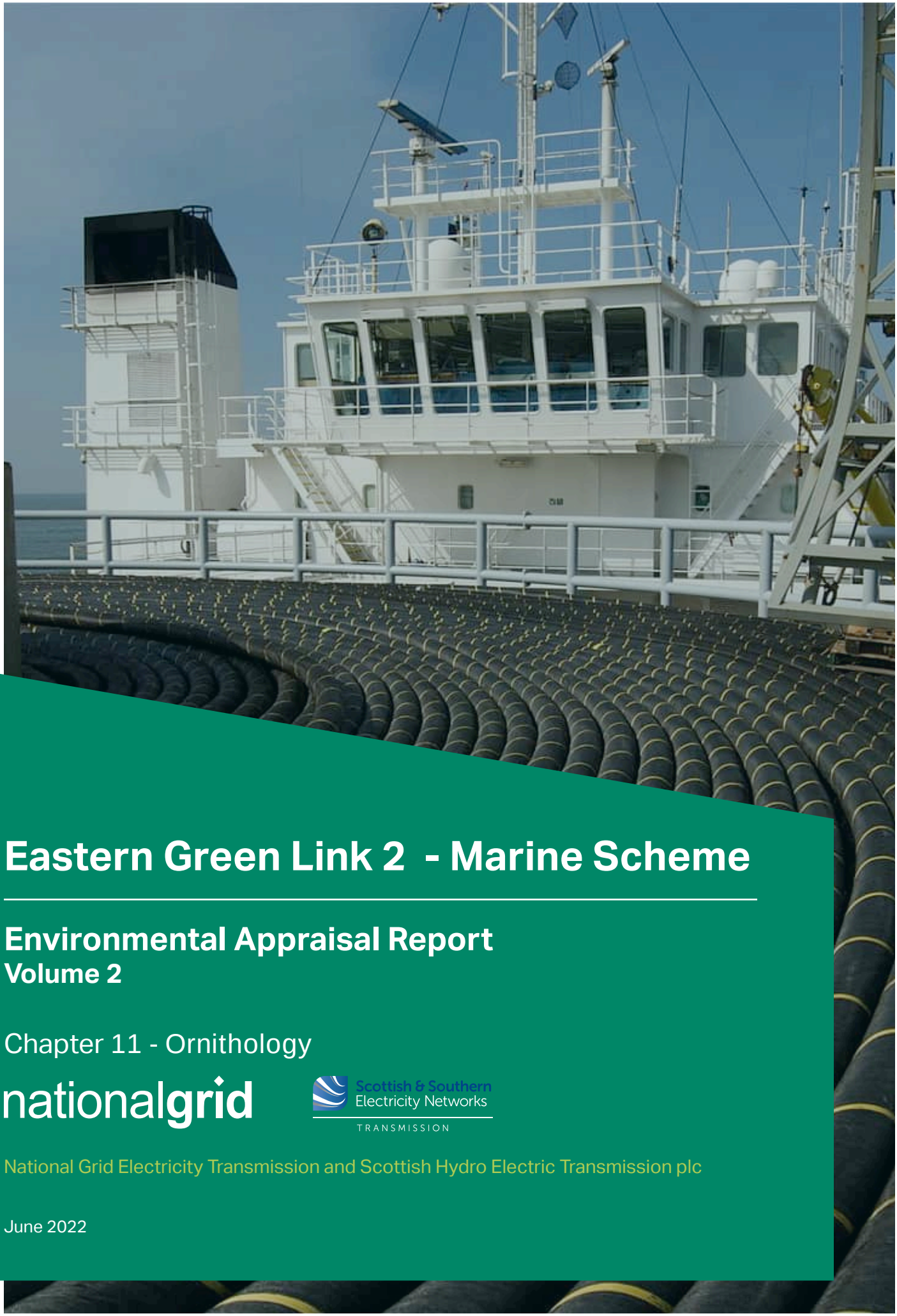

# Eastern Green Link 2 - Marine Scheme

## Environmental Appraisal Report
### Volume 2

Chapter 11 - Ornithology

nationalgrid

Scottish & Southern Electricity Networks
TRANSMISSION

National Grid Electricity Transmission and Scottish Hydro Electric Transmission plc

June 2022

## Prepared for:

National Grid Electricity Transmission and
Scottish Hydro Electric Transmission Plc

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Brown and May Marine Ltd (Commercial Fisheries).

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# Figures



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# 11. Ornithology

## 11.1 Introduction

This chapter of the Environmental Appraisal Report (EAR) provides an appraisal of the potential interaction of the Marine Scheme with marine ornithological receptors. Impacts to ornithology are interrelated with impacts on benthic ecology (Chapter 8: Benthic Ecology) and fish (Chapter 9: Fish and Shellfish). The potential for Likely Significant Effects to the National Site Network (including Special Protection Areas (SPAs) and Ramsar Sites), formerly known as European sites, is presented in Appendix 8.2: Habitats Regulations Assessment (HRA) Report.

The potential for interaction between the Marine Scheme and other plans/projects, which may result in significant cumulative effects, is considered in Chapter 17: Cumulative and In-Combination Effects.

## 11.2 Legislation, Policy and Guidance

This section outlines legislation, policy, and guidance relevant to the appraisal of the potential effects on marine ornithological receptors associated with installation, Operation and Maintenance, and Decommissioning Phases of the Marine Scheme. For further information regarding the legislative context, refer to Chapter 3: Legislative and Policy Framework and Appendix 3.2: Topic Specific Legislation.

### 11.2.1 International Legislation

The following international legislation and agreements in which the UK is a signatory concerning the preservation of maritime ornithological receptors during the planning and execution of projects such as offshore cable development in UK waters:

- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (the Birds Directive)

### 11.2.2 National Legislation

The following national and devolved legislation concerning the preservation of avian populations during the planning and installation of projects such as subsea cable developments in UK waters:

#### 11.2.2.1 UK (England and Scotland)

- Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009);
- Wildlife and Countryside Act 1981 (HM Government, 1981);
- The Marine Strategy Regulations 2010 (HM Government, 2010); and
- The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2017 (HM Government, 2017).

#### 11.2.2.2 Scotland

- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Scottish Statutory Instrument 2011 No. 209 (HMSO, 2009), as amended;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (Scottish Government, 1994) (as amended);
- The Conservation of Habitats and Species (EU Exit) (Scotland) (Amendment) Regulations 2019; and
- Nature Conservation (Scotland) Act 2004 (Scottish Government, 2004).

#### 11.2.2.3 England

- The Conservation of Habitats and Species Regulations 2017 (HM Government, 2017) (as amended);
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- The Natural Environment and Rural Communities Act (HM Government, 2006); and
- The Countryside and Rights of Way (CRoW) Act 2000 (HM Government, 2000) (as amended).

### 11.2.3 National Policy

The following national and devolved policies concerning the preservation of marine ornithological receptors during the planning and execution of projects such as offshore cable development in UK waters:

#### 11.2.3.1 UK (Scotland and England)

- UK Marine Policy Statement (MPS) (HM Government, 2011); and
- UK Post 2010 Biodiversity Framework (HM Government, 2010).

#### 11.2.3.2 Scotland

- Scottish National Marine Plan (2015) (Scottish Government, 2015); and
- Scottish Planning Policy (Scottish Government, 2020).

#### 11.2.3.3 England

- Biodiversity 2020 (HM Government, 2011);
- National Planning Framework 2 (HM Government, 2012);
- National Policy Statements (NPS) (HM Government, 2014);
- North East Inshore and North East Offshore Marine Plan (HM Government, 2021); and
- East Inshore and East Offshore Marine Plan (HM Government, 2021).

### 11.2.4 Guidance

Best practice guidelines regarding offshore projects' impact on the maritime ornithological receptors. Although no specific guidance has been developed for offshore cables, the following existing guidance should be noted:

- National and Local Biodiversity Action Plans (BAPs);
- The Birds of Conservation Concern (BoCC) 5 (Stanbury et al, 2021);
- The Scottish Marine Wildlife Watching Code for advice, information and recommendations for watching marine wildlife (NatureScot, 2017a); and
- The Guide to Best Practice for Watching Marine Wildlife to reduce the disturbance of important marine species (NatureScot, 2017b).

## 11.3 The Study Area

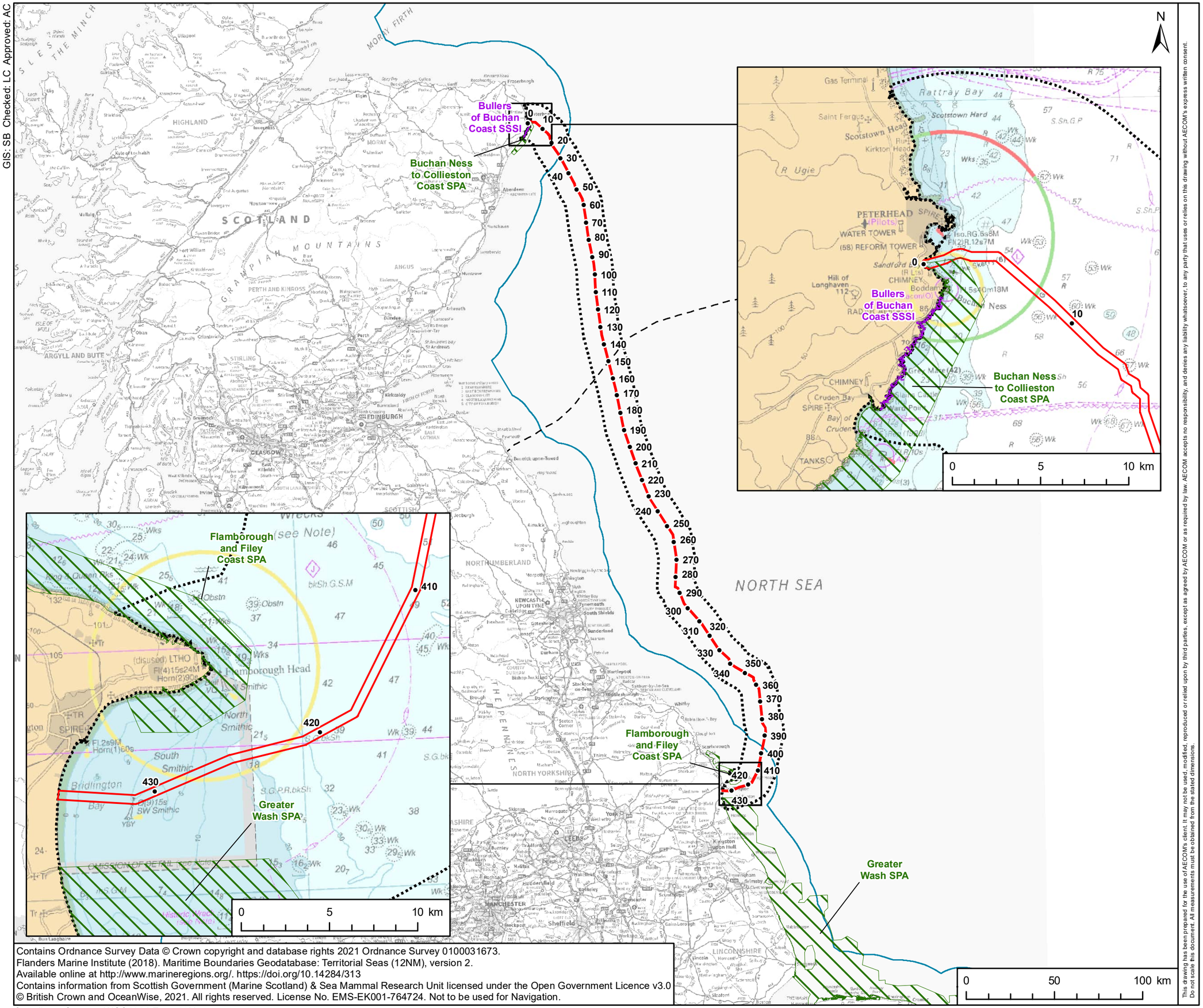
The appraisal in this chapter focuses on the marine environment between Mean High Water Springs (MHWS) at the Scottish landfall and MHWS at the English landfall. This includes any waterbirds (i.e., wading birds or waterfowl) using intertidal areas between MHWS and Mean Low Water Springs (MLWS) and marine birds (i.e., seabirds) which forage at sea and may be nesting on cliffs on the interface between the Marine Scheme and both the Scottish and English Onshore Schemes.

