



Chapter 17: Ornithology



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17 Ornithology

17.1 Introduction

This chapter presents the avian Ecological Impact Assessment (EclA) of the proposed onshore and marine HVDC cable installation. Both terrestrial and marine ornithological receptors are considered in this chapter and are evaluated in the context of nature conservation legislation and relevant planning policy (see Chapter 5: Planning Policy). Impacts on receptors are identified and subject to detailed impact assessment. This EclA presents baseline information, anticipated impacts both onshore and offshore for avian receptors during installation and operational phases of the project.

Mitigation is proposed, cumulative impacts are considered, and finally the residual impacts and their significance are assessed.

This chapter is supported by the following Appendices:

- F.1: Survey Report: NorthConnect Report on Ornithological Surveys (NRP, 2017);
- F.2: Technical Report: Temporal and Spatial Variation in Seabird Attendance at Longhaven Cliffs (Affric Limited, 2018); and
- F.3: Summary Data of Buchan Ness to Collieston SPA Seabirds Between 100m and 1000m from HDD Entrance and Exit Locations.

17.2 Sources of Information

International and national legislation assists in identifying sensitive bird species whose presence on a site should be given greater consideration during assessment. This legislation also allows for designation of sites for ornithological interests (as laid out in section 17.4.1). Further guidance for sensitive species was sought from the latest Biodiversity Action Plans (BAPs) and the Birds of Conservation Concern (BoCC) lists.

17.2.1 European and International Legislation

The primary European legislation relating to bird interests is the Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version), commonly referred to as the Birds Directive (European Commission, 2010). This provides a framework for the management and conservation for wild birds throughout the EU.

The Birds Directive allows for the classification of Special Protection Areas (SPAs) for rare or vulnerable species listed on Annex 1 of the Directive, or for where there are regular concentrations of migratory, particularly wetland, species (Article 4). Since 1994 all SPAs in combination with Special Areas of Conservation (SACs) comprise the UK contribution to the Natura 2000 ecological network of protected sites.

As such, species listed on Annex 1 are considered sensitive species for the purposes of this assessment.

In addition to European legislation, there are also international agreements on the protection of birds. The most relevant here is the Ramsar Convention on Wetlands, an international agreement signed in 1971 in Ramsar, Iran, to protect wetland birds (Ramsar, 1971). The Convention has subsequently been extended to focus on the protection of wetland habitats, as well as wetland birds (Ramsar, 2014). The UK is a contracting party of the Convention and has designated a number of wetland sites in the UK as Ramsar sites. All Scottish Ramsar sites are included as part of the Natura 2000 network, and many are also recognised as Sites of Special Scientific Interest (SSSI). Although there is no specific legal

framework that safeguards Scottish Ramsar sites, they benefit from the measures required to protect and enhance the Natura sites and SSSIs which overlap them.

17.2.2 National Legislation

The primary legislation transferring the Birds Directive into UK law is the Wildlife and Countryside Act 1981, as amended (UK Parliament, 1981) and the Nature Conservation (Natural Scotland) Act 2004 (Scottish Parliament, 2004). Under these acts, all wild birds are protected under UK law and may not be taken, injured or killed without a licence at any time (with exceptions). Additionally, nests are also protected from damage or destruction while in use and eggs may not be taken or destroyed without a licence. For certain species, listed on Schedule 1 of the Act, special protection is provided, and it is an offence to disturb those species at their nest while it is in use.

As such, species listed on Schedule 1 of the WCA are considered sensitive species for the purposes of this assessment. In certain circumstances, where no significant effect is found following the assessment, but the works have the potential to disturb Schedule 1 species at their nest, this would be considered a significant effect. This is to ensure the works are legally compliant with the WCA, and to allow mitigation to be identified to protect the nests of Schedule 1 species from potential disturbance.

17.2.3 Other Guidance

In addition to the legislation identified above, there are two other key reviews that are considered when carrying out an impact assessment for ornithological receptors.

National and local Biodiversity Action Plans (BAPs) list species which have been identified as threatened, and for which action plans have been developed to aid recovery. Any species listed on a national BAP are given special consideration for this impact assessment (JNCC, 2016c). Species listed on the local BAP (LBAP) are also identified (Aberdeenshire Council, 2014).

Birds of Conservation Concern (BoCC) (Eaton et al., 2015) is a review carried out to assess the status of bird species in the UK, Channel Islands and Isle of Man. This review also considers Globally Threatened species that have occurred in the UK over the last 25 years, taken from the IUCN Red List for birds (BirdLife International, 2015). A total of 244 species are assessed, and those for which populations or range are declining are identified. All bird species are classified into one of three groupings:

Red – species which are globally threatened, or which have suffered a historical population decline in the UK, or which have undergone a severe population decline or a severe range decline;

Amber – species of conservation concern across Europe, or which have undergone a historical population decline but are now recovering, or have undergone a moderate decline in breeding or non-breeding population or range, or are a rare breeder or have a restricted range or are internationally important; and

Green – species which do not fall into the previous two categories.

For the purposes of the assessment, all red list species will be taken forward for consideration. Amber list species will be taken forward for consideration where they are recorded breeding.

17.3 Assessment Methodology

17.3.1 Desktop Study

A desk study and literature search were undertaken to inform the characterisation of the existing baseline conditions. The following data sources were consulted to aid in identifying and assessing the avian species which may be utilising the proposed development area, and surrounding areas, including gaining information on annual cycle timings and foraging characteristics:

- SNH interactive map facility at SiteLink (SNH, 2017a);
- Defra MAGIC website (Defra, 2017);
- North-East Scotland Biological Records Centre (NESBReC, 2018);
- The UK BAP and the North-East Scotland LBAP (Aberdeenshire Council, 2014; JNCC, 2016b);
- Breeding birds of North-East Scotland (Francis & Cook, 2011);
- National Biodiversity Network (NBN) gateway information service (NBN, 2017);
- NorthConnect Converter Building – Winter walkover bird surveys and Breeding Bird Surveys (Agroecosystems, 2014; Atmos Consulting, 2015);
- Seabird Monitoring Programme (JNCC, 2018a); and
- Suggested seasonal definition for birds in the Scottish Marine Environment (SNH, 2017b).

17.3.2 Field Surveys

In addition to the wintering and breeding bird surveys carried out as part of the EIA for the converter station site and HVAC cable route, a series of bird surveys and studies were commissioned specifically for the HVDC cable route and landfall site. These incorporated those birds predominantly using the terrestrial environment and those using both terrestrial and marine environments. The summary of surveys that took place are shown in Table 17.1.

Table 17.1 Summary of Survey Data Collected

Survey Date	Survey Description	Survey company	HVDC cable corridor section
18-May-2014	Initial survey of Longhaven cliffs	Affric Limited	Landfall site
April 2016-July 2016	Breeding Bird Survey	Natural Research Projects Ltd	Onshore cable route and landfall
October 2016-November 2016	Migrant survey	Natural Research Projects Ltd	Onshore cable route and landfall
February 2016-January 2017	Peregrine falcon survey	Natural Research Projects Ltd	Onshore cable route and landfall
February 2016-January 2017	Colonial seabird count	Natural Research Projects Ltd	Landfall site
February 2016-January 2017	Vantage Point watches	Natural Research Projects Ltd	Offshore cable route
April 2016-June 2017	Time-lapse seabird study	Affric Limited	Landfall site

17.3.2.1 Initial Seabird Ornithological Survey of Longhaven Cliffs

An ornithological survey took place, not for a complete count of each bird species within the Longhaven cliff section, but rather as an initial census of what species were utilising the cliffs and, crucially, which sections of the cliff were less dense. Photographs were taken of the cliff in sequence

and any cliff sections which were devoid of, or almost completely devoid of, apparent seabird breeding activity, were noted on the map and photographed in further detail.

17.3.2.2 Breeding Bird Survey (BBS)

The BBS undertaken between April 2016 and July 2016 followed guidelines adapted from the British Trust for Ornithology (BTO), extending the usual three site visits for breeding birds, to four. The survey was carried out along the proposed onshore cable corridor with a 500m buffer (Figure 17.1). A 500m buffer was used as when the survey was initially carried out the cable corridor had not been worked out, so the survey could help inform the routing. The route devised ensured all parts of the defined bird survey area were approached to within 200m, and habitat features such as trees and walls were specifically visited.

Bird locations and behaviour were recorded on a map during each visit and a summary map for those species of conservation concern was produced. The location and activity of birds were mapped onto enlarged 1:25000 scale Ordnance Survey maps using standard codes. The position of each bird was mapped at the point of first detection and flight lines recorded. At the end of each visit, a summary map was compiled showing the locations of each identified territory or breeding pair. The following evidence was considered diagnostic of breeding:

- song, courtship or territorial display;
- territorial dispute;
- nest building and hole excavation;
- agitated behaviour by adult bird(s) indicative of the presence of a nearby nest or young (e.g. repetitive alarm calling, distraction display);
- adult(s) carrying food; presence of newly fledged young;
- adult(s) removing faecal sac.

Where a number of breeding individuals were present, and it was not possible to determine the exact number of breeding pairs, a method was devised to allow the number of discrete territories to be estimated. Registrations of individual birds were deemed to represent discrete breeding territories / pairs if the distance between them was more than 250 m (200 m for small passerines). Whilst it is recognised that these distances are arbitrary, and the territory size varies both inter- and intra-specifically, this approach produces a standardised index of abundance based on the distance that members of a breeding pair are likely to move during the survey period. In cases where two individuals were considered to constitute a pair of birds, the location of the pair was placed centrally by convention.

Population estimates were derived by comparing the summary maps for the four survey visits. A method was developed to estimate discrete territories. Territories plotted during each visit were considered to be separate from one another if they were located more than 1000 m apart (500 m for snipe and skylark, 300 m for other small passerines). These distances were chosen to reflect the distances birds could plausibly move between survey dates. The locations of territories mapped in more than one survey period were plotted centrally.

Surveys were not undertaken in conditions considered likely to affect bird detection, for example, strong winds (greater than Beaufort Force 5), persistent precipitation, poor visibility (less than 300m) or in unusually hot or cold temperatures.

17.3.2.3 Migrant Survey

The bird survey area detailed in Figure 17.1 was covered during two visits between October and November 2016 were made to record migrating birds, particularly geese and waders. Summary maps were produced for the species recorded.

17.3.2.4 Peregrine Falcon Survey

Monthly surveys from February 2016-January 2017 recorded the presence of peregrine falcons along the cliff. The survey utilised the same sub-division of cliff areas (Figure 17.1), as described in more detail below in section 17.3.2.5. Surveyors were SNH licenced and every effort was made to minimise disturbance. The location and sex of any peregrines seen was noted, together with information on likely nest sites.

17.3.2.5 Colonial Seabird Count

The cliffs from Boddam to Collieston are part of the seabird colony register (SCR) census, and sub-divisions have been defined by JNCC. The cliff area surveyed for the colonial seabird count encompassed 47 of these (Figure 17.1). One additional area, termed “22” was added to the cliff survey area. Monthly counts were made between February 2016 and January 2017, targeting the seabird species utilising the cliffs both during breeding and non-breeding periods.

On each visit the surveyor systematically examined each count section from the cliff tops and recorded:

- The numbers of birds present and whether these are at breeding or loafing sites;
- Where possible, adult and immature birds were counted separately based on plumage, and breeding birds were distinguished from non-breeding birds based on behaviour;
- During the breeding season, where possible, the numbers of apparently occupied nests (Thaxter et al.) or apparently occupied breeding sites (AOS) were estimated.

The recording units of AON and AOS are the preferred units as stated in seabird monitoring handbook (Walsh et al., 1995). For European shag *Phalacrocorax aristotelis* (hereafter “shag”), black-legged kittiwake *Rissa tridactyla* (hereafter “kittiwake”), and herring gull *Larus argentatus*, estimates of apparently occupied nests (Thaxter et al.) are suggested, whilst for northern fulmar *Fulmarus glacialis* (hereafter “fulmar”) apparently occupied breeding sites (AOS) are the standard count. For the other species especially razorbill *Alca torda* and common guillemot *Uria aalge* (hereafter “guillemot”), the total count of individual birds was used to estimate use of each section of the survey area. Surveyors also recorded other breeding species which were present, such as common eider *Somateria mollissima* (hereafter “eider”), Atlantic puffin *Fratercula arctica* (hereafter “puffin”), lesser black-backed gull *Larus fuscus* and great black-backed gull *Larus marinus*.

