDMPS	Offshore and territorial waters, year-round, very common	Negligible

Species	Disturbance susceptibility category	Disturbance susceptibility category source information	Receptor population(s) considered	Occurrence in OSA	Disturbance spatial magnitude (see Table 10.9)
Oystercatcher	Medium	Goodship & Furness, 2019	Non-breeding regional	Intertidal habitat, winter, regularly present in winter in low numbers (maximum 21)	Negligible
Curlew	Medium	Goodship & Furness, 2019	Non-breeding regional	Intertidal habitat, occasionally present in winter in low numbers (maximum 12)	Negligible
Bar-tailed godwit	Medium	Goodship & Furness, 2019	Non-breeding regional	Intertidal habitat, occasionally present in winter and on passage in low numbers (maximum 7)	Negligible
Turnstone	Low	Goodship & Furness, 2019	Non-breeding regional	Intertidal habitat, , regularly present in winter and on passage in low numbers (maximum 6)	Negligible
Sanderling	Medium	Goodship & Furness, 2019	Non-breeding regional	Intertidal habitat, regularly present in winter and on passage in low numbers (maximum 11)	Negligible
Purple sandpiper	Low	Goodship & Furness, 2019	Non-breeding regional	Intertidal rocks, occasionally present in winter in low numbers (maximum 3)	Negligible

10.12.1.2.2. SENSITIVITY OF THE RECEPTORS

100. The overall sensitivity of ornithological receptors to construction disturbance takes into consideration the following three receptor characteristics (Table 10.14):

- The nature of the likely disturbance response (if any) by a species to construction activity, taking into consideration the potential availability of alternative habitat;
- The value of the receptor population; and
- The conservation status of the receptor population.

101. The examination of species' sensitivity to offshore windfarms developed by Garthe and Huppop (2008) and Furness and Wade (2013) are based on combining scores for individual scores developed by Furness and Wade are based on combining scores for a variety of individuals, susceptibility and availability of habitat.

102. Wild bird populations are generally strongly valued by society in the UK. Their value is recognised in law by the general legal protection afforded to all wild bird species by the Wildlife and Countryside Act 1981 (as amended) and the additional legal protection afforded to certain species with small breeding populations listed on Schedule 1 of the act. Additional legal protection is also given to certain rare species listed on Annex I or the EU Birds Directive, and to the most important habitat of Annex I species and various other migratory species (i.e. SPAs). Important areas of habitat critical to some non-migratory bird species is also afforded additional legal protection under MCZ legislation.

103. In Table 10.14 all species receptor populations are considered to have at least 'medium' value in recognition of the fact that all are protected and all are defined at a regional or larger geographic scale. A value category of 'high' is considered appropriate for receptor populations of species that have enhanced protection through inclusion on the Schedule 1 or Annex I lists mentioned above, and/or a that contain a high proportion of the individuals of a species that is a qualifying interest of either an SPA or a MCZ (common eider). A receptor value category of 'very high' was also considered, but was not considered appropriate for any receptor population, because in all case the species considered also have other substantial receptor populations elsewhere in the UK.

104. The receptor population conservation status shown in Table 10.14 is based on Birds of Conservation Concern 5 (BoCC5) (Stanbury *et al.,* 2021). This is periodic assessment of conservation priority of UK species. It should be noted that not all species on the BoCC5 Amber List have an unfavourable conservation status (Stanbury *et al.,* 2021).

105. All species receptor populations are considered to have a high recoverability to the effects of disturbance and therefore this characteristic is not examined in more detail.

106. The overall sensitivity of each ornithological receptors considered is presented in Table 10.14.

Table 10.14. Ornithology receptor sensitivity criteria to disturbance impacts

Species	Disturbance susceptibility category (Table 10.13)	Receptor population	Legislative protection	Receptor population value (paragraphs 101 and 102)	Conservation status	Overall disturbance sensitivity
Red-throated diver	Very high	Non-breeding BDMPS	S1, A1	High	Favourable, Green list	High
Great northern diver	Very high	Non-breeding BDMPS	S1, A1	High	Favourable, Amber list	High
Fulmar	Negligible	Breeding regional, & Non-breeding BDMPS	High proportion birds likely from SPA	High	Unfavourable, Amber list	Low
Manx shearwater	Negligible	Passage BDMPS	General	Medium	Favourable, Amber list	Low
European storm petrel	Negligible	Passage BDMPS	A1	Medium	Favourable, Amber list	Low
Gannet	Low	Breeding regional, & Non-breeding BDMPS	High proportion birds likely from SPA	High	Unfavourable, Amber list High HPAI mortality	Medium
Cormorant	High	Breeding regional	General	Medium	Favourable, Green list	Medium
European shag	High	Breeding regional	High proportion birds likely from SPA	High	Unfavourable, Red list	High
Common eider	Medium	Breeding regional	All birds likely from MCZ	High	Unfavourable, Amber list	Medium
Common scoter	Very high	Non-breeding BDMPS	General	Medium	Unfavourable, Red list	Medium

Species	Disturbance susceptibility category (Table 10.13)	Receptor population	Legislative protection	Receptor population value (paragraphs 101 and 102)	Conservation status	Overall disturbance sensitivity
Red-breasted merganser	Medium	Non-breeding BDMPS	General	Medium	Unfavourable, Amber list	Medium
Goldeneye	High	Non-breeding BDMPS	General	Medium	Unfavourable, Red list	Medium
Arctic skua	Negligible	Passage BDMPS	General	Medium	Unfavourable, Red list	Medium
Great skua	Negligible	Passage BDMPS	High proportion birds likely from SPA	High	Unfavourable, Amber list High HPAI mortality	Medium
Little gull	Assumed low	Passage BDMPS	A1	High	Unfavourable, Green list	Medium
Black-headed gull	Negligible	Non-breeding BDMPS	General	Medium	Unfavourable, Amber list	Low
Common gull	Low	Non-breeding BDMPS	General	Medium	Favourable, Amber list	Low
Lesser black-backed gull	Low	Breeding regional, & Non-breeding BDMPS	General	Medium	Unfavourable, Amber list	Low
Herring gull	Low	Breeding regional, & Non-breeding BDMPS	General	Medium	Unfavourable, Red list	Low
Great black-backed gull	Low	Breeding regional, & Non-breeding BDMPS	General	Medium	Unfavourable, Amber list	Low