Recognising the highly mobile and wide-ranging nature of birds in the marine environment and the potential implications of local impacts on wider populations, the study area has been defined to identify important ornithological features encompassing all sites designated for birds with a marine component

within 10 km of the Marine Installation Corridor and selected sites beyond 10 km in recognition of the cited species' often extensive foraging ranges. Only qualifying bird species which have the potential to be present with the zone of influence of the Marine Installation Corridor will be considered further within this chapter. For example, wintering waterfowl and waders which do not forage offshore, preferring to feed along the coast.

The Marine Installation Corridor and the study area for the ornithology baseline in shown on Figure 11-1.

GIS: SB Checked: LC Approved: AC

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Flanders Marine Institute (2018). Maritime Boundaries Geodatabase: Territorial Seas (12NM), version 2.
Available online at http://www.marineregions.org/. https://doi.org/10.14284/313
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Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:2,000,000 / 1:200,000



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PROJECT
**Eastern Green Link 2**

KEY
- Marine Installation Corridor
- Kilometre Point (KP)
- UK Territorial Sea Limit
- Scottish/English Water Border
- 10km Ornithological Study
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)

TITLE
**Figure 11-1**
**Ornithological Study Area**

REFERENCE
SEGL2_M_EAR_11-1_v2_20220624

SHEET NUMBER
1 of 1

DATE
24/06/2022

# 11.4 Approach to Appraisal and Data Sources

## 11.4.1 Appraisal Methodology

This chapter applies the methodology as detailed in Chapter 4: Approach to Environmental Appraisal. The identification and appraisal of effects and mitigation are based on expert judgments and following the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018, and updated September 2019.) In order to do this, the sensitivity of the receptor, potential magnitude of impacts and significance of effects have been assessed using the terminology outlined in Chapter 4: Approach to Environmental Appraisal.

A non-statutory scoping request was submitted to both MS-LOT and the MMO on 06 July 2021, with responses received on 06 September 2021 from the MS-LOT and 04 November 2021 from the MMO. It detailed the potential to impact important ornithological features during the Installation, Operation and Maintenance, and Decommissioning Phases of the Marine Scheme.

## 11.4.2 Data Sources and Consultations

### 11.4.2.1 Data Sources

Baseline conditions have been established by undertaking a desktop review of published information and through consultation with relevant organisations. The data sources used to inform the baseline description and appraisal include:

- The Joint Nature Conservation Committee (JNCC) website for details of Special Protection Areas (SPAs) including site information and designation details, including Supplementary Advice on Conservation Objectives (SACOs);
- The British Trust for Ornithology (BTO) website for site specific data from the Wetland Bird Survey (WeBS), a partnership between the BTO, the Royal Society for the Protection of Birds (RSPB) and JNCC (the last on behalf of Natural England (NE), Natural Resources Wales (NRW), Scottish Natural Heritage (SNH) and the Department of the Environment Northern Ireland (DENI)) in association with the Wildfowl and Wetlands Trust (WWT);
- Distribution of seabirds in the North-East Atlantic (Waggitt et al., 2020);
- Relevant Environmental Statements and associated appendices detailing the results of project specific ornithological surveys from relevant marine schemes, predominantly Offshore Wind Farms (OWFs). Details of relevant source material used are summarised in Table 11-2;
- Seabird foraging ranges (Thaxter, Lascelles, Sugar, & Cook, 2012; Woodward, Thaxter, Owen, & Cook, 2019), including site and specific species studies; and
- FAME (Future of the Atlantic Marine Environment) and STAR (Seabird Tracking and Research) seabird tracking projects.

No specific marine ornithology surveys have been undertaken for the Marine Scheme; the availability of ornithology data within the North Sea region is considered sufficient to characterise the baseline relevant to the Marine Scheme. This is considered a proportionate approach, based on the potential impacts of the Marine Scheme as described in Section 11.6. There will be no direct mortality during the operational phase of the project, e.g., through collision, nor displacement, avoidance or loss of foraging areas from permanent offshore structures. This approach is consistent with that generally required by statutory authorities when considering impacts of export cables from offshore wind farms and is therefore, considered sufficient to characterise the baseline for the Marine Scheme. This chapter draws on other surveys undertaken for the Project (i.e., the Scottish Onshore Scheme and English Onshore Scheme) at the landfalls, where relevant.

#### 11.4.2.2 Summary of Consultations

Advice from the MMO and MS-LOT and their respective consultees and advisers provided feedback on the Marine Scheme and EAR scope. Those consultees and advisors included NatureScot, Marine Scotland Science and Royal Society for the Protection of Birds (RSPB).

Comments received confirmed that consultees were content with the proposed scope of the ornithology EAR chapter as proposed by the non-statutory scoping report. Requests were made to include consideration of sites beyond the 10 km study area defined by the scoping report as a result of the long foraging ranges of some bird species, and this has been considered in Section 11.5 and Appendix 8.2: Habitats Regulation Assessment Report. Furthermore, embedded mitigation measures to avoid disturbance to rafting birds particularly in the immediate post breeding dispersal period for auks (mid-August to mid-September) were requested, and this has been provided in embedded mitigation as descried in Chapter 2: Project Description. Full details of the consultation process and associated responses are presented in Appendix 6.1: Scoping Responses.

### 11.4.3 Data Gaps and Limitations

The availability of ornithological data within the North Sea region is considered sufficient to characterise the baseline and as such, there is a good understanding of the existing environment. As with all ecological data, there are, however, some limitations to the third-party bird data, which form this knowledge base. This is primarily due to the highly mobile nature of bird species and the potential variability in usage of the area. The survey data often only provides a seasonal specific description of the composition, abundance and distribution of bird species; with these a number of factors are expected to vary both within and between years. As a result, each survey contributing to the available library of research, realistically, only provides a snapshot.

## 11.5 Baseline Conditions

This section presents the ornithological baseline for the Marine Scheme. It describes and evaluates the importance of the study area and adjacent waters with respect to breeding, migratory and over-wintering populations of seabirds and waterbirds using the marine and coastal environment. Whilst it is recognised that the waters off the coasts of Peterhead in Aberdeenshire and East Riding of Yorkshire, are important at different times of the year for a number of bird species, birds from designated sites represent priority populations which have been selected as requiring conservation measures and therefore represent birds of highest sensitivity and importance. This section therefore focuses on establishing how important the Marine Installation Corridor is to bird species from such potential and existing designated sites.

### 11.5.1 Relevant Designated Sites

The Marine Installation Corridor passes directly through one internationally designated site for the protection of seabirds (refer to Figure 11-1) namely, the Buchan Ness to Collieston Coast SPA.

Buchan Ness to Collieston Coast SPA is a stretch of south-east facing cliff in Aberdeenshire, Scotland. The cliffs extend for 15 km and comprises granite, quartzite and other rocks. It runs south of Peterhead, broken only by the sandy beach of Cruden Bay. The coastal vegetation located on the ledges and the cliff tops comprises maritime heath, grassland and brackish flushes. The Marine Installation Corridor runs through the marine extension component of the SPA included for loafing and foraging seabirds where it is bounded by MLWS, for approximately 2.3 km and accounts for an area that is equivalent to 2.1% of the total SPA. The SPA is designated for 21 seabird and waterbird species, including both breeding and overwintering species. Details of these are provided in Table 11-1.

In addition to this, three other sites (Figure 11-1) designated for the protection of seabirds are located within the study area, namely:

- Bullers of Buchan Coast Site of Special Scientific Interest (SSSI), which is a component site of the Buchan Ness to Collieston Coast SPA;
- Flamborough and Filey Coast Castle SPA; and

- Greater Wash SPA.

Due to the highly mobile and transient nature of seabirds, particularly when foraging it is possible the qualifying features of other sites designated for the protection of seabirds, such as the Forth Islands SPA, could interact with the Marine Scheme. Foraging seabirds from breeding colonies are considered in Section 11.5.3.

Details of the four designated sites identified above are provided in Table 11-1. The potential for bird species cited within these designations to occur within the study area is also considered.

**Table 11-1: Sites Designated for Ornithology within the Study Area**

| Designated Site (Country) | Reason for Designation | Relationship to the Marine Scheme and potential for cited qualifying species to occur within the Marine Installation Corridor |
|---|---|---|
| Buchan Ness to Collieston Coast SPA (Scotland) | Breeding seabird (Migratory)<br>Fulmar Fulmarus glacialis<br>Common guillemot *Uria aalge*<br>Herring gull Larus argentatus<br>Black-legged kittiwake *Rissa tridactyla*<br>European shag Phalacrocorax aristotelis<br>Seabird assemblage of more than 20,000 seabirds in the breeding season. | The SPA overlaps with the Marine Installation Corridor for approximately 2.3 km when it leaves the Scottish landfall, although it does not overlap with any of the sea cliff habitats which hosts the breeding birds. The offshore waters within the SPA are protected for foraging and resting seabirds associated with the cliff colonies along the coast. All cited species and the wider assemblage species have the potential to occur within the Marine Installation Corridor. |
| Bullers of Buchan Coast SSSI (part of the Buchan Ness to Collieston Coast SPA) (Scotland) | The sea-cliffs and inshore stacks support a colony of breeding seabirds which is of international importance. This assemblage includes nationally important populations of kittiwake and guillemot. Shag, herring gull, fulmar, razorbill *Alca torda*, and puffin *Fratercula arctica* are also present | The Marine Installation Corridor is approximately 2 km north of the Bullers of Buchan Coast SSSI. At this distance the Marine Installation Corridor is within the foraging ranges of cited seabirds and therefore, breeding seabirds associated with the Bullers of Buchan Coast SSSI have the potential to occur within the Marine Installation Corridor. |
| Flamborough and Filey Coast SPA (England) | Breeding seabird (Migratory)<br>Northern gannet *Morus bassanus*:<br>Common guillemot;<br>Black-legged kittiwake; and<br>Razorbill *Alca torda*.<br>Seabird assemblage of more than 20,000 seabirds in the breeding season. | The Marine Installation Corridor is approximately 1.7 km east and then south of the Flamborough and Filey Coast SPA. At this distance the Marine Installation Corridor is within the foraging ranges of cited seabirds and therefore, breeding seabirds associated with the Flamborough and Filey Coast SPA have the potential to occur within the Marine Installation Corridor. |
| Greater Wash SPA (England) | **Breeding seabird (Annex I)**<br>Common tern Sterna hirundo;<br>[redacted]; and,<br>Sandwich tern Thalasseus sandvicensis.<br><br>**Non-breeding waterfowl (Annex I)**<br>Red-throated diver *Gavia stellata*.<br><br>Non-breeding waterfowl (Migratory)<br>Common scoter *Melanitta nigra*.<br><br>Non-breeding seabird (Annex I)<br>Little gull *Larus minutus*.<br><br>Seabird assemblage of more than 20,000 seabirds in the breeding season. | The Marine Installation Corridor is approximately 3.1 km north of the Greater Wash SPA. Whilst, outside the core designated areas for foraging breeding terns and non-breeding seabirds and waterbirds, there is the potential for all cited species to occur in the Marine Installation Corridor. |

### 11.5.2 Review of Information held by Other Schemes

Areas further offshore in the central North Sea are important as feeding and loafing areas, and as migration routes for a wide range of marine birds. A review of ornithological surveys and monitoring at OWF and other submarine cable projects in the central North Sea and relevant to the Marine Project Scheme (i.e., within 50 km) was undertaken and the key species associated with these sites are provided in Table 11-2 and shown in Figure 11-1: Ornithology Study Area.