Attention was paid to cover all parts of each count section, which meant that some sections were observed from a few locations and totals derived by summing the counts. In such cases the limits of each partial section already counted was noted on the map by the observer to avoid double counts.

Care was also taken to avoid disturbing breeding birds by keeping an appropriate distance from breeding sites which were closer to the cliff tops.

Information on disturbance such as the birds' response to potential disturbance stimuli, such as passing walkers or vessels was noted, if seen during field visits. Information on meteorological conditions was recorded, in particular sea state (using the Douglas Sea State numeric scale), wind speed (using the Beaufort Wind Force numeric scale) and direction, and visibility. Section counts were generally done under dry conditions with good visibility. During the section counts sea state ranged from 1 to 4 and sea swell from 0.25 m to 1.5 m. Wind conditions ranged between Beaufort Force 1 to 5.

As recommended by SNH, a distance-based approach was taken when considering how many birds were within the vicinity to the different activities. Distance radii from key activities ranged from 100m up to 1000m.

Data from their 2007 survey was provided by JNCC from their survey from Buchan Ness to Collieston, and this was used to obtain totals for seabird species throughout the whole area.

17.3.2.6 Vantage Point Seabird Watches

Two vantage points (VPs) were identified (Figure 17.1) which allowed all parts of the coastal waters within 2km of the coast to be observed from at least one VP. The VPs were located (one at the north of the site (VPN) and one at the south (VPS)) to minimise overlap and therefore the possibility of double counting.

VP watches aimed to quantify the numbers and distribution of seabirds on the sea out to 2 km from the coast. This was achieved by systematically and steadily scanning the area using a spotting scope fitted with an inclinometer. This allowed for detection of birds that may be temporally obscured from view by wave crests or when diving. Surveys were generally done under dry conditions with good visibility. During VP counts sea state ranged from 0 to 4 and sea swell from 0 to 1.5m. Wind conditions ranged from Beaufort Force 1 to 5.

During each VP scan, individual birds or group of birds were identified, counted, their location (in a distance band on a compass bearing) recorded, and behaviour (e.g. foraging, loafing, preening, flying etc.) noted.



Figure 17.1 Bird Survey areas for the HVDC Ecological assessment.

17.3.2.7 Time-lapse Seabird Study

Two cameras were placed at locations along the cliff (Figure 17.1), termed “North cam” and “South cam” due to their locations. One picture every 10 minutes during the dawn to dusk period was taken. The cameras were deployed from April 2016 to June 2017. For analysis, one picture was chosen at random during the morning (before noon), afternoon (between noon-5pm) and evening (after 5pm), for each day, over a full year period. Where the camera image was obscured due to weather or sun glare, the image was not included in further analysis. Fulmar, kittiwake and guillemot were counted with AONS/AOSs/total counts as per the colonial seabird study. Birds were counted manually, using the software ImageJ. For shags, the cameras were not set up at sites where shags were breeding. Instead, shags were recorded as roosting during the non-breeding period at this site, and were recorded as a binary data point, being either “present” (1) or “absent” (0). A summary of the species recorded from each camera and number of images analysed is provided in Table 17.2. The data was then analysed for seasonal and diurnal differences in cliff presence within each species, using the software R version 3.4.2.

Further details on the camera type and settings can be found in Appendix F.2.

Table 17.2 Summary of Time-lapse Camera Images Counted

Camera	Species counted/presence recorded*	No. of images analysed
North cam	Kittiwake	977
	Fulmar	974
	Shag*	987
South cam	Guillemot	1085
	Shag*	1095

17.3.3 Impact Assessment Methodology

The assessment of the significance of predicted impacts on ecological receptors is based on both the ‘value’ of a receptor and the nature and magnitude of the impact that the development will have on it. Effects on biodiversity may be direct (e.g. the loss of species or habitats), or indirect (e.g. effects due to noise, light or disturbance), on receptors located within or out with the respective survey area. This EclA has, in principle, followed the assessment methodology outlined in Chapter 3 with the specific ecological assessment methods and criteria detailed below.

17.3.3.1 Evaluation of Ecological Receptors

The evaluation methodology has been adapted from the Guidelines for Ecological Impact Assessment in the United Kingdom (CIEEM, 2016). A key consideration in assessing the effects of any development on flora and fauna is to define the areas of habitat and the species that need to be considered. This required the identification of a potential zone of influence, which is defined as those areas and resources that may be affected by biophysical changes caused by project activities, however remote from the respective survey area.

The approach that has been undertaken throughout this EclA is to identify ‘valued ecological receptors’ i.e. species and habitats that are both valued in some way and could be affected by the proposed development and separately, to consider legally protected species. Both species populations and habitats have been valued using a broad geographical basis with full details in Table 17.3.

The approach taken in this assessment is that a species population or habitat area that is of Regional or greater importance in biodiversity conservation terms is considered to be a valued ecological

receptor. Therefore, if a species population is considered to be of High Local value or less, the proposed development is not anticipated to have as great an effect on the species population as a whole. Exceptions are made if the species population or habitat area has been identified as having a high social or economic value, or if the species is legally protected, for example if they are a Schedule 1 or Schedule 5 species, or are a European Protected Species (EPS).

Table 17.3 Nature Conservation Receptor Evaluation Criteria.

Value	Criteria
International	<ul style="list-style-type: none"> • An internationally important site (SPA or SAC) or a site proposed for, or considered worthy of designation; • A regularly occurring substantial population of internationally important species (listed on Annex I of the Birds Directive).
National	<ul style="list-style-type: none"> • A nationally designated site, SSSI, or a site proposed for, or considered worthy of such designation; • A regularly occurring substantial population of a nationally important species, e.g. listed on Schedule 5 & 8 of the 1981 Wildlife and Countryside Act.
Regional	<ul style="list-style-type: none"> • Areas of internationally or nationally important habitats which are degraded but are considered readily restored; • Viable populations identified in the UKBAP or smaller areas/populations which are essential to maintain the viability of a larger area/population as a whole; • Regionally important population/assemblage of an EPS, Schedule 1 and/or 5 species. • Regionally important assemblages of other species.
High Local	<ul style="list-style-type: none"> • Locally important population/assemblage of an EPS, Schedule 1 and/or 5 species; or • Sites containing viable breeding populations of species known to be county rarities (e.g. included in the LBAP) or supplying critical elements of their habitat requirements.
Moderate Local	<ul style="list-style-type: none"> • Undesignated sites, features or species considered to appreciably enrich the habitat resource within the local context (within 2km radius from the site) and may benefit from mitigation as a good practice measure.
Low Local	<ul style="list-style-type: none"> • Undesignated species considered to appreciably enrich the habitat resource within the immediate environs of the site and may benefit from mitigation as a good practice measure.
Negligible	<ul style="list-style-type: none"> • Common and widespread species.

The approach of this assessment is to consider the value of the Site for the species under consideration, rather than the nature conservation importance of the species itself, although this is a factor in the evaluation process with the level of use of the Site (number of individuals using the site and nature and level of use) taken into consideration. An assessment is then made of the value of the Site to that species, based upon a combination of data sources, professional judgment and knowledge of the Site and wider area.

17.3.3.2 Legal Protection of Species

There is a need to identify all legally protected species that could be affected by the proposed development to ensure that the development complies with all relevant nature conservation legislation. It is, therefore, appropriate to take into full consideration the legal protection of a species within the evaluation process.

17.3.3.3 Nature and Magnitude of Impact

Impacts can be: permanent or temporary; direct or indirect; adverse or beneficial; reversible or irreversible; and may also have a cumulative function with other activities outwith the assessed development. These factors are taken into consideration in the context of the sensitivity of the valued ecological receptor and the range of potential effects. To identify whether impacts are significant or not it is important to undertake the assessment in terms of the integrity (coherence of the ecological structure and function) and conservation status (ability of the receptor to maintain its distribution and/or extent/size) of the receptor.

Table 17.4 provides an overview of the range of impact magnitudes referred to within this assessment. Impacts may be either positive or negative in nature.

Table 17.4 Definition of Magnitude of Impact.

Magnitude	Description
Negligible / None	Very slight change from the baseline conditions. Changes barely detectable, approximating to the 'no-change' situation. Any effects likely to be reversible within 12 months and not affect the conservation status or integrity of the receptor.
Low	Minor shift away from baseline conditions. Effects will be detectable but unlikely to be of a scale or duration to have a significant effect on the conservation status or integrity of the receptor in the short term (1-5 years). Overall baseline character of site will not alter substantially.
Medium	Clear effect on the conservation status or integrity of the receptor in the short to medium term (6-15 years), although this is likely to be reversible or replaceable in the long-term (15 years plus).
High	Total loss of, or major alteration to conservation status or integrity of a receptor with situation likely to be irreversible, even in the long term. Fundamental alteration to the character and composition of the Site.

17.3.3.4 Impact Significance

The significance of an effect is a product of the value of the ecological receptor and the magnitude of the impact on it, moderated by professional judgment. Table 17.5 illustrates a matrix based on these two parameters which is used for guidance in the assessment of significance. In terms of the EIA Regulations, only effects which are 'moderate' or 'major' are considered significant, the others constituting a non-significant effect. The level of effect has been assessed as either major, moderate, minor or negligible, or beneficial in accordance with the definitions provided in Chapter 3: Methodology.

Table 17.5 Significance of Effects Matrix.

Magnitude of Impact	Sensitivity				
	International	National	Regional	High Local/ Moderate Local	Low Local /Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible	Negligible

Key

	Significant Effect
	Non-Significant Effect

17.4 Baseline Information

17.4.1 Statutory Designated Sites

Table 17.6 details the sites near the development that have been designated in full or part for avian nature conservation interests, as well as one which has been designated for a feature which indirectly benefits those birds utilising the marine environment. The boundaries of these are mapped in Drawing NCFFS-NCT-X-XG-0005-01, hereafter named Drawing 0005-01. The distance given is the closest distance to the cable corridor from the centre point of the designated site.

Table 17.6 Designated Sites Relevant to the Avian Receptors

Site	Distance from Cable Corridor	Relevant designated Interests	Feature's importance (from JNCC site and species information pages)
Buchan Ness to Collieston Coast (includes marine extension) SPA.	Crossed at HVDC cable landfall.	Northern fulmar, breeding Common guillemot, breeding Herring gull, breeding Kittiwake, breeding Eurasian shag, breeding Seabird assemblage, breeding	0.3% national population 1.2% national population 2.7% national population 6.2% of national population 2.8% national population Under Article 4.2 of the Directive (79/409/EEC), over 95,000 seabirds supported.
Bullers of Buchan Coast SSSI	Crossed at HVDC cable landfall.	Seabird colony, breeding Common guillemot, breeding Kittiwake, breeding Eurasian shag, breeding	All as designated under SPA.

Site	Distance from Cable Corridor	Relevant designated Interests	Feature's importance (from JNCC site and species information pages)
Collieston to Whinnyfold Coast SSSI	8km south of HVDC cable landfall	Northern fulmar, breeding Common guillemot, breeding Herring gull, breeding Kittiwake, breeding Razorbill, breeding Seabird assemblage, breeding	As designated under SPA, except razorbill.
Ythan Estuary, Sands of Forvie and Meikle Loch SPA and SSSI	20km south of HVDC cable landfall	Arctic tern, breeding Common tern, breeding Little tern, breeding Sandwich tern, breeding Pink-footed goose, non-breeding Waterfowl assemblage (eider, lapwing, redshank, pink-footed goose), non-breeding	SSSI designation only 2.2% national population 1.7% national population 4.3% national population 7.7% of the wintering Eastern Greenland/Iceland/UK population Under Article 4.2 of the Directive (79/409/EEC) over 20,000 waterfowl
Turbot Bank MPA	30km South of HVDC cable corridor	Sandeel ground.	Potential prey resource for marine ornithological interests.
Troup, Pennan and Lion's Heads SPA	60km north-west of UK landfall	Common guillemot, breeding Seabird assemblage, breeding	1.3 % of East Atlantic population Under Article 4.2 of the Directive (79/409/EEC), over 15,000 seabirds supported
Fowlsheugh SPA	75km south of UK landfall	Common guillemot, breeding Kittiwake, breeding Seabird assemblage, breeding	1.8% of East Atlantic population 1.1% of East Atlantic population Under Article 4.2 of the Directive (79/409/EEC), over 170,000 seabirds supported
Moray Firth pSPA	145km north-west of UK landfall	European shag, breeding Common eider, non-breeding Common goldeneye, non-breeding Common scoter, non-breeding Great northern diver, non-breeding Greater scaup, non-breeding Long-tailed duck, non-breeding Red-breasted merganser, non-breeding Red-throated diver, non-breeding Slavonian grebe, non-breeding Velvet scoter, non-breeding	Important breeding population of European shags. Important non-breeding populations of diver and seaduck species.