Species	Disturbance susceptibility category (Table 10.13)	Receptor population	Legislative protection	Receptor population value (paragraphs 101 and 102)	Conservation status	Overall disturbance sensitivity
Kittiwake	Low	Breeding regional, & Non-breeding BDMPS	High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
Sandwich tern	Low	Breeding regional	A1, High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
Arctic tern	Low	Breeding regional	A1, High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
Common tern	Low	Breeding regional	A1, High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
[Redacted]						
Guillemot	Medium	Breeding regional	High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
Razorbill	Medium	Breeding regional	High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
Little auk	Low	Non-breeding BDMPS	General	Medium	Unfavourable, Green list	Low
Puffin	Low	Breeding regional, & Non-breeding BDMPS	High proportion birds likely from SPA	High	Unfavourable, Red list	Medium

Species	Disturbance susceptibility category (Table 10.13)	Receptor population	Legislative protection	Receptor population value (paragraphs 101 and 102)	Conservation status	Overall disturbance sensitivity
Oystercatcher	Medium	Non-breeding regional	General	Medium	Unfavourable, Amber list	Medium
Curlew	Medium	Non-breeding regional	General	Medium	Unfavourable, Red list	Medium
Bar-tailed godwit	Medium	Non-breeding regional	General	Medium	Favourable, Amber list	Medium
Turnstone	Low	Non-breeding regional	High proportion birds likely from SPA	High	Unfavourable, Amber list	Medium
Sanderling	Medium	Non-breeding regional	General	Medium	Favourable, Amber list	Medium
Purple sandpiper	Low	Non-breeding regional	High proportion birds likely from SPA	High	Unfavourable, Red list	Medium

10.12.1.2.3. SIGNIFICANCE OF THE EFFECT

107. For all ornithological receptors except diver species and European shag receptors, the overall magnitude of the construction disturbance impact is deemed to be negligible and the sensitivity of the receptors potentially affected is considered to range from low to medium depending on species (Table 10.14). The effect of disturbance will, therefore, be of **negligible, adverse** significance, which is not significant in EIA terms.

108. For red-throated diver, great northern diver and European shag receptors, the overall magnitude of the construction disturbance impact is deemed to be negligible and the sensitivity of the receptors potentially affected is considered to be high (Table 10.14). The effect of disturbance will, therefore, be of **minor, adverse** significance, which is not significant in EIA terms.

10.12.1.2.4. SECONDARY MITIGATION AND RESIDUAL EFFECT

109. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

10.12.1.3. CHANGE IN PREY AVAILABILITY

110. There is potential for ornithological receptors to be affected indirectly as a result changes in prey distribution, availability or abundance. Reduction or disruption to prey availability for marine birds may cause displacement from foraging grounds in the area or reduced energy intake, affecting survival rates or productivity in the population in the short-term (BBWFL 2022).

111. Cable installation within the Marine Scheme may lead to temporary subtidal habitat loss/disturbance as a result of a range of activities including seabed preparation, installation of cables and cable protection and the use of jack-up barges at the trenchless technique punch-out location. As outlined in the MDS table, there is potential for up to 18 km^2 of temporary seabed disturbance throughout the Marine Scheme, of which 14 km^2 will be in English Waters and 4 km^2 in Scottish Waters.

112. Construction activities will occur intermittently over a period of up to 39 months. This includes seabed preparation, 15 months for Landfall construction and 18 months for installation of the Offshore Export Cables. Activities from seabed preparation to completion of installation will not all occur at the same time, although some activities may overlap and occur simultaneously for a period of time. Given the intermittent nature of the activities, only a small area of seabed is expected to be disturbed at any one time. Furthermore. recovery of seabed habitats will commence immediately following installation of infrastructure allowing key prey species to repopulate the areas of previous disturbance.

113. Increases in SSC and associated sediment deposition may also reduce the abundance and distribution of prey species. Modelling was undertaken as part of the BBWF EIA to determine the increases in SSC resulting from cable installation associated with the BBWF (BBWFL, 2022a). Average levels of SSC increased to between 50 mg/l and 500 mg/l across the plume extent. These levels dropped to background levels on the slack tide. As peak currents within the BBWF array area are of a similar magnitude to the Marine Scheme, it is likely that any changes in SSC as a result of the BBWF cables will be of a similar magnitude to the changes in SSC within the Marine Scheme as a result of Offshore Export Cable installation.

114. Respectively the installation of offshore export cables may result in short-term avoidance of affected areas by fish and smothering of sessile organisms such as bivalves. Adult fish have high mobility and may show avoidance behaviour in areas of high sedimentation. However, there may be impacts on the hatching success of fish larvae and consequential effects on the viability of spawning stocks due to limited mobility. Spawning grounds for sandeel overlap with the Marine Scheme fish and shellfish ecology study area, and their eggs are buried in the seabed for couple

of weeks before hatching. Sandeel eggs are known to be tolerant to sediment deposition due to the nature of re-suspension and deposition within their natural high energy environment, and it is therefore very likely that any effect from increased SSC during construction will be limited. Herring spawning grounds are also found within the Marine Scheme fish and shellfish ecology study area, with their eggs potentially tolerant of very high levels of SSC. Most bivalves are known to be tolerant to sediment deposition due to the nature of re-suspension and deposition within their natural high energy environment, and it is therefore very likely that any effect from increased SSC during construction will be limited (Volume 2, Chapter 9 Fish and Shellfish Ecology) Furthermore, deposited sediments are expected to be removed quickly by the currents resulting in small amount of sediment being deposited. Given the small amount of predicted deposition, local spatial extent and relatively short duration of predicted SSC increases, no effect on survival of these key prey species was predicted by Volume 2, Chapter 9 Fish and Shellfish Ecology.