**Table 11-2: Summary of Key Seabird and Waterbird Species Recorded in the North Sea from Other Relevant Schemes within 50 km of the Marine Installation Corridor**

| Scheme Name | Proximity to the Marine Installation Corridor | Most Recent Ornithological Monitoring Result Source | Important Ornithological Features |
|---|---|---|---|
| NorthConnect HVDC | Approximately 3.2 km to the south | NorthConnect: Appendix F.1: Report on Ornithological Surveys (Natural Research Projects, 2017).<br>NorthConnect HVDC Cable Infrastructure EIAR: Volume 2 – Main Document (NorthConnect, 2018).<br>Colonial seabird counts and vantage point surveys of landfall location between February 2016 and January 2017. | The distribution of breeding seabird species within the Buchan Ness to Collieston Coast SPA was irregular within the survey area, with apparent clusters noted in a number of areas.<br>Vantage point surveys recorded fulmar, shag, razorbill, guillemot, kittiwake and herring gull as the most frequently recorded species. |
| Berwick Bank OWF | Approximately 11 km to the west | Berwick Bank Offshore Wind Farm Scoping report.<br>Boat-based surveys between December 2009 and November 2011 and aerial surveys between March 2019 and April 2021. | Breeding species: Common guillemot, black-legged kittiwake, northern gannet, Atlantic puffin and razorbill.<br>Migrating species: pink-footed goose and barnacle goose *Branta leucopsis*. |
| Hywind II, Buchan Deep OWF | The array area is located approximately 13 km to the north east with the export cable corridor located approximately 3.5 km north of the Scottish landfall | Hywind Scotland Pilot Park Environmental Statement Non-Technical Summary (Statoil, 2015). Boat-based surveys of wind farm area undertaken in 2013. | Project specific baseline surveys showed that a range of common seabird species forage in and pass through the Turbine Project and its vicinity. For most species and at most times of year the abundance of these species in the area potentially affected by the Turbine Project was low or very low in the context of their population size.<br>However, during the breeding season two species, common guillemot and razorbill, were at times present in moderate or high abundance, especially in August. |
| Seagreen Phase 1 OWF | Approximately 19 km to the west | Sea Green Wind Energy Environmental Statement Chapter 10: Ornithology (Consultancy, 2012).<br>Boat-based surveys of project area between December 2009 and November 2011. | A wide range of bird species were identified in high numbers within the windfarm site. Common guillemots, kittiwakes and gannets were identified in the highest numbers within the windfarm site. |

| Scheme Name | Proximity to the Marine Installation Corridor | Most Recent Ornithological Monitoring Result Source | Important Ornithological Features |
|---|---|---|---|
| Aberdeen European Offshore Wind Deployment Centre (EOWDC) | Approximately 25 km to the west | • European Offshore Wind Deployment Centre Environmental Statement Chapter 10: Ornithology (AOWFL, 2011).<br>• Monthly boat-based surveys were undertaken between February 2007 and April 2008, with an additional 12 months of surveys from August 2010. | A total of 79 species were recorded during the field surveys 37 of which were notable (i.e., either a qualifying species or were recorded in high numbers). These notable species include:<br>Fulmars, gannets, kittiwakes, sandwich tern, puffins, common guillemots and razorbill, red throated diver, common eider and common scoter. |
| Westermost Rough OWF | Approximately 28 km to the south | • Westermost Rough Environmental Statement (Energy, 2009)<br>• Boat surveys between August 2004 and June 2006 and aerial surveys between September 2004 and June 2006. Targeted little gull surveys in 2008.<br>• Post-construction ornithological surveys: Year 2 (Percival and Ford, 2017). | Key bird species identified were: Common guillemot, black-legged kittiwake, northern gannet, Atlantic puffin and razorbill, black-headed gull, herring gull, common gull and common tern.<br>During and post construction monitoring - Reduced observations of several species including gannet, little gull, kittiwake and razorbill densities have been greater within the wind farm suggesting some operational displacement of these species. |
| Blyth Offshore Demonstrator Phase 2 OWF | Approximately 45 km to the west | • Blyth Offshore Demonstration Project Phase 2 – Supporting Environmental Information (Renewables, 2020).<br>• Pre-construction surveys between March and October 2018. | The most common bird species identified include common guillemot, kittiwake, razorbill, herring gull and puffin. |
| Hornsea Four OWF | The array area is located approximately 50 km to the east, with the export cable corridor located approximately 0.2 km south of the English landfall | • Hornsea Project Four: Environmental Statement. Volume A5, Annex 5.1: Offshore and Intertidal Ornithology Baseline Characterisation Report (Orsted, 2021)<br>• Hornsea Project Four: Environmental Statement. Volume A2, Chapter 5: Offshore and Intertidal Ornithology (Orsted, 2021)<br>• Aerial surveys of the array area, plus a 4 km buffer, between April 2016 and March 2018. | A total of 24 bird species were recorded during the 24-month survey programme. The findings of the 24-month survey programme identified the following key species (those recorded in the greatest abundance / density within the Hornsea Four array area and 4 km buffer): fulmar, gannet, kittiwake, great black-backed gull (*Larus marinus*), guillemot, razorbill and puffin.<br>Relative densities of red-throated diver were modelled for the export cable corridor, in the absence of field data. This estimated low densities of between 0.004 and 0.005 birds per $km^2$, equating to between two and three individuals present within a 2 km buffer of the export cable. |

## 11.5.3 Breeding Seabirds

The study area is located in waters which may be used by foraging seabirds from designated sites listed in Section 11.5.1. The mean maximum breeding season foraging ranges of seabirds present in these designated sites are presented in Table 11-3 (Woodward, Thaxter, Owen, & Cook, 2019).

**Table 11-3: Indicative Breeding Season Foraging Ranges for Qualifying Bird Species Designated for their Breeding Population.**

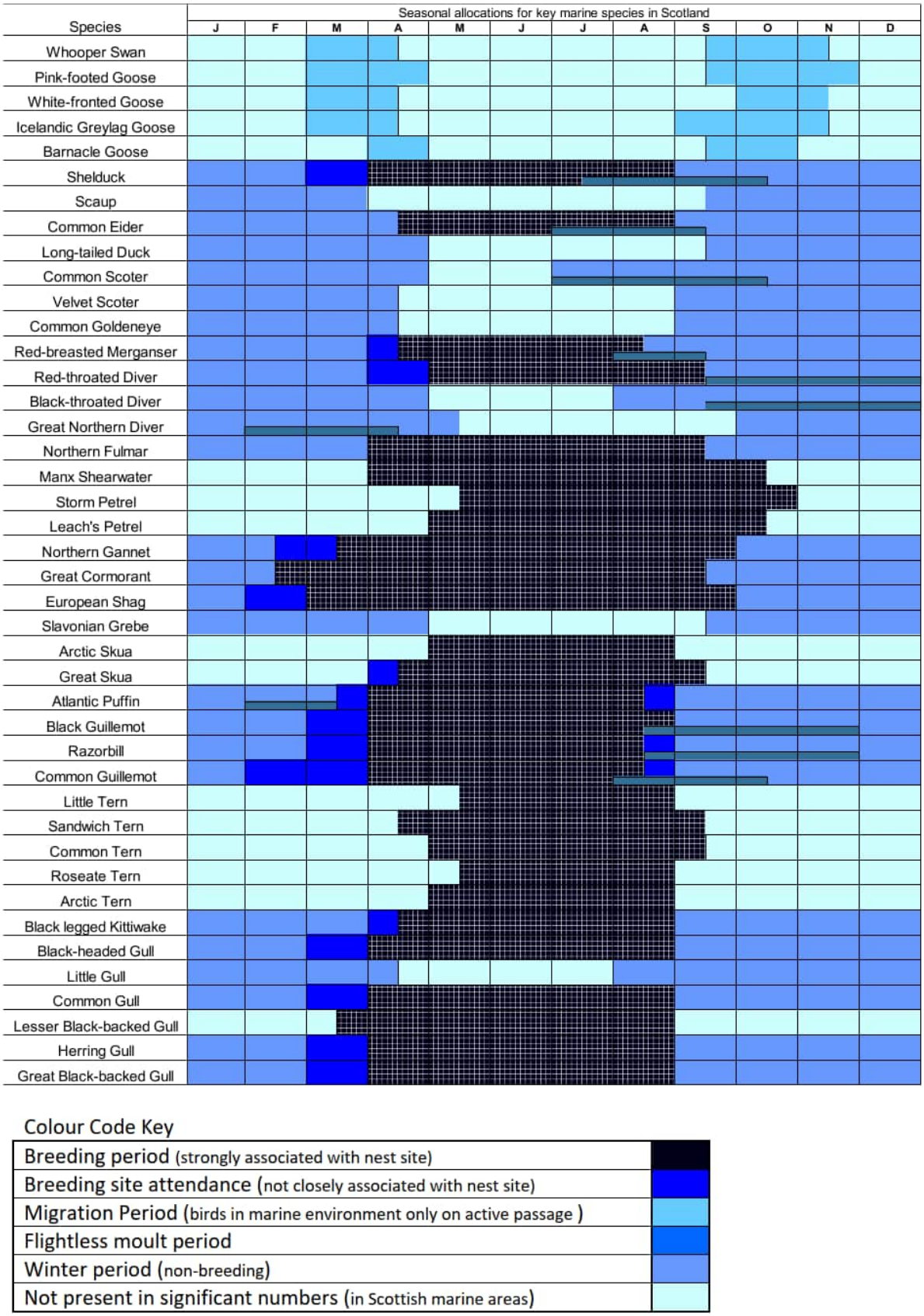
| Qualifying Bird Species | Mean Maximum Foraging Range (km ± SD) (Woodward, Thaxter, Owen, & Cook, 2019) |
|---|---|
| Kittiwake | 156.1 ±144.5 |
| Guillemot | 73.2 ± 80.5 |
| Common tern | 18.0 ± 8.9 |
| Shag | 13.2 ± 10.5 |
| Herring gull | 58.8 ± 26.8 |
| [redacted] | [redacted] |
| Gannet | 315.2 ± 194.2 |
| Razorbill | 88.7 ± 75.9 |
| Sandwich tern | 34.3 ± 23.2 |
| Fulmar | 542.3 ± 657.9 |

It is also recognised that seabirds from other SPA colonies may also be present in the study area, particularly those with extensive foraging ranges (e.g., gannet) or out with the breeding period. However, it is not possible to determine which designated sites these birds may originate from, although, overall, foraging density declines with distance from the colony (Camphuysen, 2011).

The breeding season for seabirds varies between species but broadly extends between April and August, with the core breeding period between May and July, during which time their distribution offshore is constrained by the requirement to return to their breeding sites. Following breeding, seabirds disperse away from their colonies to their wintering areas, e.g., they may travel west into the Atlantic or southwards through the North Sea. Some species such as common guillemots and razorbills disperse from the colonies during July and August. Adults become flightless during their post-breeding moult and the males are accompanied by flightless chicks. The highest numbers of flightless birds initially occur near the breeding colonies during July and early August. Figure 11-2 shows the lifecycle phases for relevant species in the Scottish marine environment[1].

Distributions of seabirds within the North East Atlantic are presented in Waggitt, et al. (2020) and species relevant to the North Sea and with the potential to interact with the Marine Scheme are shown in Figure 11-3. Higher concentrations of seabirds are typically associated with significant breeding colonies, with those associated with the Buchan Ness to Collieston Coast SPA and Flamborough and Filey Coast SPA, of particular relevance to the Marine Scheme. A series of large-scale seabird tracking studies have been undertaken by the RSPB and partners between 2010 and 2015 across the UK during the late incubation / early chick rearing period of the breeding season. These data have been used to map the UK wide at sea distribution of four species: Shag, kittiwake, guillemot and razorbill. These hotspot maps are presented in Cleasby et al. (2018) and demonstrate the importance of the marine areas immediately offshore from the designated sites supporting breeding colonies, listed in Table 11-4. Of note, Kittiwake hotspots were also identified to the south east of the Flamborough and Filey Coast SPA (see Figure 11-4).