Site	Distance from Cable Corridor	Relevant designated Interests	Feature's importance (from JNCC site and species information pages)
Outer Firth of Forth and St Andrews Bay pSPA	160km south-west of UK landfall	Arctic tern, breeding Atlantic puffin, breeding Common guillemot, breeding and non-breeding Common tern, breeding European shag, breeding and non-breeding Herring gull, breeding and non-breeding Kittiwake, breeding and non-breeding Manx shearwater, breeding Northern gannet, breeding Black-headed gull, non-breeding Common eider, non-breeding Common goldeneye, non-breeding Common gull, non-breeding Common scoter, non-breeding Little gull, non-breeding Long-tailed duck, non-breeding Razorbill, non-breeding Red-breasted merganser, non-breeding Red-throated diver, non-breeding Slavonian grebe, non-breeding Velvet scoter, non-breeding	Important area for both breeding and non-breeding populations of seabirds, divers and seaducks.
Firth of Forth Islands SPA	185km south-west of UK landfall.	Arctic terns, breeding Common tern, breeding Roseate tern, breeding Sandwich tern, breeding Gannet, breeding Lesser black-backed gull, breeding Puffin, breeding European shag, breeding Seabird assemblage, breeding	1.2 % national population 6.5% national population 15% national population 0.2% national population 13.1% breeding N. Atlantic population 2.4 % of Western Europe population. 2.3% of breeding population. 2.3 % breeding population of Northern Europe. Under Article 4.2 of the Directive (79/409/EEC), over 90,000 seabirds supported

17.4.1.1 Buchan Ness to Collieston Coast SPA

Buchan Ness to Collieston coast SPA (with marine extension) regularly supports over 95,000 seabirds (JNCC, 2001a). The SPA covers a 15km stretch of coastline, formed of granite, quartzite and rocky cliffs as well as a sandy beach section by Cruden Bay. The cliffs are in general less than 50m high and there are many stacks just off the cliffs. The marine extension means that the waters 2km off the cliffs are also protected. The overarching conservation objectives of the site is:

“To avoid the deterioration of the habitats of the qualifying species...or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained”, (SNH, 2018)

and the subsequent conservation objectives are:

“To ensure for the qualifying species that the following are maintained in the long term: Population of the species as a viable component of the site; Distribution of the species within the site; Distribution and extent of habitats supporting the species; Structure, function and supporting processes of habitats supporting the species; and No significant disturbance of the species”. (SNH, 2018)

All species designated for this SPA are considered for the assessment due to the cable corridor passing through the designated site. Following discussions with SNH, it is acknowledged that an appropriate assessment will be required for this designated site. Therefore, information is provided in this chapter to aid Marine Scotland in their assessment of the effects of the development on the designated site.

The three most recent surveys are shown in Table 17.7. Note that 2007 is the latest publicly available data (JNCC, 2018a). As this data is more than 10 years old, NorthConnect specifically commissioned seabird surveys for an approximate stretch of 3km of coastline within the Buchan Ness to Collieston Coast SPA, as described more in section 17.3.2.5.

Table 17.7 Buchan Ness to Collieston Coast SPA data from 2001, 2004, and 2007 (JNCC, 2018a).

Qualifying Species	2001	2004	2007
Northern fulmar	1976	Not counted	1389
Common guillemot	29389	Not counted	19296
Herring gull	3126	3217	3079
Kittiwake	14093	13330	12542
Eurasian shag	415	594	331

17.4.1.2 Bullers of Buchan Coast SSSI

As well as being designated for maritime cliff and for geological features of the coastline, this coastal SSSI supports internationally important numbers of seabirds. The SSSI fits within the Buchan Ness to Collieston Coast SPA up to the Cruden Bay section of the SPA. As such, this site is considered in conjunction with the SPA designation. As such, all associated species will be considered within the assessment.

17.4.1.3 Collieston to Whinnyfold Coast SSSI

This coastal SSSI supports internationally important numbers of seabirds. The SSSI fits within the Buchan Ness to Collieston Coast SPA. As such, this site is considered in conjunction with the SPA designation. Associated species will be considered within the assessment of the SPA. Razorbills, not on the SPA designation are considered within the separate species accounts.

17.4.1.4 Ythan Estuary, Sands of Forvie and Meikle Loch SPA/Sands of Forvie and Ythan Estuary SSSI

This designated site encompasses an area of estuary, a sand dune system and mudflats (JNCC, 2005). Meikle Loch provides a roost for migratory geese at night. There is potential connectivity between the goose roost and the farmland within the HVDC cable corridor, therefore this site is taken forward for further consideration.

17.4.1.5 Turbot Bank MPA

Sandeels provide an important food source for many seabirds and as such this MPA for sandeels will benefit the seabirds feeding on them. The site area is 251km² of largely sandy ground with a shelf bank and mound feature present (JNCC, 2018b). The area is particularly important for the Raitt's sandeel *Ammodytes marinus*. This MPA is considered in greater detail in Chapter 15: Fish and Shellfish. The

result of the impact assessment on the Turbot Bank MPA revealed a 'no change' scenario for the site. Therefore, no effects are expected on the seabirds' prey items. This MPA is subsequently scoped out of further assessment.

17.4.1.6 Troup, Pennan and Lion's Head SPA

The Troup, Pennan and Lion's Head SPA is between the Banff and Buchan coast and includes a 9km stretch of sea cliffs (JNCC, 2001c). The cliffs are known to be particularly important for breeding auks, as such guillemots are the key designated feature of this SPA. Breeding guillemots at this SPA are within the breeding foraging range to overlap with the HVDC cable corridor (Table 17.10). Therefore, this site is included within the assessment.

17.4.1.7 Fowlsheugh SPA

Fowlsheugh SPA encompasses an area of sheer cliffs between 30-60m high (JNCC, 2001b). The SPA supports large numbers of breeding gulls and auks. The designated guillemot and kittiwake are within the breeding foraging range to overlap with the HVDC cable corridor (Table 17.10). Therefore, this site is included within the assessment.

17.4.1.8 Moray Firth pSPA

This proposed SPA is predominantly designated for wintering waterfowl and diver species. The Moray Firth has a variety of habitats available for the diving birds, including sheltered bays and rocky outcrops. The only breeding species on the qualifying interest list for shags, that have an important breeding population north of Helmsdale (SNH, 2016b). Due to the foraging distances of shags in the breeding period being 14 ± 3.5 km (Table 17.10), and the distance between this pSPA and the HVDC cable corridor being 145km north (Table 17.6), this designated site can be scoped out of any further assessment.

17.4.1.9 Outer Firth of Forth and St Andrews Bay pSPA

This proposed SPA encompasses an area of 2,721km² from Arbroath down to St Abb's Head (SNH, 2016c). The sheltered waters are an important foraging habitat for both breeding and non-breeding birds. Despite the distance between this site and the HVDC cable corridor (160km), many of the designated seabird species have large foraging ranges during in the non-breeding period when they are no longer as constrained by a nest site (Table 17.10). Arctic terns are known to have a relatively short foraging range compared to other seabird species (Eglington & Perrow, 2014), having a maximum foraging range of 30km (Thaxter et al., 2012). Therefore, arctic terns are excluded from further assessment due to not overlapping with the development. The coastal area around the HVDC cable corridor is not an important site for divers or seaducks and it is unlikely there will be any overlap between the designated seaduck and diver species between the proposed SPA and the development area. As such, these species are excluded. For the purposes of assessment breeding seabird assemblage and non-breeding seabird assemblages are taken forward for valuation.

17.4.1.10 Firth of Forth Island SPA

This SPA comprises of a number of islands, including: Inchmickery, Fidra, Lamb, Craigleith, Bass Rock and Isle of May. Bass Rock is recorded as being the world's largest colony of northern gannets following a recent count in 2014 (JNCC, 2016a). Terns species are known to have a relatively short foraging range compared to other seabird species (Eglington & Perrow, 2014), having a maximum foraging range of 30km (Thaxter et al., 2012). Therefore, the tern species can be excluded from further assessment due to not overlapping with the development. Due to the foraging distances of

shags in the breeding period being 14 ± 3.5 km, shags can also be excluded from further assessment of this SPA. The remaining species; puffin, lesser black-backed gull, and gannet are all within the foraging range and therefore will be included in further assessment.

17.4.2 Other sites

The Scottish Wildlife Trust (SWT) Longhaven Cliffs Reserve is within the boundaries of the designated sites Buchan Ness to Collieston SAC and Bullers of Buchan Coast SSSI. The landfall site will fall within the cliffside section of the Reserve. As such, this will be considered in conjunction with the assessment of the SPA/SSSI. There is also an inland area of the Reserve which will be taken forward for assessment.

17.5 Field Survey Results

17.5.1 Initial Seabird Ornithological Walkover

The initial walkover in May 2014 revealed two areas with very low densities of seabirds utilising the cliffs during on the peak breeding months. One area was a bay with grassy banks and a small stony beach at the base (Photo 1). Minimal breeding seabirds were noted here, though kittiwakes were noted collecting nesting material in the bay.



Photo 1 Section of Longhaven cliffs May 2014

The second area is a bay with large amounts of rubble at the base from a disused quarry (Photo 2). This bay, and the associated headland to the south had less suitable nesting habitat than other cliff sections.



Photo 2 Section of Longhaven cliffs May 2014.

This initial survey helped inform where the landfall selection would be, which ended up being in the area by Photo 2, south of the disused quarry. From the beginning, the designated seabirds were an integral part of the design process in choosing a suitable landfall section.

17.5.2 Breeding Bird Survey (BBS)

17.5.2.1 Passerines and Waders

A total of four Northern lapwing *Vanellus vanellus* ("lapwing") and two common snipe *Gallinago gallinago* ("snipe") territories were recorded in the BBS area (Appendix F.1: Figure 12). Passerine species territories recorded included Eurasian skylark *Alauda arvensis* ("skylark"), song thrush *Turdus philomelos*, dunnoek *Prunella modularis*, common linnet *Linaria cannabina* ("linnet"), yellowhammer *Emberiza citrinella* and common reed bunting *Emberiza schoeniclus* ("reed bunting") (Appendix F.1: Figure 13) (Table 17.8). The latest numbers of these species across their UK breeding population is also included in the table (BTO, 2018).

Table 17.8 Territories Noted of Passerine and Wader Species in the HVDC Breeding Bird Survey Area.

	Territories		Breeding period	Time-	UK Population Territories
Species	Confirmed	Probable			
NRP Report 2016 BBS Survey					
Lapwing	4		Late March-early June		156,000
Snipe	2		April – mid July		59,300
Skylark	18		April-August		1,785,000
Song thrush	3		March-August		1,144,000
Dunnock	7		April-July		2,163,000
Linnet	4	1	April-July		556,000
Yellowhammer	8		April-July		792,000
Reed bunting	3		April-August		192,000
Agroecosystems 2014 Pre-liminary BBS: additional species					
Sedge warbler	1		April-July		321,000
Goldfinch	7		April-August		313,000
Lesser redpoll	2		April-July		26,900
Willow warbler	4		April-July		2,400,000
Wren	9		March-July		8,512,000
Blackbird	1		April-July		4,935,000
Tree sparrow	1		April-August		68,000
House sparrow	1		April-August		2,100,000

Table 17.8 also shows the breeding period times for each of the species recorded. The most common passerine recorded during the BBS were skylarks. One skylark territory was recorded as being within the Landfall area by the Longhaven cliffs. Skylarks prefer vegetation to be around 20-50cm in height and may have two to three nesting attempts during the season (RSPB, 2018d). Similarly, passerines such as song thrushes will also have several attempts at breeding throughout their long breeding season. Many passerines will build nests amongst trees and shrubs, along walls, on ledges and sometimes on the ground within thick vegetation or crops. Lapwings nest in either bare ground or short vegetation and their individual territories are around 0.4-0.8 hectares (RSPB, 2018b). Snipe require a mixture of short and tall vegetation types in wet ground.