115. Increases in SSC and associated reductions in water clarity may also affect the ability of foraging marine birds to locate fish at the sea surface and in the water column, reducing the availability of key prey species. However, it is considered that most foraging marine birds will be largely unaffected by the low-level temporary increases in SSC, as the concentrations are likely to be within the range of natural variability (generally <5 mg/l but can increase to over 100 mg/l during storm events/increased wave heights) and will reduce to background concentrations within a very short period (approximately two tidal cycles).

116. Reduced benthic prey availability as a result of physical disturbance to the seabed by construction activity has potential to give rise to a likely significant effect on the regional receptor population of common eider. Common eider regularly use parts of the inshore and near shore sections of the OSA (i.e., where the seabed lies at a depth of less than approximately 20 m) to feed on non-mobile benthic prey, in particular bivalves molluscs. The effects on non-mobile benthic prey caused by construction activity would be reversible, with benthic prey populations likely to gradually recover through natural recolonisation from surrounding habitat to baseline conditions over the medium-term (up to approximately two years after construction work ends). The potential for reduced non-mobile benthic prey availability would persist from the initial physical disturbance of seabed habitat by construction activity until recovery occurs.

117. Some fish species are also sensitive to marine noise. Where this leads to the disturbance and displacement of these sensitive fish species and this has potential to lead to reduced availability of fish prey for seabirds. Marine invertebrate prey species (e.g., molluscs) are not generally considered to have more than negligible sensitivity to underwater noise. Construction activities will generate a degree of underwater noise (for example from vessel propellers, trenching works (if required) and pre-construction geophysical investigations). This noise emitted by construction activities is anticipated to be highly localised, of not more than moderate loudness (e.g., there will be no use of explosives or pile driving) and short term in nature. The impact of this underwater noise on fish receptors is examined in detail in Volume 2, Chapter 9: Fish and Shellfish Ecology.

118. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. It is currently unclear as to how the presence, and subsequent removal of, subsea structures may affect prey species (Peschko *et al*., 2020; BOWL 2021a, b; Scott, 2022). It is possible that prey abundance could decline from the levels present during the operation and maintenance period. This could occur if cable protection measures lead to an increase in key prey abundance within the Marine Scheme via the provision of artificial reef habitats. However, it is assumed that some cable protection will be left in situ with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning. Thus, any reduction in prey abundance through removal of subsea structures is likely to be very small relative to the area over which marine birds forage.

10.12.1.3.1. MAGNITUDE OF IMPACT

119. For all fish receptors, Volume 2, Chapter 9: Fish and Shellfish Ecology concludes that marine construction activity impacts on fish receptors (temporary habitat loss and disturbance, increased SSC and marine noise) will be negligible to minor and not significant in EIA terms. It follows that there is no potential for a knock-on significant indirect effect on ornithological receptors through reduced fish prey availability. It is also relevant to point out that the various fish-eating seabird receptors that utilise the OSA (e.g., auks, shag, gannet, gull and tern species) are all highly mobile and have very extensive foraging areas available to them, extending over 100's to 1000's of km^2. For the various reason described above it is determined there is no potential for indirect effects on ornithological receptors of more than negligible magnitude to arise from a reduction in fish prey availability due to noise arising from construction activity.

120. It is considered that that there is no potential for a likely significant effect on diving birds species that sometimes target (as well as fish) mobile benthic shellfish prey, such as crabs, as mobile benthic prey is likely to quickly recolonise disturbed seabed habitat, and thus any effect on prey availability would persist only over the short term.

121. In the case of common eider, the Northumbrian breeding (and wintering) population is considered to represent a discrete population and one of high conservation interest (Natural England, 2019). The spatial extent of critical marine habitat for this population has been determined by Natural England and is defined by the boundary of the Berwick to St Mary's MCZ (Natural England, 2019). This MCZ covers an area of 634 km^2 and roughly corresponds to the extent of territorial waters off the Northumberland coast that are less than 20 m deep (see Cambois Connection MPA and MCZ Assessment).

122. The maximum area of seabed habitat that will be disturbed by construction activity and that is in waters of <20 m depth is approximately 0.3 km^2 (i.e., 3 km x 100 m). This represents less than 0.05% of the potential foraging habitat available to the common eider receptor population. Even if a modest proportion of the MCZ area is unsuitable or low quality foraging habitat for common eider, it is clear that the spatial magnitude of the benthic prey availability impact would be negligible in context of the area forging habitat available to the population. It is also relevant to note that common eider is a mobile species and therefore any individuals that were to experience a localise reduction in benthic prey availability would be able to relocate to nearby alternative habitat. It is therefore concluded that the spatial magnitude of benthic prey availability impact on the common eider receptor would be negligible.

123. It is also judged that that there is no potential for a likely significant effect on non-breeding wader species that feed on benthic prey in intertidal habitats in the OSA. Although it is possible that under some cable Landfall design scenarios that intertidal soft-sediment beach habitat (e.g. sand and gravel) could be disturbed, the areas affected (up to a few 100 m^2) are negligible in the context of the 100s of km^2 of inter-tidal soft-sediment habitat available to waders in the region to waders in the region. It is also relevant to note that purple sandpiper and turnstone, two species of wader rated as having receptor populations of high value (Table 10.14), would not be affected by habitat change to beach sediments and knock-on effects on benthic prey because these species specialise in feeding on intertidal rocky habitat.

10.12.1.3.2. SENSITIVITY OF THE RECEPTOR

124. For all seabird species receptor, the characterisation of sensitivity with respect to receptor value, legislative protection and conservation status presented in Table 10.14 for disturbance also applies to sensitivity to prey availability.

125. Common eider are dependent on benthic prey (especially bivalve molluscs) and the area of foraging habitat available to the receptor population is relatively restricted. The common eider regional receptor population is deemed to be of high susceptibility to benthic prey availability, of high value,

have an unfavourable conservation status and have high recoverability. The overall sensitivity of the common eider receptor is judged to be high.

126. The other seabird species receptors considered, all of which predominantly target a range of fish prey, have large to very large areas of foraging habitat available. These species also all commonly travel moderate to large distances (10s to 100s of km) to forage (Woodward *et al*., 2019). Together these characteristics reduce the sensitivity of these species to prey availability as it means they have the behavioural traits and opportunity to find alternative foraging area in response to localised temporary reductions in fish prey availability. Bearing this in mind together with the characterisation of sensitivity with respect to value, legislative protection and conservation status presented in Table 10.14, the overall sensitivity to prey availability for all seabird species receptors other than common eider, shag and cormorant is rated as low for most gull and tern species (except roseate tern which is medium), puffin and gannet and medium for other species including guillemot and razorbill.