[1] The indicated periods apply to Scottish Waters - timings throughout Scotland will vary slightly (for example breeding attendance may be earlier in south, wintering departure later in north)




Colour Code Key

| | |
|---|---|
| **Breeding period** (strongly associated with nest site) | |
| **Breeding site attendance** (not closely associated with nest site) | |
| **Migration Period** (birds in marine environment only on active passage ) | |
| **Flightless moult period** | |
| **Winter period** (non-breeding) | |
| **Not present in significant numbers** (in Scottish marine areas) | |

**Figure 11-2: Suggested seasonal definitions for birds in the Scottish Marine Environment (NatureScot. 2020).**

GIS: SB Checked: RG Approved: JH

January

July

N



Coordinate System: WGS1984 Zone 30N

0 50 100 km

Scale @ A3 1:2,500,000



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PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of Black-Legged Kittiwake (Waggit 2019)**

**Value**

High : 2.07

Low : 0

TITLE
**Figure 11-3i**
**Black-Legged Kittiwake spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
SEGL2_M_EAR_11-3i_v1_20220622

SHEET NUMBER
1 of 1

DATE
22/06/2022

GIS: SB Checked: RG Approved: JH

January

July

N



Coordinate System: WGS1984 Zone 30N

0 50 100 km

Scale @ A3 1:2,500,000



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PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of Herring Gull (Waggit 2019)**

**Value**

High : 1.85

Low : 0

TITLE
**Figure 11-3ii**
**Herring Gull spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
SEGL2_M_EAR_11-3ii_v1_20220622

SHEET NUMBER
1 of 1

DATE
22/06/2022

GIS: SB Checked: RG Approved: JH

January

July

N



Coordinate System: WGS1984 Zone 30N

0 50 100 km

Scale @ A3 1:2,500,000



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PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of Common Guillemot (Waggit 2019)**

**Value**

High : 6.26

Low : 0

TITLE
**Figure 11-3iii**
**Common Guillemot spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
SEGL2_M_EAR_11-3iii_v1_20220622

SHEET NUMBER
1 of 1

DATE
22/06/2022

GIS: SB Checked: RG Approved: JH

January

July

N





Coordinate System: WGS1984 Zone 30N

0 50 100 km

Scale @ A3 1:2,500,000

nationalgrid
Scottish & Southern Electricity Networks

PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of European Shag (Waggit 2019)**

**Value**

High : 1.57

Low : 0

TITLE
**Figure 11-3iv**
**European Shag spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
SEGL2_M_EAR_11-3iv_v1_20220622

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1 of 1

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22/06/2022

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0 50 100 km



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Scale @ A3 1:2,500,000



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PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of Northern Fulmar (Waggit 2019)**

**Value**

High : 3.9

Low : 0

TITLE
**Figure 11-3v**
**Northern Fulmar spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
SEGL2_M_EAR_11-3v_v1_20220622

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July

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0 50 100 km

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PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of Northern Gannet (Waggit 2019)**

**Value**

High : 1.65

Low : 0

TITLE
**Figure 11-3vi**
**Northern Gannet spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
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DATE
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GIS: SB Checked: RG Approved: JH

January

July

N

0 50 100 km

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PROJECT
**Eastern Green Link 2**

KEY

- Marine Installation Corridor
- UK Territorial Sea Limit
- Scottish/English Water Border

**Distribution of Razorbill (Waggit 2019)**

**Value**

High : 3.01

Low : 0

TITLE
**Figure 11-3vii**
**Razorbill spatial variation in predicted densities (individuals/km2) in January and July (Source: Waggit et al., 2019)**

REFERENCE
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The Greater Wash SPA boundary was established as a composite site enclosing the extents of the important areas identified for each of the qualifying species. Common tern, [redacted] and sandwich tern are qualifying species and the Greater Wash SPA, is designated, in part, for the protection of their foraging areas. While the data in Table 11-3 indicates that these qualifying tern species would forage within the Marine Installation Corridor, site-specific information is considered further in the following paragraphs to conclude the Marine Installation Corridor is outside the core designated areas for foraging breeding terns. [redacted]

The foraging area for common tern and sandwich tern within the Greater Wash SPA was determined by boat based visual tracking surveys for foraging birds carried out between 2006 and 2008 (Natural England & JNCC, 2016). The results of these surveys combined with information on the habitat characteristics of the locations relative to other areas available, was to construct habitat association models of tern usage. These models were used to predict species-specific tern usage patterns and determine their foraging areas around breeding colony SPAs. For this, the nearest breeding colony for both species was located within the North Norfolk Coast SPA (which overlaps with the Greater Wash SPA). Sandwich tern was tracked from both Scolt Head and Blakeney Point over three survey seasons from 2006 to 2008, while common tern was tracked from Blakeney Point during 2008. The results show that in every case, the predicted foraging usage for common tern and sandwich tern was greatest in the vicinity of the colony, with very little or no usage distant from the shore. These colonies are located outside the study area more than 130 km. The foraging ranges for common tern and sandwich tern therefore does not extend into the study area.

A summary of foraging seabirds identified from the data sources set out in Section 11.4.2.1 as likely to be present within the study area during the breeding season is provided in Figure 11-2.

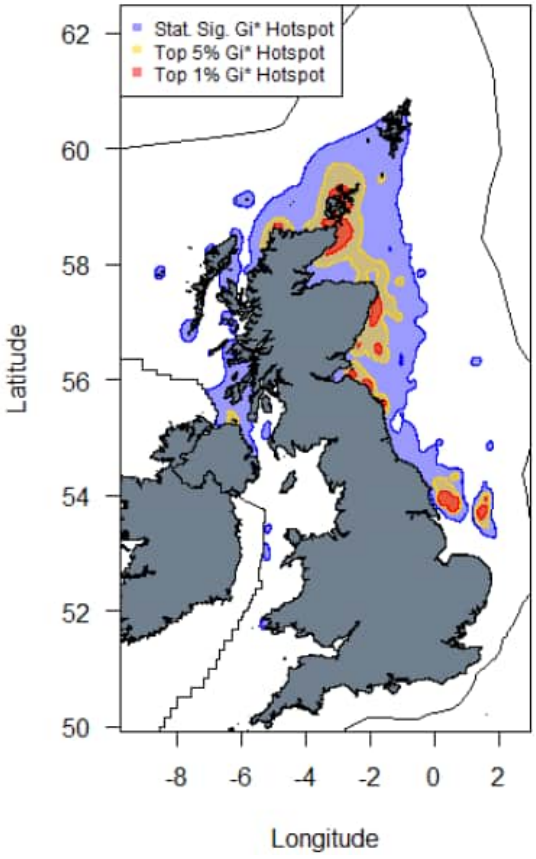


**Figure 11-4: Kittiwake Foraging Hotspots (Cleasby, et al. 2018)**

## Table 11-4: Presence and Seasonal Distribution of Seabirds Within the Study Area During the Breeding Season

| Receptor | Summary of Data Relevant to the Study Area | Presence in the Study Area |
|---|---|---|
| Kittiwake | Qualifying feature of the Buchan Ness to Collieston Coast SPA and the Flamborough and Filey Coast SPA, with foraging hotspots from these SPAs along the north east coast of Scotland and to the south east of Flamborough Head (Cleasby, Owen, Wilson, & Bolton, 2018) and north of Flamborough Head (Waggitt, et al., 2020).<br>The number of kittiwake along the Buchan Ness to Collieston Coast shows a 20% decline in numbers since 2001 (14,091 individuals) to 2019 (11, 265 individuals) (JNCC, Black-legged kittiwake (Rissa tridactyla), 2021a). They leave their breeding colonies in July/August and spend the winter at sea, often beyond the continental shelf.<br>Their diet consists of mainly fish including capelin *Mallotus villosus*, herring *Clupea harengus*, sprat *Sprattus sprattus* and sand eel *Ammodytes tobianus* and they have been known to feed on small crustaceans such as shrimps. Highest numbers of Kittiwake located along the north east coast of Scotland and south east and north of Flamborough Head were recorded in the spring and summer. | **Yes**.<br>Kittiwake are likely to be present throughout the Marine Installation Corridor, particularly where the Marine Installation Corridor passes through the Buchan Ness to Collieston Coast SPA and near to the Flamborough and Filey Coast SPA. The identified foraging hotspot south east of Flamborough Head (Cleasby, Owen, Wilson, & Bolton, 2018) does not appear to be in the Marine Installation Corridor, but the high densities identified to the north of Flamborough Head in July (Waggitt, et al., 2020) does appear to be within the Marine Installation Corridor and therefore birds will pass through the Marine Installation Corridor to reach these favoured areas.<br>Widely distributed throughout the study area all year, but particularly between May and August. |
| Guillemot | Qualifying feature of the Buchan Ness to Collieston Coast SPA and the Flamborough and Filey Coast SPA, with foraging hotspots from these SPAs along the north east coast of Scotland and offshore from the East Yorkshire coast between Flamborough Head and Filey (Cleasby, Owen, Wilson, & Bolton, 2018; Waggitt, et al., 2020).<br>The number of guillemot along the Buchan Ness to Collieston Coast shows a relatively even population trend since 2001 (29,389 individuals) to 2019 (29,187 individuals) (JNCC, Guillemot (Uria aalge), 2021b). Nesting is confined to areas safe from mammalian predators such as sheer cliffs and offshore islands. Guillemot leave their breeding colonies from July and spend the winter at sea. Prey species predominantly consists of sandeel and clupeids *Clupeidae* spp. Highest numbers recorded in the spring and early summer. The highest number of guillemot along the Buchan Ness to Collieston Coast SPA and the Flamborough and Filey Coast SPA were recorded in summer. | **Yes.**<br>Guillemot are likely to be present throughout the Marine Installation Corridor, particularly where the Marine Installation Corridor passes through the Buchan Ness to Collieston Coast SPA and near to the Flamborough and Filey Coast SPA. Whilst the highest numbers have been shown to be present close to nesting colonies, they are likely to be widely distributed throughout the Marine Installation Corridor, with numbers present from January and declining from July onwards as nest sites are abandoned. |
| Shag | Qualifying feature of the Buchan Ness to Collieston Coast SPA and the Flamborough and Filey Coast SPA, with foraging hotspots from these SPAs along the north east coast of Scotland and offshore from the East Yorkshire coast between Flamborough Head and Filey (Cleasby, Owen, Wilson, & Bolton, 2018; Waggitt, et al., 2020). The number of shag along the Buchan Ness to Collieston Coast shows a 10% decline in numbers since 2001 (408 individuals) to 2019 (369 individuals) (JNCC, European shag (Phalacrocorax aristotelis), 2021c). Shags are partially migratory, meaning that a proportion of individuals remain resident at the breeding colony throughout the year, while the remainder migrate to other locations in the non-breeding season. Shags are preponderantly benthic feeders (i.e., they find their prey on the sea bottom). They will eat a wide range of fish, but their primary food source is sandeel. | **Yes.**<br>Shag are likely to be present throughout the Marine Installation Corridor, particularly where the Marine Installation Corridor passes through the Buchan Ness to Collieston Coast SPA and near to the Flamborough and Filey Coast SPA. Whilst the highest numbers have been shown to be present close to nesting colonies, they are likely to be widely distributed throughout the Marine Installation Corridor, albeit in greatly reduced numbers with distance from land. Predominantly present between November and June, although recorded throughout the year. |