In the autumn of 2016, a flock of 13 Eurasian curlew *Numenius arquata* (“curlew”) was recorded feeding in the southern end of the bird survey area with a second flock of 20 nearby. It is known that over the non-breeding period coastal numbers build up and peak in January and February, before they then return to their breeding grounds (RSPB, 2018a).

Outside the BBS area but within the Seabird Survey Area, a Raven *Corvus corvus* was recorded nesting in area 2H.

17.5.2.2 Migratory Birds

During the two extra visits to the BBS area over the non-breeding period to assess migratory birds, no geese or migratory wading birds were recorded during the October visit. In November, a flock of 45 pink-footed geese *Anser brachyrhynchus* was observed in the far north of the area. Pink-footed geese migrate from Spitsbergen, Iceland and Greenland to winter in the U.K, to feed on winter grains, cereals and grasses. The total UK wintering population is at approximately 360,000 birds, a large proportion of which winter in eastern Scotland (RSPB, 2018c).

Outside the BBS area but within the Seabird Survey Area, one non-breeding adult Common redshank *Tringa tetanus* was recorded in October, and 2 were recorded in November.

17.5.2.3 Peregrine and Other Birds of Prey

Adults were recorded at a breeding site in February at a confidential location within the survey area, but not within the cable corridor. An adult sitting on 4 eggs was recorded in April. Three small chicks were recorded in May, three juveniles in June and 3 fledged juveniles in July. The peregrines have been observed hunting by the seabird cliffs, so during the breeding season it is likely that the seabirds provide a source of food for the peregrines. The adults were resident throughout the year and were recorded in every month except January 2017. The maximum number of adults seen together was three.

Other birds of prey were recorded during the surveys. A single buzzard was noted in November 2016 and one was noted flying past in January 2017. Immature and juvenile kestrels were also noted: 3 in September 2016 (one of which flew past), and 3 in October 2016. During the 2014 breeding bird survey which was carried out as part of the EIA for the HVAC cabling and converter station works, a barn owl pellet was noted in the eastern part of the HVDC cable corridor though no signs of a barn owl breeding in the survey area was noted. No barn owls were not recorded in the more recent breeding bird surveys.

17.5.3 Seabird Surveys

See Appendix F.1 for the NRP Ornithology report and the associated data tables for the complete data set recorded. What presented here is summary analysis which was carried out as part of a technical ornithological report by NorthConnect (Affric Limited, 2018), with further information on the key seabird species recorded as using these cliffs, and the surrounding waters.

17.5.3.1 General Seabird Information and Summary Tables.

Seabirds are long-lived species and can take several years to reach sexual maturity. Though it is species-specific, seabirds generally only produce one or two young per season, with exceptions existing, such as shags which can produce broods of four young. Once a seabird chooses a breeding colony, they will often remain site faithful to that breeding site, returning each year, often consistently to the same nest. Seabirds do not breed every year, sometimes deferring breeding for a year either due to not finding a partner that year, or due to being in a poor body condition. However, non-breeding birds may still return to the colony and will loaf around the colony. As breeding is such an energetically expensive activity, in general a seabird's annual moult (i.e. replacement of new feathers) will occur after the breeding season has completed. Moult can begin at the breeding site however it is more common for moult to be completed at sea, during the non-breeding period. During the moulting period the birds may be less agile in flight and in swimming.

These seabird species recorded during the year-long seabird surveys along with their associated vulnerability index are shown in Table 17.9, where a score of 1 is the lowest vulnerability and 5 is the highest (Furness, Wade, & Masden, 2013). This vulnerability index is related to likelihood of eliciting a response whilst the birds are on the sea. As the seabirds at Buchan Ness to Collieston Coast SPA may be affected both on sea and on land, a flushing distance due to human disturbance is also given.

Table 17.9 Seabird Vulnerability scores to Vessel and Human Disturbance.

Species	Vulnerability score to disturbance by vessels on sea	Response whilst on sea	Vulnerability/Flushing distance on land
Fulmar	1	Little response (Garthe & Hüppop, 2004)	May be between 10m-100m, depending on how disturbed the colony is already (Quinn, pers.comm.)
Kittiwake	2	Slight avoidance at short range (Garthe & Hüppop, 2004)	40-180m based on assessment of gulls and terns and human disturbance effects (Carney & Sydeman, 1999) and Canadian Arctic gulls (Mallory, 2016)
Herring gull	2	Slight avoidance at short range (Garthe & Hüppop, 2004)	40-180m based on assessment of gulls and terns and human disturbance effects (Carney & Sydeman, 1999) and Canadian arctic gulls (Mallory, 2016)
Guillemot	3	Moderate avoidance at short range (Bellefleur, Lee, & Ronconi, 2009; Garthe & Hüppop, 2004)	50m if vessel remains for extended periods of time (Rojek, Parker, Carter, & McChesney, 2007)
Razorbill	3	Moderate avoidance at short range (Bellefleur et al., 2009; Garthe & Hüppop, 2004)	Due to similarity in ecology, taken to be as for guillemot.
Shag	4	Moderate flush distance and alert to vessels at 500m (Velando & Munilla, 2011)	70m for a small (4.3m) motorised boat approaching the nests directly (for double-crested cormorant, as similar nesting habits) (Rodgers & Smith, 1995)
Puffin	2	Slight avoidance at short range (Garthe and Hüppop 2004)	N/A for nest flushing as nests in burrows.
Gannet	2	Slight avoidance at short range (Garthe and Hüppop 2004)	N/A for land flushing as none nest on the Buchan Ness cliffs.

Table 17.10 presents a summary of the key seabird species recorded during the year-long breeding survey and what their annual cycle and foraging characteristics are in broad terms.

Table 17.11 is a summary of the number of adults and breeding adults recorded for the main seabird species recorded along the seabird study area during each month of the survey year. For a full breakdown of other species recorded during the seabird surveys, see Appendix F.1.

Table 17.12 summarises the number of immature and juvenile birds recorded either on sea or on land during the surveys.

The vantage point (VP) surveys revealed what birds were utilising waters up to 500m from the seabird cliffs off the Buchan Ness to Collieston Coast SPA. A total of 13 seabird species were recorded from the two VPs, a full break down of which is found in Appendix F.1. Overall, the largest combined monthly counts were between May-July, and the lowest combined count of birds on sea was in February.

As recommended by SNH, a distance-based approach of assessment of numbers of birds along the cliffs was undertaken, with differing radii from key activities: 100m, 200m, 300m, 400m, 500m, 750m, and 1000m. Due to the far-ranging nature of seabirds, it is likely that birds across the cliffs will be in proximity to the development when flying over or resting on the sea. However, disturbance is at its greatest when a bird is disturbed from its nest. Nest disturbance can cause breeding attempt abandonment, or can cause predation of the egg or chick, if the adult is flushed from the nest. Therefore, it is more appropriate to assess based on the zones within which nest disturbance is more likely. The 100m distance encompassed the adjacent area to the activity and is a disturbance distance identified for the main species during a literature review (see Table 17.9). For the purposes of this EIA, birds on land within 100m is used as a key distance to assess effects. A summary for birds on land within 200m is also presented as a precautionary value. The results of the numbers of birds within each distance radii are provided in Appendix F.3 to help inform the later Appropriate Assessment. Table 17.13 is a summary of the numbers and proportions of key seabird species recorded in the 100m radii from the HDD landfall site, as identified from Drawing NCFFS-NCT-X-XG-0006-01, hereafter Drawing 0006-1 (area 2Z), and in the areas within 200m of the HDD landfall (areas 2W to 3C).

Table 17.14 is a summary of the numbers and proportions of key seabird species recorded in the 200m radii from the HDD marine exit, as identified from Drawing NCFFS-NCT-X-XG-0007-01, hereafter Drawing 0007-1 (areas 3A and 3B). There are no breeding seabirds within the adjacent 100m of the HDD exit.

Table 17.10 Key Seabird Species Breeding and Non-breeding Period Timings and their Foraging Characteristics

Species	Annual cycle				Foraging range (km from breeding colony)		Foraging depth	Predominant foraging strategy
	Breeding period			Non-breeding period				
	Pre-laying	Egg Incubation	Chick-rearing	Wintering	Breeding	Non-breeding		
Fulmar	April	May-June (52-53 days)	June-August (46-51days)	September-March	400km±246km (mean maximum) (Thaxter et al., 2012)	1016km (D., M., & C.),3500km (max) (Quinn, 2014)	<5m (Edwards, Quinn, Wakefield, Miller, & Thompson, 2013)	Surface feeding
Kittiwake	April	May-June (25-32 days)	June-July (33-54 days)	September-March	60.0±23.3 (mean maximum) (Thaxter et al., 2012)	<100km->3000km (median) (Frederiksen et al., 2012)	<4m (Daunt et al., 2002)	Surface feeding
Guillemot	March	April-June (28-37 days)	May-July (18-25 days)	August-February	84.2±50.1 (mean maximum) (Thaxter et al., 2012)	<1000km (Tranquilla et al., 2013)	Up to 200m (BirdLife International 2018)	Pursuit diving
Razorbill	March	April-June (32-39 days)	May-July (14-24 days)	August-February	48.5±35.0km (mean maximum) (Thaxter et al., 2012)	<950km (Linnebjerg et al., 2013)	Up to 140m (Piatt & Nettleship, 1985)	Pursuit diving
Shag	March	April-June (30-31 days)	June-August (48-58 days)	September-February	14.5±3.5km (mean maximum) (Thaxter et al., 2012)	486km (Grist et al., 2014)	Up to 80m (BirdLife International 2018)	Benthic feeding
Herring gull	March	April-June (28-36 days)	June-July (35-40 days)	September-February	61.1±44km (mean maximum) (Thaxter et al., 2012)	41km (BirdLife International, 2018)	<2m (Lilliendahl & Sólmundsson, 2006)	Surface feeder/Scavenger

Lesser black-backed gull	March	April-June (24-27 days)	June-July (30-40 days)	September-February	141.0±50.8km (mean maximum) (Thaxter et al., 2012)	1672km-7585km (Bustnes, Moe, Helberg, & Phillips, 2013; Klaassen, Ens, Shamoun-Baranes, Exo, & Bairlein, 2012)	<2m (BirdLife International 2018)	Surface feeder/Scavenger
Great black-backed	March	April-June (27-28 days)	June-July (50-55 days)	September-February	39km (Wernham, 2002)	54.5km (median) (Wernham, 2002)	<2m (BirdLife International 2018)	Scavenger/Kleptoparasite
Puffin	April	May-June (36-43 days)	June-July (34-44 days)	August-March	105.4±46.0km (mean maximum), (Thaxter et al., 2012)	<700km (Harris, Daunt, Newell, Phillips, & Wanless, 2010)	Up to 70m (BirdLife International 2018)	Pursuit diving
Gannet	February	March-June (42-46 days)	May-September (84-97 days)	October-February	229.4±124.3km (mean maximum), (Thaxter et al., 2012)	343km-4654km (range), 2766km±1658km (D. et al.) (Kubetzki, Garthe, Fifield, Mendel, & Furness, 2009)	Up to 34m (BirdLife International, 2018)	Plunge diving

Table 17.11 Summary of Number of Adults (AD) and Breeding Sites (AOS/AON) for Mean Seabird Species Recorded during the Year-long Survey Maximum count shown in bold.