10.12.1.3.3. SIGNIFICANCE OF THE EFFECT

127. Overall, for the common eider regional breeding/non-breeding receptor population the magnitude of the impact of changes in prey availability is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms (in English waters only).

128. Overall, for all other seabird species receptors considered, the magnitude of the impact of changes in prey availability is deemed to be negligible and the sensitivity of the receptor is considered to be low (for gulls, terns, puffin and gannet), medium (for guillemot, razorbill and roseate tern) or high (shag and cormorant). The effect will, therefore, be of **negligible adverse significance** for most species except shag and cormorant, for which the effect will be **minor adverse significance**, which is not significant in EIA terms.

10.12.1.3.4. SECONDARY MITIGATION AND RESIDUAL EFFECT

129. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

10.12.2. Potential Effects During Operation and Maintenance

10.12.2.1. DISTURBANCE AND DISPLACEMENT

130. The potential for bird disturbance the during the operation and maintenance phase arises from vessel activity required to check the condition of the Marine Scheme and complete any necessary repairs and reburials, as explained in Volume 2, Chapter 5: Project Description. Up to four repair events and four reburial events of up to 1 km each are anticipated under a worst-case basis over the 35-year lifetime. There may also be a requirement for an annual routine inspection and geophysical surveys to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans.

131. It is anticipated that the vessel activity required in the operation and maintenance phase would mainly involve a relatively slow moving vessel working slowly along the cable route, together with associated transit journeys from/to local ports, and would generally involve the use of vessel that are smaller than the cable laying vessel and/or craft used during construction. It is also anticipated that operation and maintenance activities would on average require considerably fewer vessel movements than the during the construction phase. The range of bird species likely to be affected by vessel disturbance is the same as during construction (Table 10.14) and that these would be expected to show similar levels of vessel proximity tolerance and types of behavioural responses to vessel activity including localised displacement.

10.12.2.1.1. MAGNITUDE OF IMPACT

132. Taking all the similarities and differences to the disturbance in the construction phase discussed above into consideration, it is concluded that that nature of disturbance due to vessel activities during O&M would be similar to the construction phase but of a smaller magnitude due to the anticipated smaller size of vessels used and the lower number of vessels movements. However, the operation and maintenance phase would persist over the operational life of the Marine Scheme (35 years). Therefore, although O&M phase activities will have a long term duration (lifetime of the Marine Scheme) these activities and associated vessel presence will comprise very localised, infrequent short duration events (e.g. up to four cable repairs and four cable reburials affecting 1 km sections of the Offshore Export Cables over 35 years).

133. Following the same line of reasoning used for the assessment of Construction disturbance it is determined that the overall magnitude of operation and maintenance disturbance on all bird receptors is negligible.

10.12.2.1.2. SENSITIVITY OF THE RECEPTORS

134. The sensitivity of bird receptors to vessel disturbance during the operation and maintenance phase is the same as during the Construction phase discussed earlier and summarised in Table 10.14.

10.12.2.1.3. SIGNIFICANCE OF THE EFFECT

135. For all ornithology receptors except diver species and European shag receptors, the overall magnitude of operation and maintenance disturbance impact is deemed to be negligible and the sensitivity of the receptors potentially affected is considered to range from low to medium depending on species (Table 10.14). The effect of disturbance will, therefore, be of **negligible, adverse** significance, which is not significant in EIA terms.

136. For red-throated diver and European shag receptors, the overall magnitude of the construction disturbance impact is deemed to be negligible and the sensitivity of the receptors potentially affected is considered to be high (Table 10.14). The effect of disturbance will, therefore, be of **minor, adverse** significance, which is not significant in EIA terms.

10.12.2.1.4. SECONDARY MITIGATION AND RESIDUAL EFFECT

137. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

10.12.2.2. CHANGE IN PREY AVAILABILITY

138. During the operation and maintenance phase, there is the potential for ornithological prey species to be indirectly impacted by the Marine Scheme as a result changes in prey distribution, availability or abundance. Reduction or disruption to prey availability for marine birds may cause displacement from foraging grounds in the area or reduced energy intake, affecting survival rates or productivity in the population in the short-term (BBWFL 2022).

139. Potential indirect effects on prey species and/or the habitats of prey species include permanent habitat loss associated with cable protection, increased SSC during Offshore Export Cable repair and reburial activities, thermal emissions and EMF effects associated with the operation of Offshore Export Cables and recolonisation of cable protection. Such activities and impacts may change the behaviour or availability of prey species for seabirds.

140. Cable protection, as described in full within Volume 1, Chapter 5: Project Description, will change the seabed for the duration of its presence on the seabed (replacing existing conditions with a hard substrate). Increased SSC levels may cause fish and mobile invertebrates to avoid the area

adjacent to the Offshore Export Cables and may smother and hide immobile benthic prey. It might also reduce water clarity affecting foraging ability of seabirds. These outcomes may lead to a reduction in prey being available within the Marine Scheme area for foraging seabirds.

141. For benthic species, Volume 2, Chapter 8: Benthic Subtidal and Intertidal Ecology concludes that permanent habitat loss, increased SSC, and EMF effects will result in negligible to minor impacts during operation, and not significant.

142. Volume 2, Chapter 9: Fish and Shellfish Ecology concludes that for EMF effects, permanent habitat loss and thermal emissions from operational cables, impacts on fish and shellfish receptors will be negligible to minor during operation, and not significant. Also as detailed in section 10.12.1.3, the fish-eating seabird receptors utilising the OSA are highly mobile and have extensive foraging ranges relative to the spatial extent of any potential impacts that will dilute any effect of a reduction in prey species from the Marine Scheme OSA.