| Receptor | Summary of Data Relevant to the Study Area | Presence in the Study Area |
|---|---|---|
| Herring gull | Qualifying feature of Buchan Ness to Collieston Coast SPA. Opportunistic feeder, taking fish, crustaceans, young birds and even garbage. Recorded throughout the year. | **Yes.**<br>Present all year round, but likely to be present in higher numbers within the Marine Installation Corridor where it approaches nearshore areas. The offshore areas of the Marine Installation Corridor are unlikely to support significant numbers of foraging herring gull. |
| Gannet | Qualifying feature of the Flamborough and Filey Coast SPA. The nearest gannet colony is the Bempton Cliffs colony located approximately 10 km north of the Marine Scheme. This colony has shown a significant increase in numbers with a 240% increase in numbers since 2003 (3,940 individuals) to 2017 (13,392 individuals) (JNCC, Northern gannet (Morus bassanus), 2021d). Recent surveys carried out on this colony showed that Gannets dispersed widely around the Bempton Cliffs, with high densities near the Bempton Cliffs and low densities over vast areas. Approximately 70% of foraging trips were within 50 km of Bempton Cliffs. They revealed that the maximum foraging range was 404 km from the colony (Langston, Teuten, & Butler, 2013). The tracking studies confirmed that the entire range (i.e., 404 km foraging range) and beyond is used by breeding gannets from the Bempton Cliffs. Gannets are pelagic feeders, foraging primarily on lipid-rich pelagic fish up to 30 cm in length such as mackerel *Scomber scombrus*, herring and sandeel. | **Yes.**<br>High numbers likely to be present throughout the Marine Installation Corridor between April and September with highest numbers between June and August and only sporadic presence between October and March. |
| Razorbill | A qualifying feature of the Flamborough and Filey Coast SPA with highest densities north of Flamborough Head (Waggitt, et al., 2020). They nest on small ledges or in cracks of rocky cliffs and in associated screes. Breeding begins in late April with a peak in mid-May. Prey species predominantly consists of sandeel. Highest numbers recorded in the spring and early summer. They feed mainly on small fish (e.g., sandeel, herring, sprat, cod *Gadus morhua*) | **Yes.**<br>Highest numbers present close to nesting colonies, but likely to be widely distributed throughout the Marine Installation Corridor, with numbers declining from July onwards as nest sites are abandoned. |
| Fulmar | Qualifying feature of Buchan Ness to Collieston Coast SPA. They typically nest on top of cliffs but will also nest on more sloping ground and in puffin burrows on Islands. They are 'opportunistic feeders' feeding at sea on a variety of foods ranging from zooplankton and small fish to offal and discards produced by commercial fishing. | **Yes.**<br>Present all year round, but likely to be present in higher numbers within the Marine Installation Corridor nearest its breeding colonies from April to August. |
| Common Tern, [redacted] Sandwich Tern | Qualifying features of the Greater Wash SPA. While the data indicates that these qualifying tern species could forage within the Marine Installation Corridor, site-specific information as set in Section 11.5 concludes that the Marine Installation Corridor is outside the core designated areas for foraging breeding terns. | **No.**<br>The Marine Installation Corridor is not identified as core foraging area for breeding terns. |

## 11.5.4 Non-Breeding Waterbirds and Seabirds

The Marine Installation Corridor is likely to support a variety of non-breeding seabird and seaduck species, however, the sources presented in Section 11.4.2 and Table 11-2, indicate that none of these species are likely to occur in significant concentrations within the Marine Installation Corridor, with only infrequent presence of transitory individuals likely. This is particularly the case at the Scottish landfall location. However, as the Marine Installation Corridor is located approximately 3.1 km north of the Greater Wash SPA (refer to Figure 11-1), the qualifying populations of this SPA are considered in more detail in this section. Qualifying non-breeding species from other designated sites are not considered in detail in this section due to the distance to the Marine Installation Corridor and likely absence from the Marine Scheme's zone of influence in significant concentrations.

Red-throated diver, little gull and common scoter are designated as qualifying species of the Greater Wash SPA, which is located approximately 3.1 km south of the Marine Installation Corridor (refer to Figure 11-1).

Red-throated diver feed on a wide variety of fish, which they catch by diving from the surface and pursuing their prey underwater. Little gull feed by picking up food off the water surface, by plunging into the water to catch their prey and/or wading in the shallow water. The fish species taken by these bird species will be influenced by what is locally most readily available, but the diet of these species can include haddock *Melanogrammus aeglefinus*, cod, herring, sprat and gurnard *Eutrigla gurnardus* along with smaller species such as sandeels*,* pipefish *Syngathidae*, gobies Gobiidae, flatfish *Pleuronectidae* and butterfish *Pholis gunnellus*. Common scoter feed almost exclusively on molluscs and small crustaceans, diving from the surface to pluck their prey from the seabed with an average foraging dive depth being shallower than 15 m.

Red-throated diver arrive in UK coastal waters in September and decline in numbers in February, although the main period of occurrence in coastal offshore waters is from October to March (Natural England, 2016). Red-throated diver and common scoter, are associated with inshore waters, occurring in sandy bays, firths, and sea lochs, as well as open coastline and shallow offshore areas, i.e., sandbanks. Little gull is a passage migrant, non-breeding summer and winter visitor which is often thinly distributed both in inshore and offshore waters (Natural England & JNCC, 2016).

Aerial surveys used to assess non-breeding populations of waterbirds and seabirds in association with the designation of the Greater Wash SPA were carried out over five winter seasons (2003 to 2008). These data showed that the highest densities of red-throated diver off the east coast of England were concentrated throughout, what is now designated as the Greater Wash SPA boundary, with densities reducing further offshore. Red-throated diver were recorded in relatively high densities (0.2 individuals per $km^2$ to 0.67 individuals per $km^2$) in the northern section of the Greater Wash SPA located approximately 3.1 km south of the Marine Installation Corridor during the non-breeding season (September to April) (Table 11-5). Whilst, the Marine Installation Corridor does not overlap with areas identified as important for red-throated diver, i.e., designated as part of the Greater Wash SPA, it is likely that individuals may occasionally occur within the Marine Installation Corridor and surrounding waters. Hornsea Four OWF modelled the potential abundance and density of red-throated diver in relation to their export cable, which runs in proximity to the Marine Installation Corridor between KP424 and KP432. This estimated that red-throated diver occur in very low densities of between 0.004 birds per $km^2$ and 0.005 birds per $km^2$ and that based on these densities, between two and three red-throated divers would be present within a 2 km buffer of the Hornsea 4 export cable (Orsted, 2021).

Common scoter was recorded in relatively low numbers for most of the surveys within the Greater Wash SPA however for three of the surveys (2003, 2005 and 2007) they were recorded in large numbers. The highest density of common scoter (31.06 individuals per $km^2$ to 56.58 individuals per $km^2$) was recorded in the central and southern end of the Greater Wash SPA, located north west of the Scolt Head. Common scoter is likely to only be an infrequent visitor within the Marine Installation Corridor, given, that the highest densities of this species are within the Wash and off the North Norfolk coast (Lawson et al. 2016).

Little gull is a predominately marine species, using inshore and offshore areas and is thinly distributed across the Greater Wash SPA. Survey data for little gull in the Greater Wash SPA was collected over

fiver winter seasons (2003 to 2008) however, the spatial coverage for two of these years (2007 and 2008) was insufficient to provide a representative distribution of this species within the Greater Wash SPA and the resulting data was therefore displayed as raw count data. The raw count data shows a majority of the individuals were recorded in the central and southern end of the Greater Wash SPA near the Wash and extended seaward beyond the Greater Wash SPA boundary. Four individuals were recorded adjacent and outside of the Greater Wash SPA boundary in the northern section located within the study area, but outside the Marine Installation Corridor.

**Table 11-5: Summary of the presence and distribution of ornithological receptors within the Study Area during the non-breeding season**

| Receptor | Summary of Data Relevant to the Study Area | Presence in the Study Area |
|---|---|---|
| Red-throated diver | Within the Greater Wash SPA the species is recorded in relatively high densities in the northern section of the SPA, approximately 3.1 km south of the Marine Installation Corridor (NE & JNCC, 2016). There is no evidence to suggest that the Scottish landfall provides suitable habitat to support significant concentrations of red-throated diver. | **Yes.** The Marine Installation Corridor does not represent key foraging areas for overwintering red-throated diver, although relatively high densities occur within the northern section of the Greater Wash SPA. Based on modelled undertaken for Hornsea Four OWF very low densities of red-throated diver, i.e., between two and three individuals may be present within the Marine Installation Corridor and surrounding zone of influence. Red-throated diver are not noted in significant numbers elsewhere along the Marine Installation Corridor. |
| Common scoter | Within the Greater Wash SPA the species is concentrated in the central and southern sections, predominantly off the North Norfolk coast (NE & JNCC, 2016). There is no evidence to suggest that the Scottish landfall provides suitable habitat to support significant concentrations of common scoter. | **No.** The Marine Installation Corridor does not represent key foraging areas for overwintering common scoter, with the species favouring the coastal waters of the North Norfolk coast. Common scoter are not noted in significant numbers elsewhere along the Marine Installation Corridor. |
| Little gull | Within the Greater Wash SPA the species is concentrated in the central and southern regions of the site (NE & JNCC, 2016). There is no evidence to suggest that the Scottish landfall provides suitable habitat to support significant concentrations of little gull. | **No.** The Marine Installation Corridor does not represent key foraging areas for overwintering little gull, with the species favouring the central and southern sections off the Greater Wash SPA. Little gull are not noted in significant numbers elsewhere along the Marine Installation Corridor. |
| Non-breeding seabirds, including auks, gulls and seaducks. | Widely distributed and transitory throughout the Marine Installation Corridor, with no evidence to suggest significant concentrations within the study area. | **No.** The Marine Installation Corridor is unlikely to represent key foraging areas for the non-breeding seabirds, with low numbers likely to be encountered infrequently across the Marine Installation Corridor. |