Month	Fulmar		Shag		Herring Gull		Kittiwake		Guillemot		Razorbill		Puffin		Great black-backed gull		Total AD	Total AON
	AD	AOS	AD	AON	AD	AON	AD	AON	AD	AOS*	AD	AOS*	AD	AOS*	AD	AON		
Jan	436	278	3	0	130	0	0	0	3091	3091	0	0	0	0	0	0	3660	3369
Feb	201	135	39	0	417	85	0	0	0	0	0	0	0	0	2	2	659	222
Mar	352	236	52	25	663	232	1567	783	6219	6219	334	334	0	0	6	5	9193	7834
Apr	450	288	95	37	474	121	2403	1186	4541	4541	649	649	8	5	4	2	8624	6829
May	268	217	144	57	629	206	4000	2000	5447	5271	1026	954	25	17	4	3	11543	8725
Jun	331	256	149	80	636	230	4003	2001	6149	6091	1165	1139	29	19	5	3	12467	9819
Jul	275	130	184	43	721	92	4358	2179	5264	5264	1178	1148	71	4	7	1	12058	8861
Aug	64	49	192	13	688	0	3561	1780	9	9	2	2	0	0	3	1	4519	1854
Sep	37	22	86	2	56	0	17	3	0	0	0	0	0	0	5	1	201	25
Oct	0	0	29	0	1	0	0	0	0	0	0	0	0	0	2	0	32	0
Nov	11	6	1	0	122	2	0	0	0	0	0	0	0	0	0	0	134	8
Dec	221	144	3	0	14	0	0	0	64	64	0	0	0	0	2	1	304	209

Table 17.12 Summary of Number of Immature Birds (IMM) Recorded on Land or Sea and Juvenile Birds (JUV) on Land

Month	Fulmar			Shag			Kittiwake			Herring Gull			Total IMM and JUV
	IMM (land)	IMM (sea)	JUV	IMM (land)	IMM (sea)	JUV	IMM (land)	IMM (sea)	JUV	IMM (land)	IMM (sea)	JUV	
Jan										8	15		23
Feb								1		33	8		42
Mar							9			85			94
Apr				7				2		9			18
May				22						46			68
Jun				11		90	3		1	39		140	284
Jul				35	1	14	2			104	18	4	178
Aug			46	96	2	14	3		1687	58	74	109	2089
Sep	1			30	2					54			87
Oct				7								3	10
Nov										4	8		12
Dec				1						4			5
Total	1	0	46	209	5	118	17	3	1688	444	123	256	2910

Table 17.13 Summary of number of key seabird species recorded within the 100m and 200m buffer zones from HDD landfall site. Proportion of birds recorded in relation to the Buchan Ness to Collieston Coast SPA count is shown in brackets as a percentage (JNCC counts, unknown date).

Month	Fulmar AOS		Kittiwake AON		Guillemot total		Razorbill total		Herring gulls AON		Shag AON	
	100m (%)	200m (%)	100m (%)	200m (%)	100m (%)	200m (%)	100m (%)	200m (%)	100m (%)	200m (%)	100m (%)	200m (%)
January	0	3 (0.22)	0	0	0	230 (1.19)	0	0	0	0	0	0
February	3 (0.22)	8 (0.58)	0	0	0	412 (2.14)	0	0	0	16 (0.52)	0	0
March	3 (0.22)	9 (0.65)	0	81 (0.65)	0	524 (2.72)	0	24 (0.57)	4 (0.13)	61 (1.98)	0	9 (2.72)
April	6 (0.43)	16 (1.15)	0	88 (0.70)	0	352 (1.82)	0	145 (3.47)	0	21 (0.68)	0	14 (4.23)
May	4 (0.29)	6 (0.29)	0	176 (1.40)	0	422 (2.19)	0	194 (4.64)	0	42 (1.36)	0	12 (3.63)
June	5 (0.36)	10 (0.36)	0	153 (1.22)	0	482 (2.50)	0	185 (4.43)	0	48 (1.56)	0	19 (5.74)
July	8 (0.58)	12 (0.58)	0	186 (1.48)	0	2 (0.01)	0	182 (4.36)	2 (0.06)	4 (0.13)	0	4 (1.21)
August	1 (0.07)	1 (0.07)	0	145 (1.15)	0	0	0	0	0	0	0	0
September	0	0	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0	0
December	1 (0.07)	1 (0.07)	0	0	0	0	0	0	0	0	0	0

Table 17.14 Summary of number of key seabird species recorded within 200m buffer zone from the HDD exit point. Proportion of birds recorded in relation to the Buchan Ness to Collieston Coast SPA count is also shown as a percentage.

	Fulmar AOS		Kittiwake AON		Guillemot total		Razorbill total		Herring gulls AON		Shag AON	
	200m	Proportion	200m	Proportion	200m	Proportion	200m	Proportion	200m	Proportion	200m	Proportion
January	0	0	0	0	230	1.19	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	14	0.45	0	0
March	0	0	41	0.33	412	2.14	16	0.38	31	1.01	7	2.11
April	1	0.07	26.5	0.21	524	2.72	105	2.51	12	0.39	10	3.02
May	0	0	76	0.61	352	1.82	104	2.49	26	0.84	12	3.63
June	0	0	25	0.20	422	2.19	108	2.58	30	0.97	14	4.23
July	0	0	92	0.73	482	2.50	118	2.82	2	0.06	4	1.21
August	0	0	66	0.53	2	0.01	0	0	0	0	0	0
September	0	0	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0

Figure 17.2 presents a summary of the year-round seabird survey data with total breeding sites being recorded in each month and the total number of adults recorded on the cliffs which will include breeders and loafers. The results demonstrate that seabirds were recorded as being present along the cliffs in large numbers particularly in the breeding period from March-August. The maximum number of birds recorded in one survey month was in June where 12,500 adults (approximately 9,900 breeding sites) were recorded. In the non-breeding period, the maximum number of birds recorded in any one month was in January when 3,660 individuals were recorded, 3000 of which were guillemots. Certain seabird species are known to return during the non-breeding period, most likely in relation to maintaining a territory over the nest site for the subsequent breeding season. Visits to the colony over the non-breeding period may also relate in part to reaffirming pair bonds, or as a way to meet potential new mates. When birds return to their colonies over the non-breeding period they are not as tied to their nest site as they are during the breeding period.

September to December shows there is a lower seabird presence in these months, but in January numbers rise again. The peak months for numbers of breeding birds (as shown in the blue in Figure 17.2) are May (8725), June (9819) and July (8861). This confirms the information gathered for Table 17.10 that these months are the busiest ones for the breeding period. In May, most seabird species will be egg laying and therefore incubating (Table 17.8). In June and July, these are key chick-rearing periods (Table 17.8).

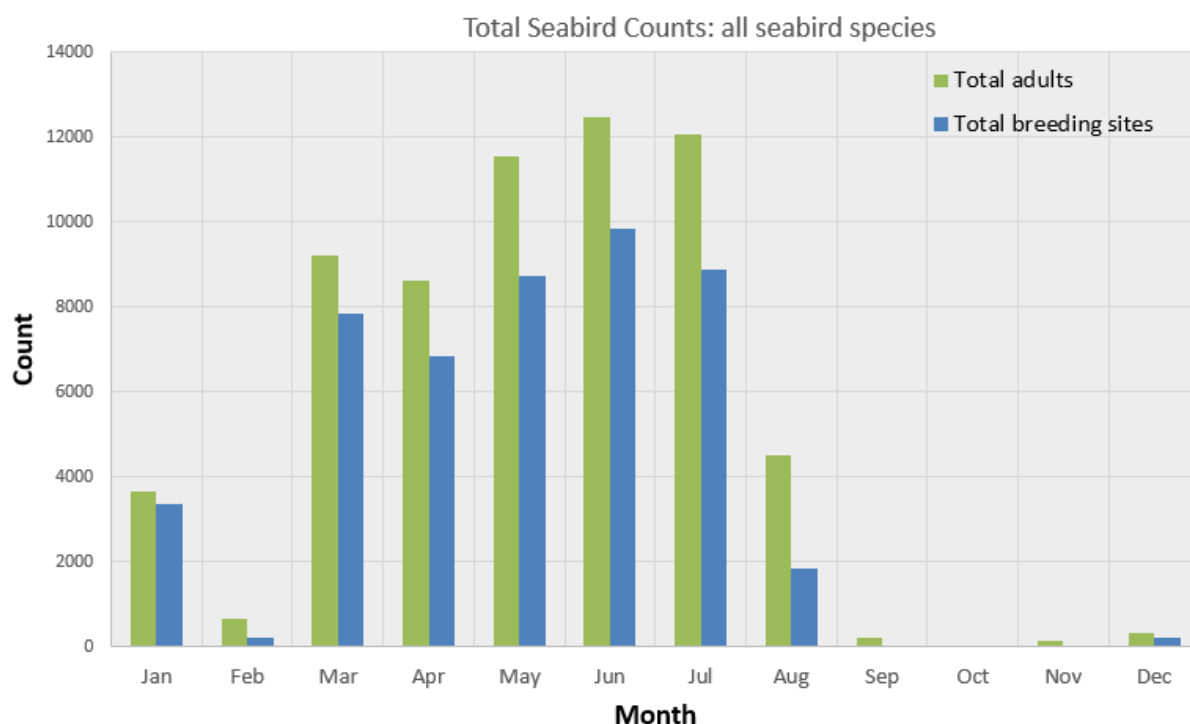


Figure 17.2 Total number of breeders (GreenBlue) and adult loafing birds (GreenBlue) recorded across the entire 3km stretch of coastline, per month.

17.5.3.2 Guillemot

Guillemots are the most numerous of the species recorded both on land and at sea. They return in large numbers in January, with their peak number in March (the pre-laying period) (Figure 17.3). From August to December they are not present on the cliffs or are present only in very small numbers (Figure 17.3). At sea, guillemots were recorded from at least one vantage point in all 12 survey months. In

May, June and July there were 378, 405 and 817 birds recorded on sea, respectively. No immature guillemots were recorded on land or on sea. A total of 7 juveniles were noted in August.

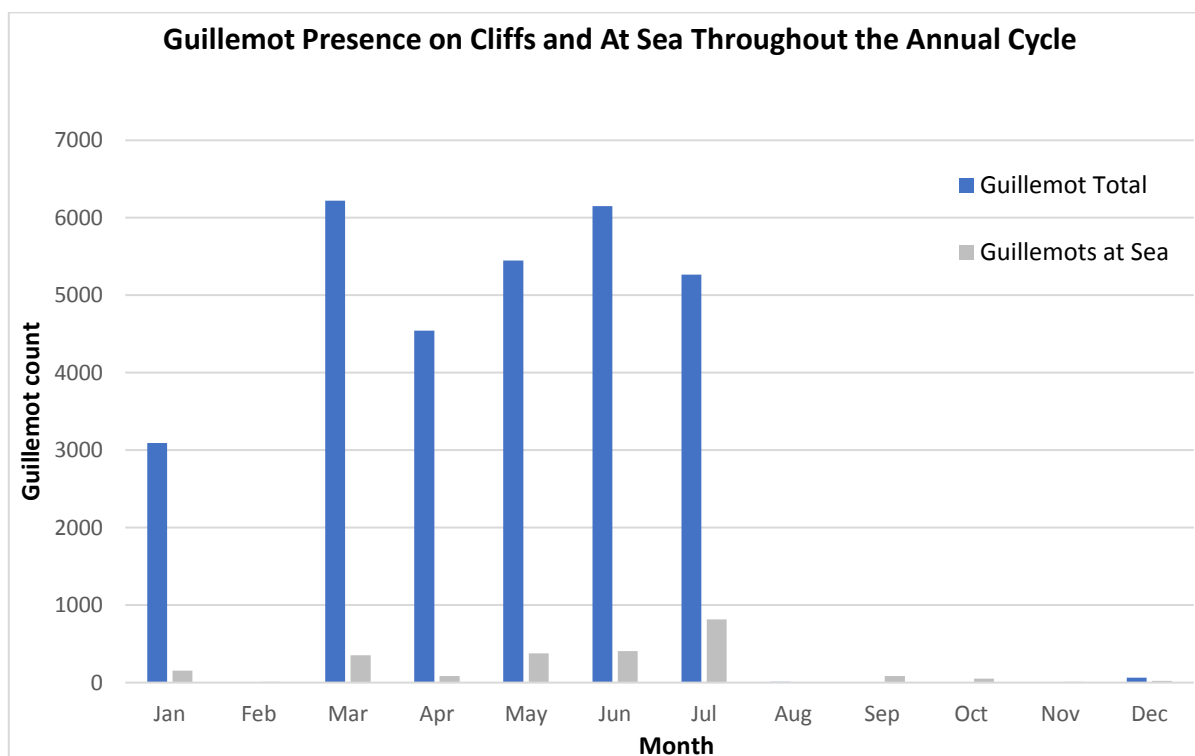


Figure 17.3 Total Number of Guillemots Recorded each Month

Appendix F.1, Figures 7 and 8 show the spatial distribution of the guillemots during both breeding and non-breeding periods. There are dense patches of breeding guillemots present, with two offshore stacks having the largest number of guillemots recorded out of all the areas (area 2P and 2V with 2550 and 1075 birds respectively). A further stack to the south of the landfall site in area 3B also had a large number of guillemots recorded during the breeding period (512). No guillemots were recorded breeding within 100m of the landfall site during the breeding period.

In the non-breeding period, most guillemots are recorded in area 2P, with 1804 being recorded. Stacks at 2V and 3B also recorded the second and third highest numbers of 520 and 230 respectively. No guillemots were recorded in the areas adjacent to the landfall site in the non-breeding period.