10.12.2.2.1. MAGNITUDE OF IMPACT

143. Permanent habitat loss that will result from the Marine Scheme is predicted to be of a very local spatial extent, in the context of the wider habitat extents, long-term duration, continuous and low reversibility. The use of cable protection will be minimised as far as practicable, and only used where required (i.e., where target burial using installation tools cannot be achieved, at crossings and the proposed Landfall location, for example). This will be informed by outputs from a Cable Burial Risk Assessment (CBRA) which will be completed by the installation contractor(s) prior to the commencement of construction.

144. For seabirds, key prey species are likely to be herring, sprat and sandeel. During the operation and maintenance phase, there is potential for up to 1.46 km^2 of long-term subtidal habitat loss where cable protection is required, with up to 0.23 km^2 of this within Scottish Waters and 1.24 km^2 in English Waters. Many species of fish are reliant upon the presence of suitable subtidal habitat for foraging, spawning and nursing. However, these areas of habitat loss will be discrete, either in the immediate vicinity of cable protection, or relatively small, isolated stretches of cable within large areas of sediment which characterise the baseline environment (i.e. soft sediments), representing a very low proportion of available foraging habitat for key ornithological species. Long-term habitat loss to key prey species during the construction phase was therefore assessed as being of low magnitude in Volume 2, Chapter 9 Fish and Shellfish Ecology.

145. With regard to the common eider, in those parts of the cable route that require cable protection, there would be a permanent change from the baseline soft-sediment benthic community to a hard substrate benthic community. Where rock armour protection is used in waters <20 m depth, this is may provide new feeding opportunities for common eider for example should mussel species (*Mytilus spp*., a favoured food of eider) colonise the substrate, something that is considered likely (please see Volume 2, Chapter 8: Benthic Subtidal and Intertidal Ecology for further information).

146. In terms of increased SSC, adult fish species are more mobile than juveniles and may show avoidance behaviour within areas affected by increased SSC making them less susceptible to physiological effects of this impact (please refer to Volume 2, Chapter 9: Fish and Shellfish Ecology for further details). Juvenile fish are therefore more likely to be affected by such habitat disturbances, as they are typically less mobile and so less able to avoid such impacts. However, natural temporary increases in SSC associated with winter storm events are also likely to occur within the area encompassed by the Marine Scheme. Therefore, it is expected that most juvenile fish likely to occur in the vicinity of the Marine Scheme will be largely unaffected by the low level temporary increases in SSC, as the concentrations are likely to be within the range of natural variability for these species and will reduce to background concentrations within a very short period (approximately two tidal cycles). Increased SSC during maintenance and repair activities is considered to be of local spatial extent, short term duration, intermittent and high reversibility.

Thermal emissions from cables and EMF effects are both considered to be highly localised spatial extent, long term duration, continuous and highly reversible.

147. Considering these together as an indirect impact on bird species, and considering that the nature of activities during operation and maintenance would be similar to the construction phase but of a significantly lower magnitude, and considering the significance of the effect assessed within Volume 2, Chapter 8: Benthic Subtidal and Intertidal Ecology and Volume 2, Chapter 9: Fish and Shellfish Ecology (assessed as not significant), the magnitude of impact for changes to prey availability is considered negligible.

10.12.2.2.2. SENSITIVITY OF THE RECEPTORS

148. As detailed in section 10.12.1.3.2, the overall sensitivity to prey availability for all seabird species receptors other than common eider is judged to be low or moderate (depending on the species), and high for common eider.

10.12.2.2.3. SIGNIFICANCE OF THE EFFECT

149. Overall, for the common eider regional breeding/non-breeding receptor population the magnitude of the impact is deemed to be **negligible** and the sensitivity of the receptor is considered to be **high**. The effect will, therefore, be of **minor** adverse significance, which is **not significant** in EIA terms (in English waters only due to potential presence in the vicinity of the Landfall).

150. Overall, for all other seabird species receptors considered, the magnitude of the impact is deemed to be **negligible** and the sensitivity of the receptor is considered to be **low** or **moderate**. The effect will, therefore, be of **negligible** adverse significance, which is **not significant** in EIA terms.

10.12.2.2.4. SECONDARY MITIGATION AND RESIDUAL EFFECT

151. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

10.12.3. Potential Effects During Decommissioning

152. Impacts on bird receptors during the decommissioning phase due to disturbance and displacement and change in prey availability are anticipated to be similar in nature and of no greater magnitude than impacts arising during the construction phase. Therefore, the assessment conclusions for the construction phase also apply equally to the decommissioning phase. For this reason and in the interest of brevity, no separate assessment is undertaken of potential impacts on bird receptors arising during the decommissioning phase.

10.13. Proposed Monitoring

153. No monitoring is proposed as no significant effects are predicted.

10.14. Cumulative Effects Assessment

10.14.1. Methodology

154. The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Marine Scheme together with other relevant plans, projects, developments and activities. Cumulative effects are therefore the complete set of effects arising from the Marine Scheme

together with the effects from a number of different developments, on the same receptor or resource. Please see Volume 2, Chapter 3: EIA Methodology for detail on CEA methodology.

155. The developments selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise and the development of a 'long list' of cumulative developments relevant to the Marine Scheme (see Volume 3, Appendix 3.1). Each development 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, to create the 'short list' as summarised in Table 10.15. This approach was agreed during Scoping and further consultation and technical engagement undertaken with consultees, as detailed in Table 10.3.

156. The specific projects scoped into the CEA for Ornithology, are outlined in Table 10.15.

Table 10.15 List of other developments considered within the CEA for Ornithology

Development/Plan	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[13]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
Cambois Connection Onshore Scheme	In planning	0 km (direct physical overlap)	Onshore cables, converter station and associated works to connect into the National Grid substation at Blyth	Construction anticipated to be 2026 to 2030	Anticipated to be operational from 2030 for 35 years	Construction and operation and maintenance
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated grid connection infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance
Scotland to England Green Link (SEGL) 1	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance
Eastern Link 3 (EL3)	Pre-planning	Limited information in the public domain, however potential for direct overlap	Subsea electricity cable(s)	Earliest in service date noted as 2031	Earliest potential operational date of 2031 – further information unavailable	Construction and operation and maintenance
Eastern Link 4 (EL4)	Pre-planning	Limited information in the public domain,	Subsea electricity cable(s)	Earliest in service date noted as 2031	Earliest potential operational date of 2031 – further	Construction and operation and maintenance