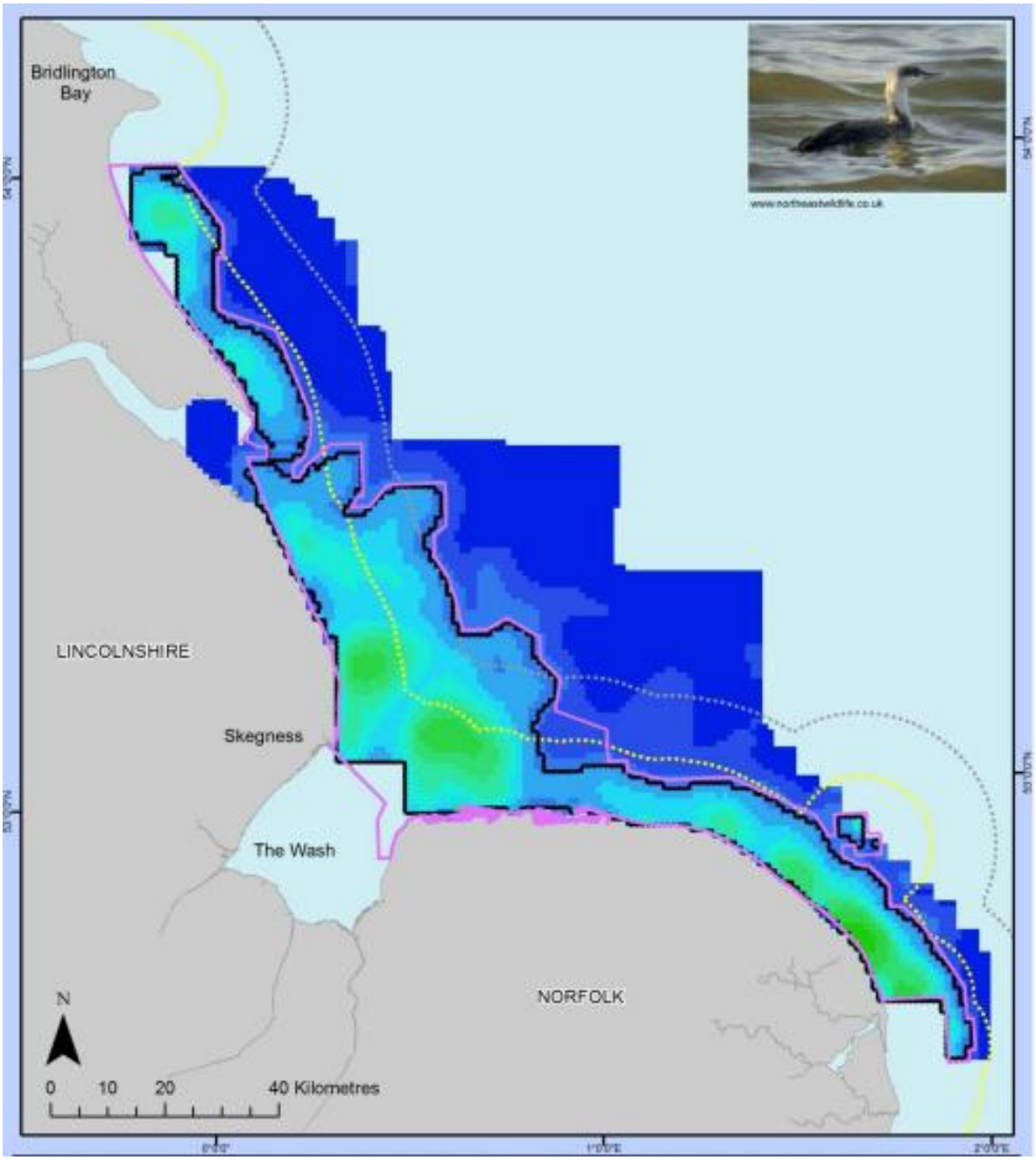


**Figure 11-5. Estimated Surface Mean Density for Red-Throated Diver Within the Greater Wash SPA Source: (Natural England & JNCC, Department Brief, Greater Wash potential Special Protection Area, 2016)**

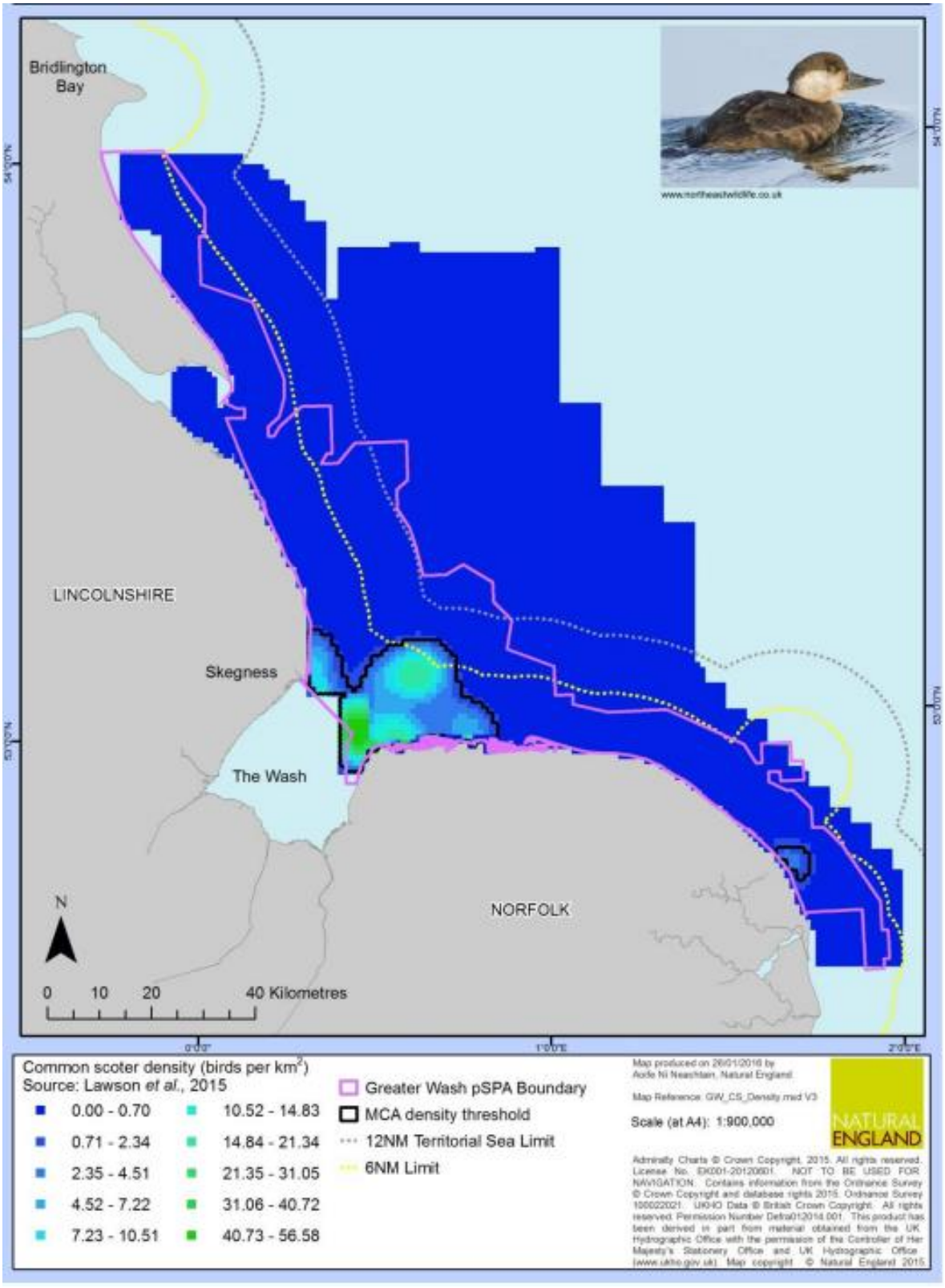


**Figure 11-6. Estimated Surface Mean Density for Common Scooter Within the Greater Wash SPA Source: (Natural England & JNCC, Department Brief, Greater Wash potential Special Protection Area, 2016)**

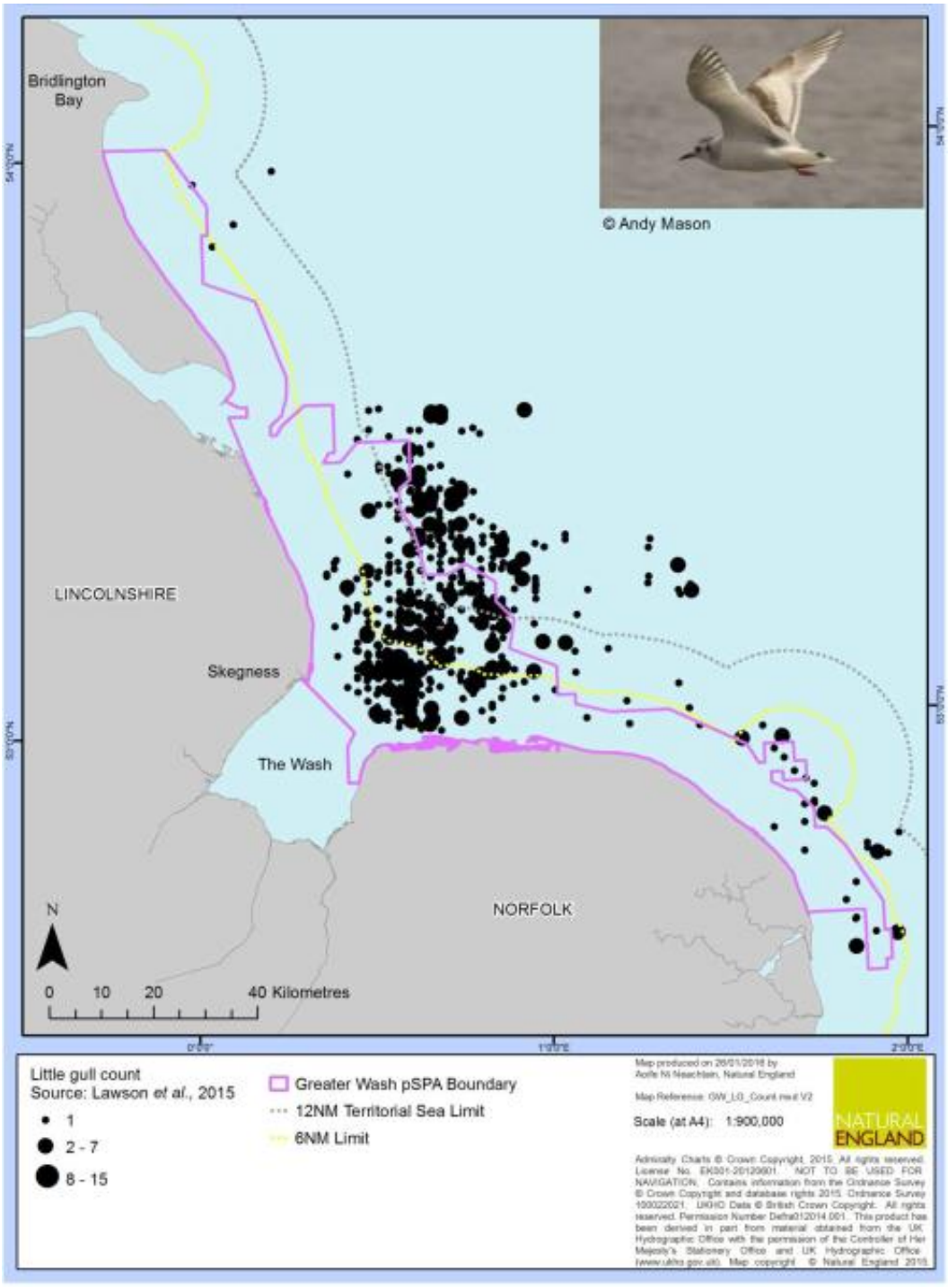


**Figure 11-7. Raw Count Data of Little Gull Recorded During Aerial Surveys within the Greater Wash SPA Source: (Natural England & JNCC, Department Brief, Greater Wash potential Special Protection Area, 2016)**

## 11.6 Appraisal of Potential Impacts

This section discusses the potential effects of the Marine Scheme on the important ornithological receptors identified in Table 11-5 during the Installation, Operation and Maintenance, and Decommissioning Phases of the Marine Scheme (Table 11-5) as described in Chapter 2: Project Description.

The appraisal has been undertaken in accordance with the methodology presented in Chapter 4: Approach to Environmental Appraisal. A summary of the potential effects is provided in Table 11-6.