Guillemots were recorded in higher numbers in the morning compared to the afternoon or evening time (Figure 17.4 and Appendix F.2). These differences between times of day and the numbers recorded were statistically significant ($F_{(2,1073)}=7.00$, $p<0.001$). Post-hoc tests revealed that differences between numbers recorded in the evening and afternoon were not statistically significant across the whole year (Tukey HSD $p=0.849$), but differences were significant between the morning and the afternoon (Tukey HSD $p=0.001$) and the morning and the evening (Tukey HSD $p=0.010$).

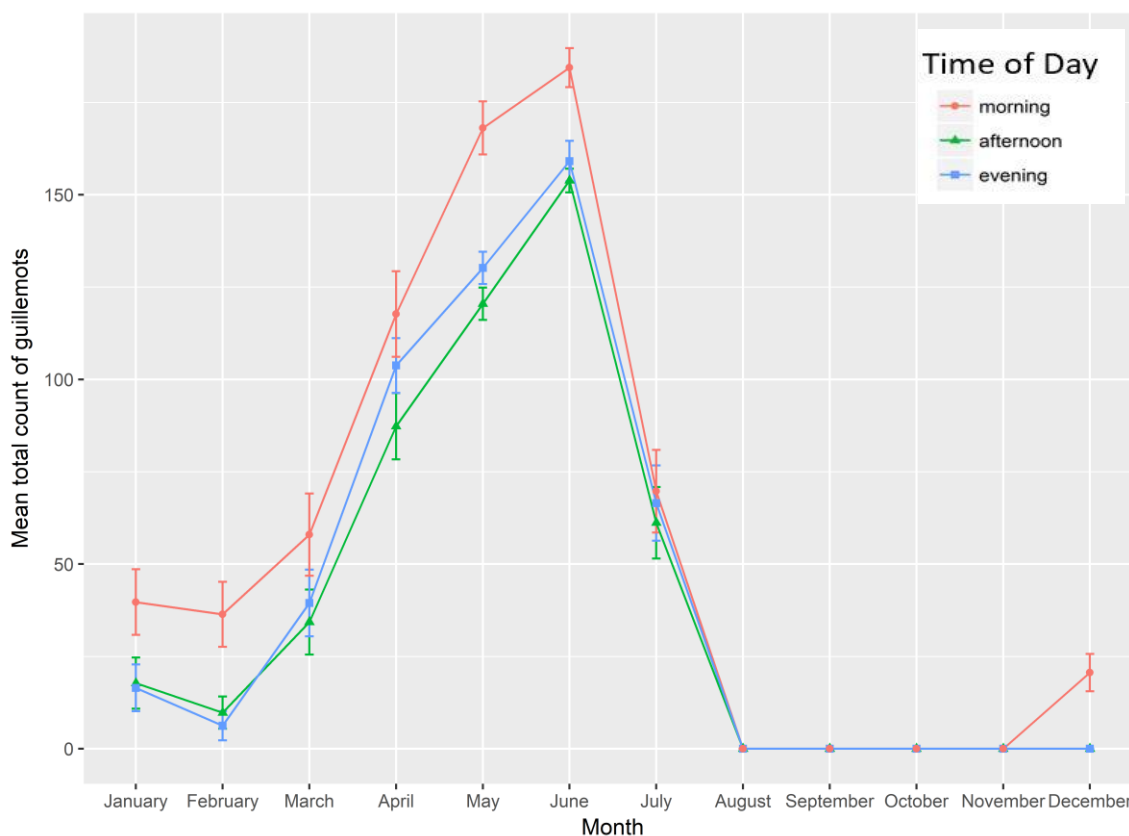


Figure 17.4 Diurnal differences in guillemot presence from time lapse camera study.

17.5.3.3 Kittiwake

Kittiwakes were the second most numerous species recorded during the surveys, both on land and on sea with adults being present from March to August. Immatures were also noted throughout the breeding season sporadically between March and August. A large number (1687 individuals) of juveniles were recorded in August. The vantage point surveys recorded them on the sea between March and September; April had the peak number of individuals recorded on the sea with 344 individuals noted.

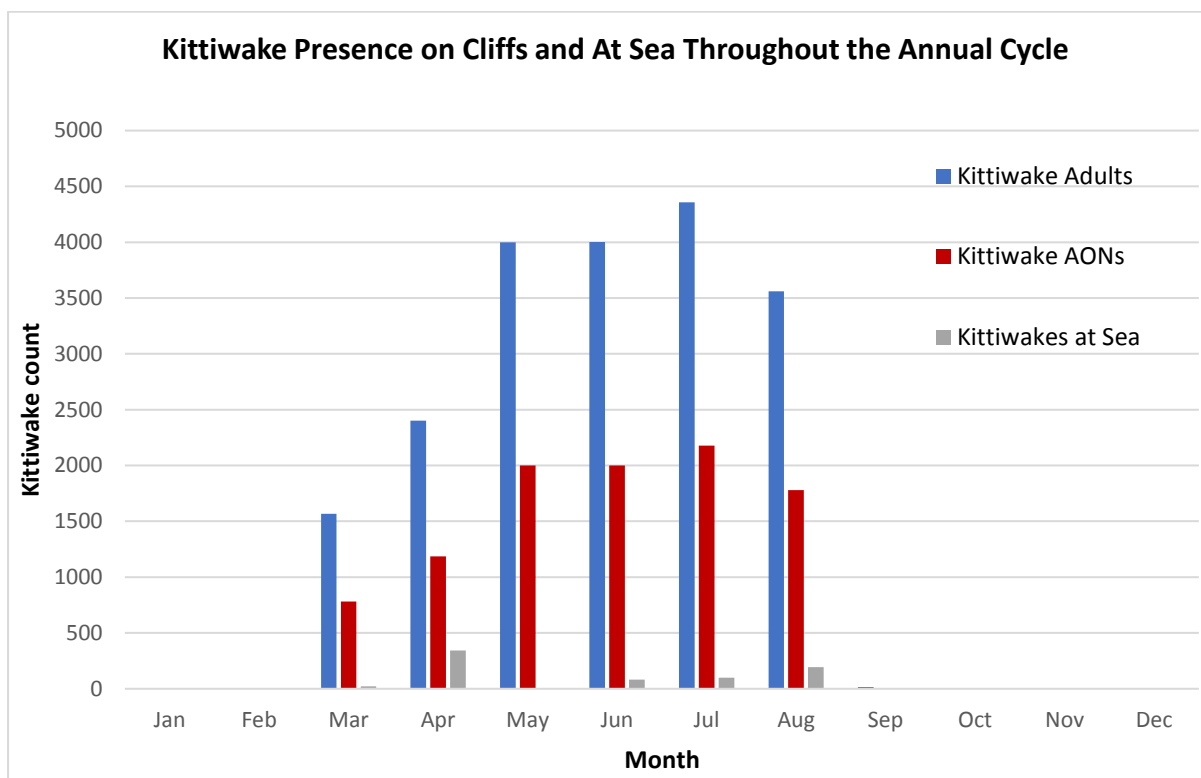


Figure 17.5 Total number of kittiwakes recorded during the year-long survey.

Appendix F.1, Figure 9 shows the spatial distribution of the kittiwakes during the breeding period. The densest areas of breeding kittiwakes within the landfall radii were areas 2N, 2O, 2P and 3F. Kittiwakes are well distributed around the coastline, with very few areas having no kittiwakes recorded. A maximum of 186 kittiwake sites were recorded in the areas within 200m of the landfall site, with the densest patch being 75 sites in area 2X. No kittiwakes were recorded within 100m of the landfall. Kittiwake juveniles were also noted in the area adjacent to the landfall: in area 2W there were 10 recorded and in area 2X there were 59 during August.

For kittiwakes, in the pre-laying period (March and April), numbers of birds recorded were found to be significantly different between different times of the day ($F_{(2,179)} = 7.33$, $p < 0.001$) (Figure 17.6). Further analysis revealed that fewer birds were recorded in the morning compared to both the afternoon (Tukey HSD $p=0.02$) and the evening (Tukey HSD $p<0.001$). In the main breeding period (May-July), once again there were significant differences between the times of day the birds were recorded ($F_{(2,265)}=5.63$, $p=0.004$). In contrast to the pre-laying period, more birds were recorded in the morning compared to the afternoon (Tukey HSD $p=0.004$) or the evening (Tukey HSD $p=0.046$).

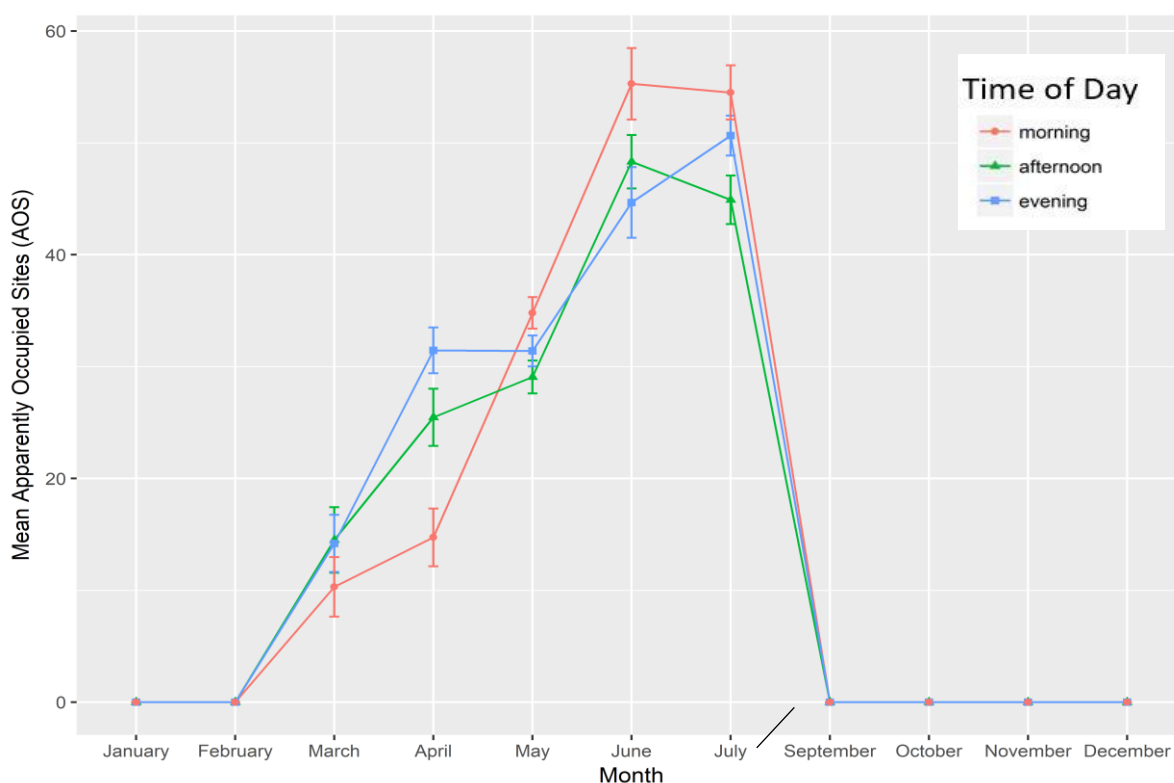


Figure 17.6 Diurnal differences in kittiwake presence from time lapse camera study.

17.5.3.4 Fulmar

Figure 17.7 reveals that fulmars are present throughout the year. Fulmars start to return to the site from November onwards. Fulmars were recorded from the VPs in all months, except October and November. The highest combined counts for fulmar were in December (125 individuals) and January (127 individuals). Only 1 immature fulmar was noted across the whole survey year and 46 juveniles were noted during August (Table 17.12), which is the month when fulmar fledglings leave the breeding site.

Appendix F.1, Figures 3 and 4 show the spatial distribution of the fulmars during both breeding and non-breeding periods. In the breeding period, the densest number of breeding sites was recorded in area 2P, a stack just off the cliffs, with 80 sites noted. From area 2N to 2S there were between 11 and 23 nests recorded in each area. There were a number of sections which had 0-5 nests recorded per area.

During the non-breeding period, the densest patch of fulmars utilising coastline were once again recorded in area 2P, a stack just off the cliffs. Areas 2N and 2R were the next densest parts of the cliff with 33 and 27 sites being recorded respectively.