[13] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029

Development/Plan	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[13]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
		however potential for direct overlap			information unavailable	
Neart Na Gaoithe Offshore Wind	Under Construction	15	Offshore wind farm	2022 to 2023	From 2023, for 25 years	Construction and operation and maintenance
Seagreen 1	Under Construction	35	Offshore wind farm	2022 to 2023	From 2023, for 25 years	Construction and operation and maintenance
Seagreen 1A Project	Consented	36	Offshore wind farm	2024 to 2026	From 2026, for 25 years	Construction and operation and maintenance
Inch Cape Offshore Wind Farm	Consented	39	Offshore wind farm	2023 to 2025	From 2025, for 50 years	Construction and operation and maintenance
Eastern Green Link (EGL) 2	In planning	Approximately 3 km	A sub-sea HVDC cable from Sandford Bay at Peterhead, Scotland to Drax in England.	Construction anticipated to be 2025 to 2029	Operational from ~2029	Construction and operation and maintenance
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

10.14.2. Cumulative Effects Assessment

157. An assessment of the likely significance of the cumulative effects of the Marine Scheme upon ornithology receptors arising from each identified impact is given below.

158. It should be noted that the Marine Scheme and BBWF overlap both spatially (within the BBWF array area) and temporally (with regards to construction, operation and maintenance and decommissioning).

10.14.2.1.1. CUMULATIVE DISTURBANCE – OFFSHORE PROJECTS

159. The vessel disturbance to seabirds predicted to occur as a result of the Marine Scheme (as set out in sections 10.12.1 and 10.12.2) will be additional to disturbance and displacement caused by other the other marine projects in the region, in particular the construction, operation and maintenance of offshore windfarms and the installation of other marine cables. It will also be additional to the baseline levels of vessel disturbance from long established shipping and fishing activities in the region.

160. It is relevant to note that the EIA for the BBWF (BBWFL, 2022b) considered the potential for a cumulative impact on ornithological receptors to arise from disturbance and displacement during construction of the Berwick Bank wind farm. Specifically, it identified that there was a possibility that the construction phases of BBWF, Inch Cape, Seagreen 1a projects and the installation of the Cambois grid connection (i.e., the Marine Scheme) could overlap temporally. It also identified that the impact assessments for these projects have identified very small magnitudes of disturbance/displacement impacts on seabird receptors and concluded that even if these occurred at the same time this would not constitute a significant cumulative effect.

161. It is also relevant to note that the disturbance/displacement cumulative assessment for the operation and maintenance stage of BBWF (BBWFL, 2022b) does not include consideration of disturbance/displacement arising from the operation and maintenance of marine cable projects. This is because it was considered that the potential for disturbance/displacement impacts on seabird receptors to arise from the operation and maintenance of marine cable projects would be negligible and would not make any material contribution to the regional scale cumulative impact.

162. Of the ornithological receptors identified for the Marine Scheme, it is the species that occur in offshore waters and that have at least moderate susceptibility to disturbance (i.e., razorbill and common guillemot) that are of greatest relevance to assessing cumulative disturbance effects. This is because the receptor populations of these species utilise large marine areas and thus are potentially affected by other marine projects in the Forth and Tay and north-east England region, in particular offshore wind farm projects (these are predicted to cause long-term displacement of auks from their vicinity (typically areas of 10 to 100s of km^2), and their associated subsea cables (these are predicted to cause short-term localised disturbance to auk species from vessel activity (Table 10.15).

163. The other ornithological receptors for the Marine Scheme that are susceptible to disturbance (red-throated diver, common eider and European shag) are restricted to territorial waters and thus do not overlap with the offshore wind farm developments in the region. There is potential for vessel activity associated with the construction of other regional subsea cable projects listed in Table 10.15 to lead to localised disturbance where the routes pass through territorial waters. However, this disturbance is anticipated to be highly localised, of low intensity, infrequent and short term in nature.

164. For all species the potential disturbance arising from the Marine Scheme in isolation (as set out in section 10.12.1 and 10.12.2) would amount to no more than highly localised, short-term, low intensity disturbance of a very small proportion of individuals in the receptor populations considered, and affect only very small proportion of a population's marine habitat. For example, in the case of the regional breeding population receptors for the guillemot, razorbill and puffin, and using cautious assumptions with regard to vessel proximity tolerance, at any one time during the

construction period vessel activity could lead to displacement of birds from an area surrounding the cable laying vessel of 0.78 km^2. An area of this size would constitute well below 0.01% of potential foraging habitat available to these regional breeding populations, and on average would be expected to be used by between one and 10 foraging individuals (based on densities reported in Kober *et al*., 2010). This number of individuals corresponds in the order of 0.01% of the regional breeding populations of these species. All the species potentially affected by disturbance are highly mobile and therefore the few individuals that may be temporarily displaced would be able to easily and quickly move to nearby (adjacent) alternative habitat.

165. Given the very small spatial magnitude and infrequent nature of potential disturbance impacts it is not plausible that the Marine Scheme would materially contribute to a wider regional cumulative disturbance impact for any bird species and the cumulative effect will, therefore, be of low adverse significance, which is not significant in EIA terms.

10.14.2.1.2. CUMULATIVE DISTURBANCE – CAMBOIS CONNECTION ONSHORE SCHEME

166. It is also appropriate to consider the Landfall area in further detail in the context of the Cambois Connection Onshore Scheme including owing to the populations of eider protected by the Berwick to St Mary's MCZ (for a full assessment of this designated site and feature, please refer to the Cambois Connection Marine Scheme MPA and MCZ Assessment) and the presence of both purple sandpiper and turnstone qualifying features of the Northumbria Coast SPA within the Landfall area.

167. Potential effects on other species identified in the non-breeding bird survey including oystercatcher, sanderling, bar-tailed godwit, ringed plover, curlew and a number of gull species also require consideration with respect to potential cumulative effects associated with the Onshore Scheme.