### Table 11-6: Potential Effects of the Marine Scheme to Ornithology Receptors

| Phase | Activities | Receptor[2] | Potential Effects | Profile of Impact Pathway (Refer to Chapter 2: Project Description for further details) |
|---|---|---|---|---|
| Installation Phase | Route preparation and cable installation | Kittiwake<br>Guillemot<br>Shag<br>Herring gull<br>Gannet<br>Razorbill<br>Fulmar<br>Red-throated diver (non-breeding) | Temporary physical disturbance and displacement of species associated with sound, visual effects and presence from vessel and construction activity. | The main disturbing activities are likely to be those associated with:<br>Horizontal Directional Drilling (HDD) and cable pull in works at the landfalls in Scotland and England, including physical presence of vessels and disturbance associated with activities;<br>Route preparation activities, including, ploughing, de-trenching of out of service cables, pre-lay grapnel runs, cable trenching and rock placement; and<br>Submarine cable laying including physical presence of vessels and disturbance associated with works.<br>With reference to Chapter 2: Project Description the following information has been used to inform the assessment of impacts on ornithological receptors:<br>HDD installation of the cables at landfall will be employed. HDD work may take up to six months to complete at each landfall, with several vessels potentially required to install the cables. Installation will be a 24-hour operation to minimise installation time;<br>Prior to installation of the cables, a series of route preparation activities are likely to be undertaken. The vessels may move relatively slowly depending on the seabed type encountered, at speeds of between 0.5 km and 5 km per day; and<br>Between five and ten cable laying campaigns may be required and in total it is anticipated that the campaigns will consist of vessels being locally present when activities are being undertaken within the Marine Installation Corridor during a five-year installation period. There may be three months between installation campaigns, and campaigns will avoid the winter months. |
| | | Kittiwake<br>Guillemot<br>Shag<br>Herring gull<br>Gannet<br>Razorbill<br>Fulmar<br>Red-throated diver (non-breeding) | Disturbance to seabed and/or reduction in water quality due to increased SSC resulting in changes in prey availability. | With reference to Chapter 2: Project Description, various activities associated with the Installation Phase of the Marine Scheme may result in disturbance and displacement of ornithological receptors from indirect effects such as disturbance to seabed and/or water quality resulting in changes in prey availability in offshore waters. The main disturbing activities are likely to be those associated with:<br>HDD; and<br>Cable laying activities, including route preparation. |
| | | Kittiwake<br>Guillemot<br>Shag<br>Herring gull<br>Gannet<br>Razorbill<br>Fulmar<br>Red-throated diver (non-breeding) | Alteration of water quality due to unplanned releases, accidental leaks and spills from vessels and equipment. | With reference to Chapter 2: Project Description, unplanned release of pollutants (e.g., oil, fuels, lubricants, chemicals) can occur from associated vessels and operations. Any release has the potential to significantly alter water quality which in turn may affect any present waterbirds and/or seabirds in the area. |
| Operation and Maintenance Phase | Maintenance and cable repair and changes in prey availability | Kittiwake<br>Guillemot<br>Shag<br>Herring gull<br>Gannet<br>Razorbill<br>Fulmar<br>Red-throated diver (non-breeding) | The potential effects of maintenance and cable repair will result in low level temporary disturbance and will be less than route preparation and cable installation in all but worst-case scenario of full removal, which will be the same or similar. | The Marine Scheme has been designed to require minimal maintenance during the operational lifetime. However, routine monitoring surveys will be conducted through the lifetime of asset to ensure the cables remain in good condition and adequately protected. These surveys may identify the need for preventative repair or maintenance activities. |
| Decommissioning Phase | Decommissioning works | Kittiwake<br>Guillemot<br>Shag<br>Herring gull<br>Gannet<br>Razorbill<br>Fulmar<br>Red-throated diver (non-breeding) | Potential effects will be less than route preparation and cable installation for all but worst-case scenario of full removal. | The principal options for decommissioning are:<br>• Leave in situ, buried.<br>• Leave in situ and provide additional protection where exposed.<br>• Remove sections of the cable that present a risk; or<br>• Remove the entire cable. |

[2] Breeding season assemblages for these species have been identified as important receptors, except for Red-throated diver where the non-breeding assemblage is identified as the receptor.

## 11.6.1 Embedded Mitigation

With reference to Chapter 2: Project Description. the following mitigation has been built into the Marine Scheme to avoid, reduce and where possible remove the identified impacts and their effects on the environment, including marine ornithological receptors, and is presented in Table 11-7. This mitigation has been developed with consideration of consultee comments and will be either incorporated into the consented scheme design and construction programme or secured via consent condition through the marine licence issued by MS-LOT and MMO in Scotland and England respectively.

### Table 11-7: Ornithology Embedded Mitigation

| Activity / Issue | Embedded mitigation commitment |
|---|---|
| **All phases** | |
| Ecological Mitigation | All vessels will comply with the following codes to protect ecological receptors:<br>• The Scottish Marine Wildlife Watching Code (SMWWC) (available from: https://www.nature.scot/sites/default/files/2017-06/Publication%202017%20-%20The%20Scottish%20Marine%20Wildlife%20Watching%20Code%20SMWWC%20-%20Part%201%20-%20April%202017%20%28A2263518%29.pdf). |
| Marine Scheme vessel requirements | • All vessels will follow the International Regulations for Preventing Collisions at Sea 1972 (COLREGS) and International Convention for the Safety of Life at Sea 1974 (SOLAS);<br>• All vessels will be in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations and will therefore be equipped with waste disposal facilities onboard. The discharging of contaminants is not permitted within 12 nm from the coast to preserve bathing waters;<br>• Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels;<br>• Lighting on-board the vessels will be kept to the minimum level required to ensure safe operations and directed towards working areas. This will minimise disturbance to seabird species. |
| **Installation Phase** | |
| Route selection | The Marine Installation Corridor has been selected to optimise the balance of environmental, technical, commercial and financial considerations, such as avoiding designated sites, known archaeological sites, recreational activities, key fishing grounds and third-party infrastructure as far as possible. |
| Micro-routeing / detailed design post consent | Detailed route development and micro-routeing will be undertaken within the Marine Installation Corridor, informed by pre-installation evaluation of site-specific survey data to avoid or minimise localised engineering and environmental constraints. This will include minimising the footprint as much as possible. |
| Construction Environmental Management Plan (CEMP) | Prior to cable installation activities commencing, a CEMP, including an Emergency Spill Response Plan (ESRP), Waste Management Plan, Marine Mammal Management Plan, Marine Non-Native Species (MNNS) Plan, Fisheries Liaison and Co-existence Plan[3] will be developed and agreed with relevant stakeholders in accordance with the coastal and marine environment site guide; and<br><br>A commitment will be included with the CEMP and implemented via the SMWWC, to ensure that transiting vessels move at low speeds allowing any rafts of birds to disperse naturally well in advance of an approaching vessel. This will minimise the energy expended and avoid unnecessary flushing, which is especially important during the immediate post breeding dispersal periods of auks from early July to mid-September. |
| Landfall installation | Horizontal Directional Drilling (HDD) will be used at both landfalls for the installation of the cables in the transition zone between the Onshore Schemes and the Marine Scheme which avoids any works in the intertidal environment. |

[3] Note that this will be a single document that will perform the role of other fisheries liaison plans, for instance, a Fisheries Management and Mitigation Strategy.

| Activity / Issue | Embedded mitigation commitment |
|---|---|
| Drilling fluids | Drilling fluids for HDD operations will be biologically inert and selected from the OSPAR List of Substances/Preparations Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR);<br><br>During drilling, drilling fluids will be recycled, treated, and reused as far as possible, and any waste drilling fluid will be transported offsite for treatment and disposal; and<br><br>Losses of drilling fluids are unavoidable; however they will be minimised insofar as practicable through the implementation of industry best practice for example, clearing runs or reducing the volume of drilling fluids in the borehole prior to breakout to the marine environment. |

## 11.6.2 Installation Phase

### 11.6.2.1 Temporary physical disturbance and displacement of species associated with sound, visual effects and presence from vessel and construction activity

Disturbance can lead to a number of physiological and behavioural responses which can affect demographic characters of the bird population. Responses to disturbance can result in loss of energy, impaired breeding, unrest through increased vigilance, disruption to incubation, and increased nest failures due to predation and nest abandonment (Valente & Fisher, 2011).

The extent to which seabirds respond to disturbance is dependent upon a number of factors including: period of life cycle during which disturbance occurs; duration, type and intensity of the disturbance (e.g., onshore works are likely to be more disruptive to seabirds than the offshore works due to the generation of loud noises and use of machinery); presence of opportunistic predators; and the degree of habituation with the disturbance (Showler, Stewart, & Pullin, 2010). Some seabirds are more resilient to disturbance and/or displacement than others with varying responses depending upon marine activity (MMO, 2018).

Within the marine environment, the evidence base around disturbance and displacement, and subsequent guidance, has been established in relation to assessing the vulnerability of seabird populations to offshore wind farms. However, the disturbance profile of cable installation activities for the Marine Scheme are significantly different to that of an OWF, particularly in terms of vessel numbers and presence in a given area, i.e., cable installation vessels will be moving through the Marine Installation Corridor and not within a fixed area. The nature of the works is also temporary and there will be no permanent infrastructure on the sea surface after works are completed. With OWFs the potential for construction activities associated with export cable laying, namely the physical presence of the CLV(s), to lead to disturbance and displacement of more sensitive species surrounding the CLV is only considered where the export cable corridor runs through offshore areas that support higher densities of the more sensitive seabird species, typically within or surrounding SPAs, so this impact pathway is not regularly included within OWF EIAs.

For most seabirds the construction and operation of an OWF can displace birds at up to 2 km from the development, with divers and seaduck more sensitive, with displacement reported at up to 4 km (Furness and Wade (2012), Bradbury (2014) (Joint Natural England & JNCC, 2017)).

For Hornsea Four OWF, where the export cable corridor runs to the north of the Greater Wash SPA (and 200 m south of the Marine Installation Corridor), a 2 km buffer surrounding the cable laying vessel was agreed with Natural England for the purpose of assessing the potential impact of displacement on red-throated diver (Orsted, 2021). Other OWF projects such as Neart na Gaoithe have used a 1 km buffer for construction activities across the wind farm and the export cable corridor.

For the Marine Scheme, disturbance from cable installation vessels will be less than those from offshore wind farm disturbance for the reasons outlined above, and a 1 km ZoI therefore represents a worst-case scenario for disturbance through visual and audible cues and any subsequent displacement of bird species from the Marine Installation Corridor during the Installation Phase. Based on the above sources and with reference to Sections 11.5.3 and 11.5.4, which sets out the ornithological features likely to be present within the ZoI, the following sensitivities to disturbance and displacement have been assigned:

- Kittiwake – Low;
- Guillemot – Moderate;
- Shag – Very High;
- Herring Gull – Low;
- Gannet – Very Low;
- Fulmar – Very Low;
- Razorbill – Moderate; and
- Red-throated diver – Very High

Note that the sensitivities listed above are derived from Bradbury (2014) and are based on different parameters to the Marine Scheme. They have informed but do not match the sensitivities outlined later in this appraisal.

Onshore cable installation activities such as those associated with HDD operations and the cable pull site set up are not within the scope of this assessment and are covered by the Onshore Schemes.

During the offshore cable installation, there will be several vessels present within the marine environment, as described above and detailed in Chapter 2: Project Description. Vessels have the potential to cause disturbance to seabirds utilising the waters near the installation activities. Different species have different sensitivities associated with visual disturbance due to a vessel's presence. Species which may be more prone to vessel disturbance are guillemot, razorbill, shag and red-throated diver.

The Marine Scheme's installation vessels will be slow moving, and any potential disturbance will take place in the context of existing sources of disturbance such as commercial shipping, recreational boating and wind farm service vehicles (see Chapter 13: Shipping and Navigation for further details). Seabirds tend to raft together in groups on the sea, which means that if a vessel passes through or close to a raft, it has the potential to disturb and displace many individuals at once. The effect of the vessel's presence would be disturbance of potential foraging or resting habitat on the sea, causing the birds to have to move elsewhere, which may result in birds having less time to forage and cause them to expend additional energy. Effects on energy budgets are extremely unlikely to result in population dynamic effects (i.e., increased adult mortality or effects on reproduction). Given the wider area available, if birds are present, they are likely to find alternative feeding/loafing grounds in the short term.

At the landfall locations, where marine activities will include the vessels undertaking the landfall preparation cable pull in and protection works there is the potential for disturbance to resting and foraging seabirds associated, in particular, with the Buchan Ness to Collieston Coast SPA and the Greater Wash SPA. Each cable pull is expected to take up to seven days of 24 hour working, giving a total duration of 21 days at each landfall for this activity. For the pull in activities, the species potentially affected by disturbance will be those which may be present within close proximity to the HDD exit. Given, the location of the Scottish landfall within the marine extension of the Buchan Ness to Collieston Coast SPA, there is the potential for species sensitive to disturbance to be present within the vicinity of the installation vessels Species are likely to presence in this area include guillemot, razorbill and shag, which will be using the area for loafing and foraging, particularly between March and September (refer to Table 11-2). As set out in Section 11.5, very low numbers of red-throated diver may be present in the vicinity of the English landfall during the non-breeding season, as well as small numbers of auks (in particular, guillemot and razorbill), associated with the Flamborough and Filey Coast SPA, during the breeding season.