In the non-breeding period, 3 fulmars were noted in area 2Z. This revealed that the areas adjacent to the landfall site do not hold large numbers of fulmars either during the breeding or non-breeding period.

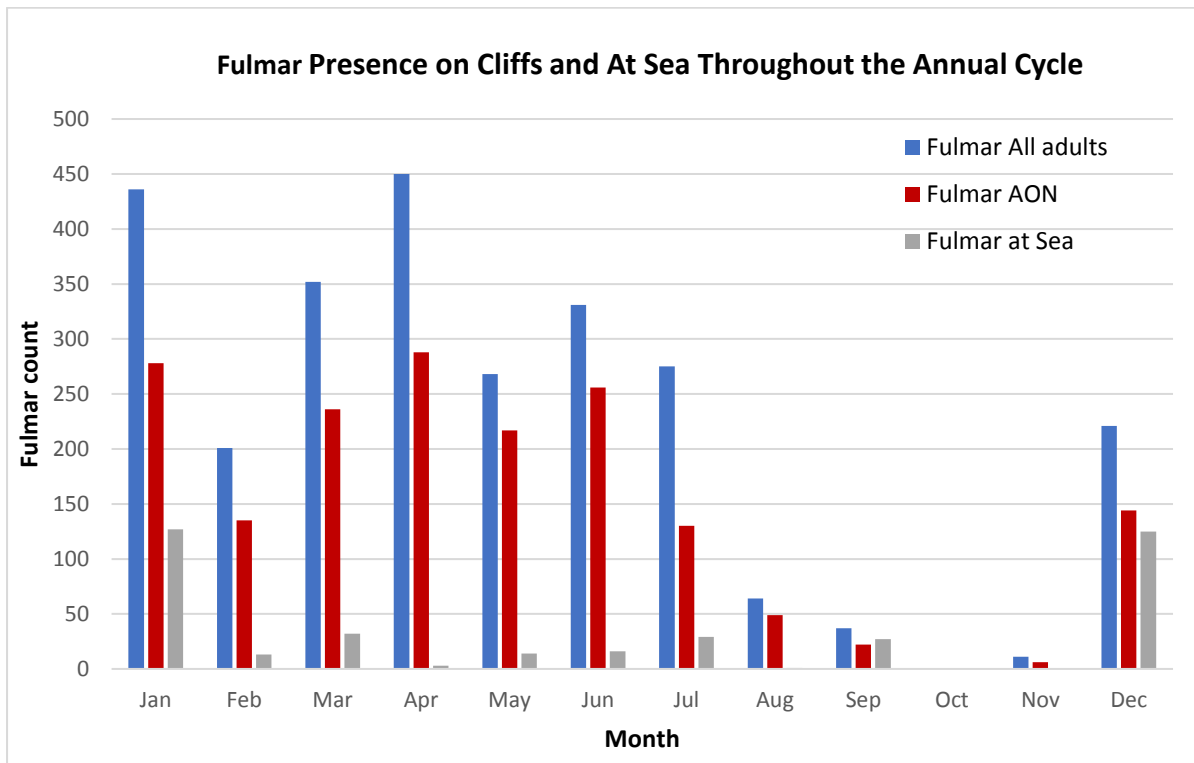


Figure 17.7 Total number of fulmars present through the year from the surveys.

For fulmars, there were significant differences between when birds were recorded during the day, across the whole year ($F_{(2,961)}=5.48$, $p=0.004$). In every month except June they were recorded in higher numbers during the evening than earlier in the day (Figure 17.8). This difference was significant (Tukey HSD evening-morning: $p=0.004$; Tukey HSD evening-afternoon: $p=0.04$). This difference was more pronounced during the non-breeding period (September to February).

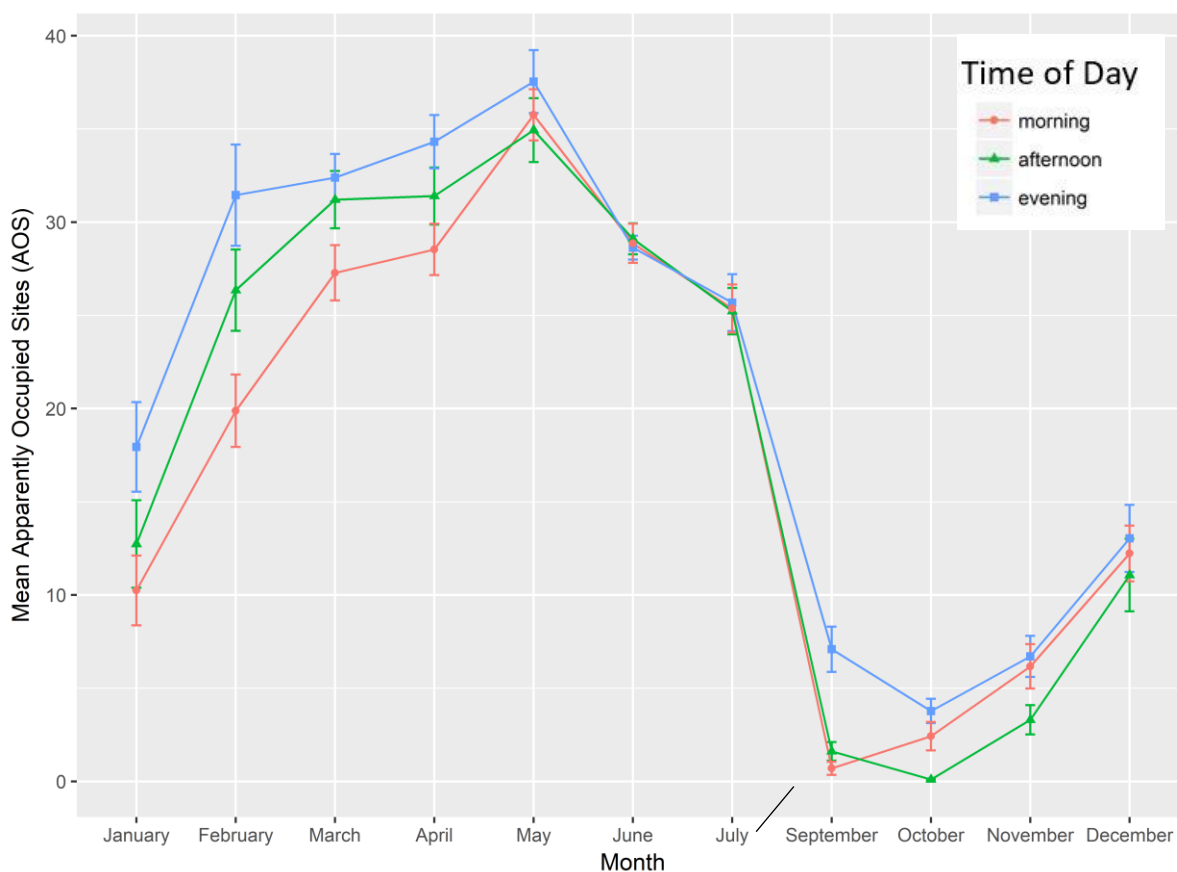


Figure 17.8 Diurnal differences in fulmar presence from time lapse camera study.

17.5.3.5 Razorbill

Razorbills were present on the cliffs from March until July, and not present at all during the non-breeding period. Razorbill was the third most numerous species seen from the vantage point surveys at sea. Most razorbills were seen on the water between April and September, although none were recorded in August. September saw their peak with 200 individuals recorded.

Appendix F.1, Figure 6 shows the spatial distribution of the razorbills during the breeding period. The densest patches of breeding razorbills were recorded in the offshore stack area 2P (132 pairs), 2N (80 pairs), 3B (96 pairs) and 3C (66 pairs). Razorbills were scattered along the coastline, with numbers varying around the coastline. No razorbills were recorded breeding in the area adjacent to the landfall area (within 100m). However, within 200m of the landfall more razorbills were recorded, over half of which within area 3A.

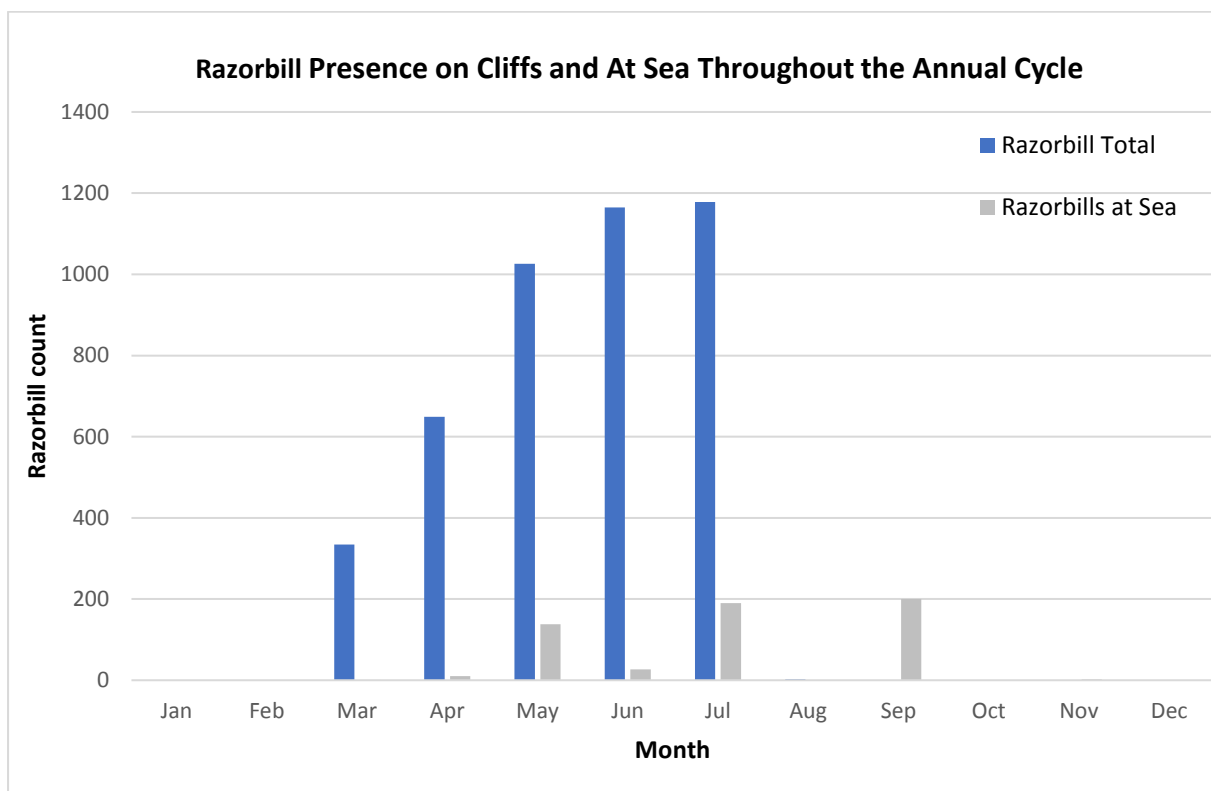


Figure 17.9 Razorbill total numbers throughout the annual cycle.

17.5.3.6 Herring Gull

Herring gull adults were recorded on land and on sea in all months except October. Immature herring gull were also observed in every month except October, with a peak being seen in August. Juvenile herring gulls were recorded most commonly between June and August (Table 17.12). Herring gull was the third most numerous species recorded during the vantage point surveys. They were recorded in eight monthly counts, and consistently between April and July. The largest combined monthly total was in June Figure 17.10.

Appendix F.1, Figures 10 and 11 show the spatial distribution of the herring gulls during both breeding and non-breeding periods. In the breeding period, within the distance radii herring gulls were recorded in greatest numbers on three stacks just off the cliffs: in area 2P (45 nests), area 2V (33 nests) and area 3B (30 nests). During the non-breeding period the two areas with the highest numbers recorded are once again area 2P (29 birds) and 3B (14 birds).

During the breeding period in the areas adjacent to the landfall (within 100m) had a maximum of 4 nests. No herring gulls were recorded as being present in the areas directly adjacent to the landfall site during the non-breeding period. On visits to the landfall site during ground investigations work (January and February 2018), herring gulls were noted using the stack off the cliffs in area 2Y.