168. Based on the maximum design scenario for the Marine Scheme, a trenchless technique such as HDD will be deployed to bring the Offshore Export Cables ashore via ducts that will be installed from a point landward of MHWS to an exit point at least 250 m seaward of MLWS, thus completely bypassing the intertidal zone.

169. Given that there will be no construction works within the intertidal area, there is no potential for any direct effects on intertidal species in terms of direct disturbance. However, there is potential for birds in the intertidal area to be disturbed by construction works in the nearshore area and from construction activities associated with the Onshore Scheme (located landward of MHWS) associated with the trenchless technology construction compounds required to install the ducts and bring the Offshore Export Cables to shore where they will be connected to the Onshore HVDC Cables. Further detail on the Onshore Scheme is provided in Chapter 5 Project Description.

170. Any disturbance from both offshore and onshore construction activities would last only for the duration of construction work i.e., whilst project vessels are present offshore and works are being undertaken in the onshore trenchless technology construction compounds, after which bird utilisation at the locality is expected to quickly return (within hours) to baseline conditions. The disturbance will also not occur within the intertidal zone (will occur offshore or onshore). It is also relevant to note that the intertidal habitat in the vicinity of the Landfall is already subject to high baseline levels of disturbance (e.g., by recreational beach users and particularly dog walkers, the greatest source of anthropogenic disturbance by far, as reported in section 10.7 above) and has low importance for feeding and roosting waders. The overall magnitude of the cumulative disturbance from both the Marine Scheme and Onshore Scheme is therefore considered to be negligible.

171. Of the birds identified in the intertidal area (section 10.7.4) oystercatcher, sanderling, bar-tailed godwit, ringed plover and curlew are considered to have medium sensitive to disturbance (Table 10.14). The gull species, purple sandpiper and turnstone have low sensitivity. The common eider is also considered have medium sensitivity to disturbance.

172. The Onshore Scheme is wholly outside of the Berwick to St Mary's MCZ and whilst some populations of common eider may wander onto land in-use by the Onshore Scheme, the common eider is a large sea-duck, and is anticipated to favour the coastal waters as opposed to regularly

frequenting the dune structure at Cambois. This is validated by the findings from the non-breeding survey carried out by the Applicant at the landfall which observed 3.1 and 5 common eider (mean peak count and maximum peak count respectively), none of which were observed on the beach / intertidal area or fields and flood water.

173. For the species that are considered to have medium sensitivity to disturbance including the common eider feature of the Berwick to St Mary's MCZ, the cumulative effect of disturbance when considered with the Onshore Scheme, will be of negligible adverse significance, which is not significant in EIA terms. For species with low sensitivity to disturbance including the purple sandpiper and turnstone qualifying features of the Northumbria Coast SPA, the cumulative effect of disturbance when considered with the Onshore Scheme, will also be of negligible adverse significance, which is not significant in EIA terms.

10.14.2.1.3. CUMULATIVE BENTHIC PREY AVAILABILITY

174. As identified in the project alone assessment, there is potential for ornithological receptors to be affected indirectly as a result changes in prey distribution, availability or abundance resulting from activities during construction, operation and maintenance and decommissioning. The key impacts on prey species include direct habitat loss and disturbance and increased SSC from pre-construction activities (seabed preparation including boulder clearance and seabed levelling), installation of cables and cable protection and cable repairs and reburials during operation. There is also potential for prey species to affected by marine noise from pre-construction geophysical surveys, permanent habitat loss due to the presence of cable protection, EMF and thermal emissions during operation and the potential recolonisation of cable protection.

175. It was concluded in Volume 2, Chapter 9 Fish and Shellfish that none of the impacts listed above would have likely significant effect on prey species. Taking this into consideration it was also concluded that, for the project alone, any effects on ornithological receptors as a result of changes in prey availability would also be of negligible to minor adverse significance which is not significant in EIA terms.

176. The potential effects of the Marine Scheme on fish and shellfish (prey species) described above were also assessed cumulatively with other projects, most notably with the BBWF, Eastern Green Link 1 and 2, Blyth Demonstrator Phase 2 and 3, Seagreen 1 and 1A and Inch Cape Offshore Wind Farms. This assessment also concluded that any potential effects would be of negligible to minor adverse significance which is not significant in EIA terms.

177. Given that there would be likely significant cumulative effects on prey species (Volume 2, Chapter 9 Fish and Shellfish) it is concluded that there would be no likely significant cumulative effects on ornithological receptors as a result of changes in prey availability.

178. With regard to the effects of prey availability on intertidal ornithological receptors (oystercatcher, sanderling, bar-tailed godwit, ringed plover, curlew, gull species, purple sandpiper and turnstone) most forage in the intertidal area rather than offshore, therefore given there is no direct effect on the intertidal area in terms of habitat loss or disturbance there is no potential for impacts on prey of these receptors. The exception to this is the common eider which forages on benthic prey.

179. Examination of the list of other projects in the region considered for CEA (Table 10.15) has identified no other projects that would also potentially have a negative impact on prey availability for the regional (Northumberland) common eider breeding/non-breeding receptor population.

180. It is therefore concluded that the cumulative effect on common eider would be the same as the project alone which would be of negligible adverse significance, which is not significant in EIA terms.

10.15. Inter-Related Effects

181. Inter-related effects are the potential effects of multiple impacts, effecting one receptor or a group of receptors. Inter-related effects include interactions between the impacts of the different stages of the Marine Scheme (i.e. interaction of impacts across construction, operation and maintenance and decommissioning), as well as the interaction between impacts on a receptor within a Marine Scheme stage. A description of the likely inter-related effects arising from the Marine Scheme on bird species is provided below.

182. The only bird species where there is potential for a likely significant effect by multiple impacts is common eider. This species is predicted to be affected by a negligible magnitude vessel disturbance effect and a negligible magnitude reduction in benthic prey availability effect. Both effects would be highly localised, would affect the same individuals and would lead to displacement of these birds to alternative (nearby) foraging habitat. As the same individuals would be involved and the consequence of both effects is the same (i.e., displacement) it is concluded that the combined magnitude of the two effects is also negligible and of Minor adverse significance.

183. These inter-related effects as described above are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phases. Therefore, these inter-related effects would not be significant in EIA terms.

10.16. Transboundary Effects

184. Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s).