As detailed in Chapter 13: Shipping and Navigation, both Sandford Bay and Fraisthorpe Sands are known to be busy areas for shipping activity and recreational use, with this part of the North Sea busy with fishing vessels, cargo vessels and increasingly, vessels associated with the offshore renewables industry. Whilst sensitive species may be present, they will be occurring against a background of existing vessel presence and shipping activity. The installation vessels generate similar levels of noise to other large marine vessels and the context of the existing environment should be taken into consideration. For the activities at the landfalls, the vessels will be largely stationary for a temporary period of up to a week. However, it is considered that at both landfall locations seabirds will have some degree of acclimatisation to vessels and recreational boats in these areas, with birds used to both

hearing and seeing vessels within the areas they are utilising for foraging and resting. In addition, as set out in Table 11-7, installation vessels will adhere to the SMWWC and avoid rafting birds.

All cable installation activities will be conducted on a 24 hour working basis, as such vessels will be operating during hours of darkness, and lighting will be required in order to ensure operations on the vessels can be conducted safety. This lighting will be directed and only used in the vicinity of the work area, to minimise the likelihood of seabirds being attracted to vessels during the night. The duration of these works and distance from breeding colonies further reduces the chances of seabirds being attracted.

Should any works cause disturbance to seabirds, the impact will be minimal and temporary in nature with low magnitude. Given that low numbers of seabirds are likely to be present within the majority of the Marine Scheme area and ZoI, the temporary nature of the cable installation works, particularly in the context of existing baseline activities along the Marine Installation Corridor, and the generally moderate and low sensitivities of the species present to the preparation and installation methods, the effect on seabirds in offshore waters has been assessed as **minor** to **negligible** and therefore **not significant**.

However, at the landfall locations where vessels will be stationary for periods of time species of moderate sensitivity, i.e., guillemot and razorbill, have the potential to be displaced from resting and foraging area, resulting in a moderate adverse effect. As the impact would be both temporary and short-term in nature, with measures embedded to mitigate the severity of impacts and set against the background shipping activity levels, the resulting effect remains **minor** to **negligible** and therefore **not significant.**

Of all the species present, given their elevated sensitivity to vessel movements, shag and red-throated diver are the species which could be temporarily disturbed whilst at sea, resulting in a moderate adverse impact. However, as the impact would be both temporary and short-term in nature, and the number of individuals in the Marine Installation Corridor potentially affected is likely to be low, the resulting effect remains **minor** to **negligible** and therefore **not significant**.

#### 11.6.2.2 Changes in prey availability

The availability and provision of food items is essential to support the seabird colonies present throughout the North Sea and along the Marine Installation Corridor. Chapter 9: Fish and Shellfish identified potential impacts on the fish and shellfish species within the Marine Installation Corridor and surrounding area, which included assessment of potential prey items of seabirds, the most relevant of which are sandeels, but also European sprat, Goby, Saithe and Whiting. The loss of habitat to these species through construction activities associated with the Marine Scheme will have negligible to minor impact and is therefore not significant. Cable installation will disturb a small proportion of the total prey species in the area and the loss of prey will result in a low level of change for a short period of time. Physical disturbance of the seabed during the route preparation and cable installation activities such as cable trenching by ploughing, trenching or excavating will temporarily increase turbidity and may subsequently result in sediment deposition and smothering of prey species. Sediment-bound contaminants, such as heavy metals and toxins, can also impact prey species including benthic communities, fish and shellfish. Overall, the magnitude of impact to all fish and shellfish and benthic community receptors from physical disturbance to the seabed is predicted to be negligible, with changes in water quality caused by installation activities also predicted to be negligible.

Overall, it is expected that the magnitude of change in prey species will be low. Although, seabirds associated with internationally important sites are likely to be present within the Marine Installation Corridor, the loss of prey will account for only a small area of the available marine habitats and therefore bird species are unlikely to be sensitive to it and will have high recoverability. Based on this information it is expected that resulting effects on prey species are likely to be **negligible** and therefore **not significant.**

The effect on benthic communities and fish and shellfish is considered further in Chapter 8: Benthic Ecology and Chapter 9: Fish and Shellfish.

#### 11.6.2.3 Reduction of water quality due to unplanned releases, accidental leaks and spills from vessels and plant

Unplanned release of pollutants (e.g., oil, fuels, lubricants, chemicals) can occur from associated vessels and operations. Any release has the potential to significantly alter water quality which in turn may affect any present waterbirds and/or seabirds in the area. Pollutants such as organic compounds, oil, and heavy metals can directly and indirectly impact waterbirds and/or seabirds, resulting in immunosuppression and genotoxicity disruption (Richard, Southern, Gigauri , & Bellini , 2021).

All efforts to avoid/minimise effects to water quality will be taken, including adherence to relevant guidance (e.g., Pollution Prevention Guidance). As detailed in Table 11-7, all vessels waste will be managed in accordance with the requirements set out within the International Convention for the Prevention of Pollution from Ships (MARPOL) and contingency plans for marine oil pollution in the form of Shipboard Oil Pollution Emergency Plan (SOPEP) and chemical handling procedures. A CEMP, Emergency Spill Response Plan and Waste Management Plan will be implemented during the Installation Phase of the Marine Scheme to minimise releases. Health, Safety, and Environment (HSE) procedures will also be implemented, with strict weather and personnel limits to reduce any risk of accidental spillage. Furthermore, preparedness and swift response is essential for effective spill management and as such, response plans will be in place should an incident occur.

With reference to Chapter 7: Physical Environment, which concludes no significant impacts to water quality and when considering the control measures outlined above, the likelihood of occurrence for accidental release/spillage is low. Therefore, the expected impact to seabirds from altered water quality resulting from pollution events is low, with the magnitude deemed negligible and the resulting effects **negligible** and therefore **not significant**.

## 11.6.3 Operation and Maintenance Phase

### 11.6.3.1 Cable maintenance and repair

As detailed in Chapter 2: Project Description, the Marine Scheme has been designed to require minimal maintenance during the operational lifetime. However, routine inspection surveys will be conducted through the lifetime of asset to ensure the cables remain in good condition and adequately protected. These surveys may identify the need for preventative repair or maintenance activities which may include:

- Re-trenching if sections become exposed through the natural hydrodynamic process;
- Maintenance and reinstatement of any degraded rock or other protection features; and
- Cable repair in the event of damage.

Maintenance activities and cable repair activities would be carried out using the same or similar methods as that of the Installation Phase and therefore the potential pathways for impact would be the same as those identified for the Installation Phase of the Marine Scheme. Maintenance or cable repair activities would be highly localised to the area of concern, with a suitable vessel possibly requiring several months to complete the works. Therefore, the spatial extent of any effects would be small.

The impacts of Operation and Maintenance Phase activities on ornithological receptors would be of smaller magnitude when compared to Installation Phase and the resulting effects on ornithological receptors are predicted to be **negligible** and therefore **not significant**.

### 11.6.3.2 Changes in prey availability

As detailed in Section 11.6.2.2, changes in the distribution of key prey species has the potential to adversely affect ornithological receptors. Chapter 8: Benthic Ecology, and Chapter 9: Fish and Shellfish identified and assessed potential long term effects on benthic, fish and shellfish, species which may result from the operation of the proposed HVDC cable infrastructure. Potential adverse effects may result from pathways including sediment heating, Electromagnetic Field (EMF) generation, and permanent habitat loss/change resulting from rock placement.

However, no significant impacts were found for any of the fish or shellfish species as a result of these potential impacts. As such, the resulting prey availability effects on ornithological receptors are predicted to be **negligible** and therefore **not significant**.

### 11.6.4 Decommissioning Phase

#### 11.6.4.1 Decommissioning works

At the end of the operational life of the cables the options for decommissioning will be evaluated and taking into consideration other project constraints (e.g., technical feasibility, safety and liability), the best practical environmental option would be implemented.

The principal options for decommissioning described in Chapter 2: Project Description are:

- Leave in situ, buried;
- Leave in situ and provide additional protection where exposed;
- Remove sections of the cable that present a risk; or
- Remove the entire cable.

Should full removal from the seabed be required, this would have the potential to cause similar impacts to the cable installation phase of the Marine Scheme.

During the Operational Phase of the Marine Scheme, it is likely that benthic habitats and communities would have recovered from impacts arising during the Installation Phase of the Marine Scheme.

Impacts during decommissioning may be of a similar magnitude to cable installation, depending upon the decommissioning option chosen, and therefore as a worst case, resulting effects on ornithological receptors is predicted to be **minor** to **negligible** and therefore **not significant**.

## 11.7 Mitigation and Monitoring

No significant effects are predicted on seabird receptors as a result of the Installation, Operation and Maintenance, and Decommissioning Phases; therefore, no additional specific mitigation measures are required.

No significant effects are predicted as a result of post-construction monitoring of the cable route.

## 11.8 Residual Impacts

Given that no significant impacts have been identified for seabird receptors, no residual impacts have been identified as a result of Marine Scheme activities.

## 11.9 Summary of Appraisal

### Table 11-8: Summary of Environmental Appraisal

| Project Phase | Potential Impact | Receptor | Sensitivity | Magnitude | Significance | Project Specific Mitigation | Magnitude after Mitigation | Significance of Residual Effect |
|---|---|---|---|---|---|---|---|---|
| Installation | Temporary disturbance and displacement from installation activities | Shag | High | Low | Minor to negligible | None required. | Low | Not significant |
| | | Red-throated diver | | | | | | |
| | | Guillemot | Medium | | | | | |
| | | Razorbill | | | | | | |
| | | Fulmar | Low | | | | | |
| | | Kittiwake | | | | | | |
| | | Herring gull | | | | | | |
| | | Gannet | | | | | | |
| | Changes in prey availability | Shag | Low | Low | Negligible | None required. | Low | Not significant |
| | | Fulmar | | | | | | |
| | | Kittiwake | | | | | | |
| | | Guillemot | | | | | | |
| | | Herring gull | | | | | | |
| | | Gannet | | | | | | |
| | | Razorbill | | | | | | |
| | | Red-throated diver | | | | | | |
| | Alteration of water quality due to increased suspended sediment concentrations (SSC), unplanned, releases, accidental leaks and spills from vessels and plant | Shag | Low | Low | Negligible | None required. | Low | Not significant |
| | | Fulmar | | | | | | |
| | | Kittiwake | | | | | | |
| | | Guillemot | | | | | | |
| | | Herring gull | | | | | | |
| | | Gannet | | | | | | |

| Project Phase | Potential Impact | Receptor | Sensitivity | Magnitude | Significance | Project Specific Mitigation | Magnitude after Mitigation | Significance of Residual Effect |
|---|---|---|---|---|---|---|---|---|
| | | Razorbill | | | | | | |
| | | Red-throated diver | | | | | | |
| Operation and Maintenance | Temporary disturbance during cable repairs and maintenance | Shag | Low | Low | Negligible | None required. | Low | Not significant |
| | | Fulmar | | | | | | |
| | | Kittiwake | | | | | | |
| | | Guillemot | | | | | | |
| | | Herring gull | | | | | | |
| | | Gannet | | | | | | |
| | | Razorbill | | | | | | |
| | | Red-throated diver | | | | | | |
| | Changes in prey availability | Shag | Low | Low | Negligible | None required. | Low | Not significant |
| | | Fulmar | | | | | | |
| | | Kittiwake | | | | | | |
| | | Guillemot | | | | | | |
| | | Herring gull | | | | | | |
| | | Gannet | | | | | | |
| | | Razorbill | | | | | | |
| | | Red-throated diver | | | | | | |
| Decommissioning | | Potential effects of decommissioning the same as Installation Phase | | | | | | |

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