185. During the non-breeding months some of the birds using the OSA will be winter visitors from arctic and subarctic breeding sites. In particular some individuals of kittiwake, fulmar, herring gull common guillemot, razorbill and puffin are likely to be of overseas origin, as are all individuals of great northern diver, little auk, common scoter, turnstone, purple sandpiper and sanderling. The most likely breeding origins of these winter visitors are sites located in both EEA states (in particular Norway and Iceland) and/or non-EEA states (in particular Russia and Greenland), depending on species. Studies of migrant populations of these species indicate that wintering birds are typically widely dispersed over very extensive wintering areas where they comingled with conspecifics from other breeding areas (Wernham *et al*. 2002; Frederiksen *et al*. 2012).

186. In order for the Marine Scheme to have a likely significant transboundary effect on an ornithology receptor from an EEA state, the OSA would need to have particular importance for that receptor population. Given the very large geographical extent of receptors' wintering areas and the likely multiple breeding site origins of overwintering birds that use the OSA, it is concluded that there is no potential for any phase of the Marine Scheme to have a likely significant transboundary effect on any EEA ornithological receptor. Therefore, transboundary effects for ornithological receptors are not considered further.

10.17. Summary of Impacts, Mitigation Measures, Likely Significant Effects and Monitoring

187. Information on offshore and intertidal ornithology within the OSA was collected through a desktop review, site-specific overwintering surveys, and consultation with relevant stakeholders. Table 10.16 presents a summary of the potential impacts, mitigation measures and the conclusion of likely significant effects in EIA terms in respect to Ornithology. The impacts assessed include:

- Disturbance and displacement (C, O&M, D); and
- Changes to prey species availability (C, O&M, D).

188. Overall, it is concluded that there will be no likely significant effects arising from the Marine Scheme during the construction, operation and maintenance or decommissioning phases.

189. Table 10.16 presents a summary of the potential cumulative impacts, mitigation measures and the conclusion of likely significant effects on Ornithology in EA terms. The cumulative effects assessed are related to benthic prey availability only, for the reasons described in section 10.14.2 above. Overall, it is concluded that there will be no likely significant cumulative effects from the Marine Scheme alongside other developments/plans.

Table 10.16 Summary of potential likely significant environmental effects, mitigation and monitoring

Description of Impact	Ornithological Receptors based on senstivity rating		Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
Disturbance and displacement (C, O&M, D)	Very high	Red throated diver Great Northern diver Common scoter	Negligible	Minor	None	Minor	None
	High	European shag Cormorant Goldeneye	Negligible	Minor	None	Minor	None
	Medium	Common eider Razorbill Guillemot Red-breasted merganser Roseate tern Oystercatch Curlew Bar-tailed godwit Sanderling	Negligible	Negligible	None	Negligible	None
	Low	Gannet Common gull Little gull Lesser black-backed gull Herring gull Great black-blacked gull Kittiwake Sandwich tern Common tern	Negligible	Negligible	None	Negligible	None

Description of Impact	Ornithological rating	Receptors based on senstivity	Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
		Arctic tern Little auk Puffin Turnstone Purple sandpiper					
	Negligible	Fulmar Manx shearwater European storm petrel Arctic skua Great Skua Black headed gull	Negligible	Negligible	None	Negligible	None
Prey availability (C, O&M and D)	Very high	Red throated diver Great Northern diver Common scoter	Negligible	Minor	None	Minor	None
	High	European shag Cormorant Goldeneye	Negligible	Minor	None	Minor	None
	Medium	Common eider Razorbill Guillemot Red-breasted merganser Roseate tern Oystercatch Curlew Bar-tailed godwit Sanderling	Negligible	Negligible	None	Negligible	None

Description of Impact	Ornithological Receptors based on senstivity rating		Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
	Low	Gannet Common gull Little gull Lesser black-backed gull Herring gull Great black-blacked gull Kittiwake Sandwich tern Common tern Arctic tern Little auk Puffin Turnstone Purple sandpiper	Negligible	Negligible	None	Negligible	None
	Negligible	Fulmar Manx shearwater European storm petrel Arctic skua Great Skua Black headed gull	Negligible	Negligible	None	Negligible	None

Table 10.17 Summary of likely significant cumulative environment effects, mitigation and monitoring

Description of Impact	Ornithological Receptors based on senstivity rating		Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
Cumulative disturbance and displacement (C, O&M, D)	Very high	Red throated diver Great Northern diver Common scoter	Negligible	Minor	None	Minor	None
	High	European shag Cormorant Goldeneye	Negligible	Minor	None	Minor	None
	Medium	Common eider Razorbill Guillemot Red-breasted merganser Roseate tern Oystercatch Curlew Bar-tailed godwit Sanderling	Negligible	Negligible	None	Negligible	None
	Low	Gannet Common gull Little gull Lesser black-backed gull Herring gull Great black-blacked gull Kittiwake Sandwich tern Common tern Arctic tern	Negligible	Negligible	None	Negligible	None

Description of Impact	Ornithological Receptors based on senstivity rating		Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
		Little auk Puffin Turnstone Purple sandpiper					
	Negligible	Fulmar Manx shearwater European storm petrel Arctic skua Great Skua Black headed gull	Negligible	Negligible	None	Negligible	None
Cumulative prey availability (C, O&M and D)	Very high	Red throated diver Great Northern diver Common scoter	Negligible	Minor	None	Minor	None
	High	European shag Cormorant Goldeneye	Negligible	Minor	None	Minor	None
	Medium	Common eider Razorbill Guillemot Red-breasted merganser Roseate tern Oystercatch Curlew Bar-tailed godwit Sanderling	Negligible	Negligible	None	Negligible	None
	Low	Gannet	Negligible	Negligible	None	Negligible	None

Description of Impact	Ornithological Receptors based on senstivity rating		Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
		Common gull Little gull Lesser black-backed gull Herring gull Great black-blacked gull Kittiwake Sandwich tern Common tern Arctic tern Little auk Puffin Turnstone Purple sandpiper					
	Negligible	Fulmar Manx shearwater European storm petrel Arctic skua Great Skua Black headed gull	Negligible	Negligible	None	Negligible	None

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