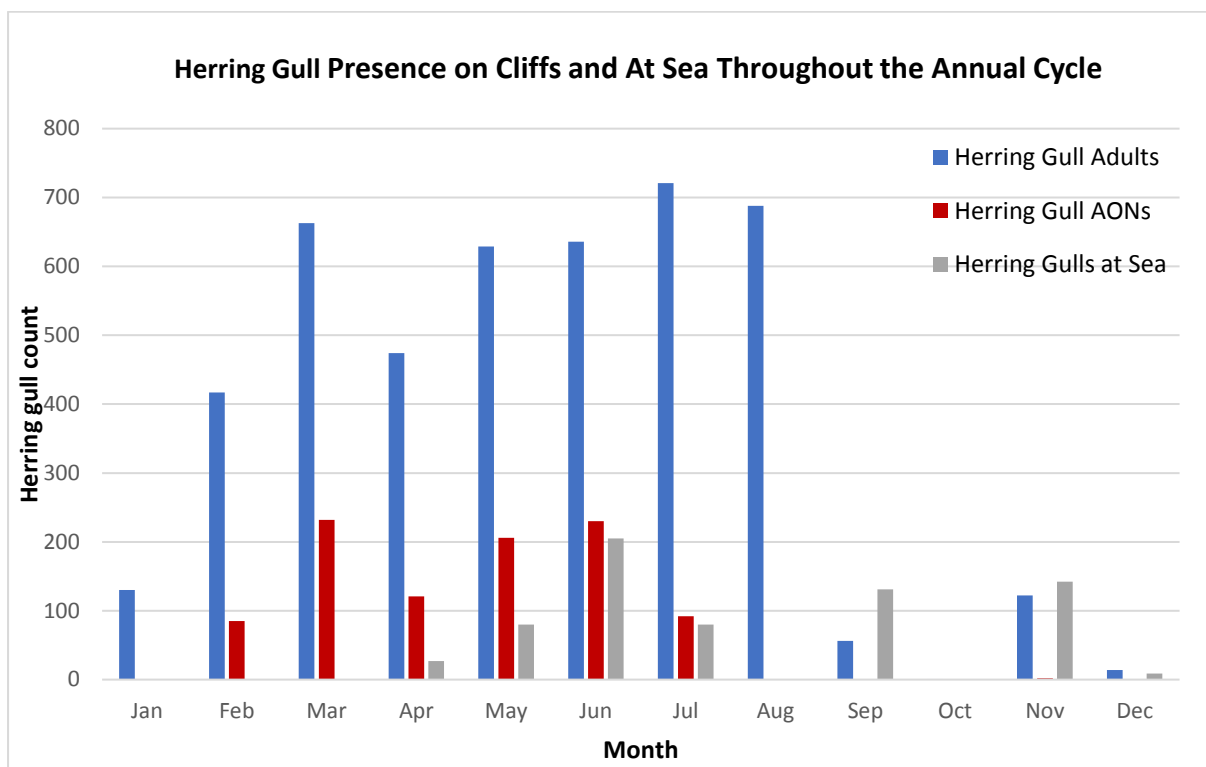


Figure 17.10 Herring gull total numbers throughout the year.

17.5.3.7 Shags

Shags were present on the cliffs in greatest numbers between May and August. They were present over the non-breeding period, though from October to March in very low numbers (Figure 17.11). Juvenile shags were noted between June and August, immature shags from April until October (Table 17.12). Shags were less numerous than the other main target species in the vantage point surveys but were recorded on the sea in all months except May, and in October only 1 individual was recorded. December had the peak number recorded at sea with 22 individuals noted.

During the breeding period low numbers of shags were recorded within proximity to the landfall site. In area 3B there were 14 breeders recorded. Only one other area had more than 5 shags breeding with area 2N being recorded as having 8 breeders. Juvenile shags were also recorded during the breeding period, with the maximum being recorded in area 3B, with 20 juveniles recorded. No breeding or non-breeding shags were recorded in areas adjacent to the landfall site. No juvenile shags were recorded in these areas either.

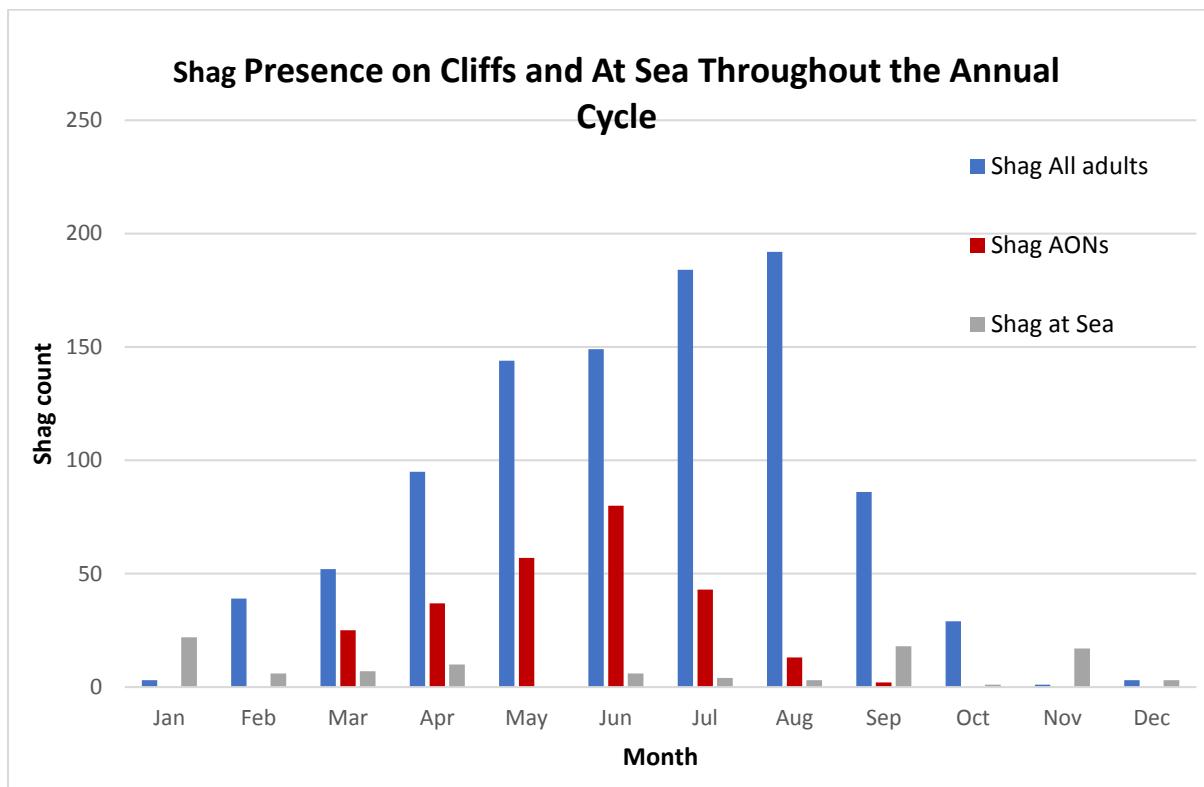


Figure 17.11 Shag presence throughout the year recorded from the surveys.

17.5.3.8 Other Species Recorded

The main target species (fulmar, shag, guillemot, kittiwake, herring gull and razorbill) were the most frequently recorded species. A small number of other species were recorded using the cliffs, including puffins, great black-backed gulls and lesser black-backed gulls.

Other species recorded during the vantage point surveys included: cormorant, eider, red-throated diver, northern gannet, puffin, lesser black-backed full and great black-backed gull. Gannets were recorded in four of the monthly counts; puffin were recorded consistently between April and August; great black-backed gull was recorded in six of the monthly counts. Species' total annual counts were of less than ten individuals for: red-throated diver and lesser-black backed gull. A maximum of 12 eider were recorded during the non-breeding period. Cormorants were recorded in low numbers throughout the year (between 1-7 individuals), and on one survey in October 22 individuals were recorded.

For a full break-down of what species were recorded at sea, see Appendix F.2, Table A3.

17.5.3.9 Summary of Qualifying Features of Designated Sites

Each of the qualifying features of the designated sites related to seabird receptors which are taken forward for assessment are shown in Table 17.15. Buchan Ness to Collieston Coast SPA and Bullers of Buchan Coast SSSI are taken into consideration concurrently as the SSSI sits within the SPA. Similarly, the Scottish Wildlife Trust Longhaven Cliffs Reserve is taken into consideration within the Buchan Ness to Collieston Coast SPA. For Buchan Ness to Collieston Coast SPA, the maximum count of nest sites recorded during the breeding period (defined as March-September) is used for the assessment of the designated sites, as it is breeding seabirds that the qualifying features are designated for. For seabird assemblage (*) assessment the combined maximum totals of each seabirds designated under the

assemblage qualification is used and compared against the estimated number of seabirds at the designated site, taken from JNCC count data.

For the designated sites outwith the HVDC corridor, a different approach was taken. SNH provides guidance on apportioning impacts from marine renewable development to breeding seabird populations in special protected areas (SNH, 2016a). The apportioning technique is more relevant for marine developments such as windfarms, which will have potential long-lived operational effects on seabird populations from different SPAs. In the case of the NorthConnect project, the main effects on the seabird will not be during operations but will be during the installation phase. Nevertheless, we have carried out an approximate apportioning for the scoped-in species from the designated sites to obtain an estimated number of birds from other sites which may be in contact with the HVDC cable corridor during installation

The apportioning technique involves weighing by colony size, by distance from the colony, and by sea area available. For our assessment of the Buchan Ness to Collieston Coast SPA we used the most recent data publicly available, which is from 2007 (JNCC, 2018a). For our assessment of the designated sites outwith the cable corridor the species total counts from the most recent Seabird Monitoring Programme (JNCC, 2018a) were used to assess proportions of birds potentially within the development vicinity. The Great Britain and Ireland population totals on the latest JNCC species accounts pages uses totals from Lloyd et al., 1991. Table 17.15 totals uses Seabird 2000 UK census totals instead as these are more up to date values (Mitchell, Newton, Ratcliffe, & Dunn, 2004).

The distance we calculated by measuring the nearest distance from the cable corridor to the designated site centre (Drawing 0005-01). For the weighting by sea area for simplicity purposes it was kept it at 0.50 for all designated sites.

For all the designated sites we calculated the maximum number of nest site counts (or predicted numbers of birds from other sites) as a percentage (%) of the designated site total. The maximum number of nest sites counts were taken from on land data (i.e. no data from sea counts were used), as shown in Table 17.11, and includes all areas of the seabird count sections.

Table 17.15 Designated sites predicted proportion of breeding species' totals.

Site	Species	Max nest site count from surveys (site 1) or predicted proportioning (sites 2-5)	Site total (JNCC counts)	Latest site count year	GB and Ireland population total (Seabird 2000)	% of site total	% GB and Ireland population total
1. Buchan Ness to Collieston Coast SPA and Bulls of Buchan Coast SSSI							
	Fulmar	288	1389	2007	538,000	20.7	0.05
	Guillemot	6219	19,296	2007	1,000,000	32.2	0.62
	Herring Gull	232	3079	2007	150,000	7.5	0.15
	Kittiwake	2179	12,542	2007	416,000	17.4	0.52
	Shag	80	331	2007	32,300	24.2	0.25
	Seabird assemblage*	9000	95,000	-	-	9.5	-
2. Troup, Pennan and Lion's Head SPA							
	Guillemot	73	23,626	2017	1,000,000	0.30	<0.01
	Seabird assemblage*	365	150,000	-	-	0.24	-
3. Fowlsheugh SPA							
	Guillemot	62	55,507	2015	1,000,000	0.11	<0.01
	Kittiwake	71	9655	2015	416,000	0.73	0.02
	Seabird assemblage*	347	170,000	-	-	0.20	-
4. Outer Firth of Forth and St Andrews Bay pSPA							
	Seabird assemblage (breeding)	219	120500		-	0.18	
	Seabird assemblage (non-breeding)	158	87000		-	0.18	
5. Firth of Forth Islands SPA (max count from vantage point sea surveys)							
	Gannet	295	75,259	2014	560,000	0.39	0.05
	Lesser black-backed gull	25	2047	2014	117,000	1.22	0.02
	Puffin	180	46,200	2013	601,000	0.38	0.03
	Seabird assemblage*	122	90,000		-	0.14	-

17.5.4 Summary of Timing Sensitivities of Avian Ecological Receptors

The timing sensitivities of the different avian receptors considered both the guidance documentation (SNH, 2017b) as well as the data gathered from the bird surveys carried out. Figure 17.12 relates the timing sensitivities to the indicative timings of when the various cable installation activities will take place. The months during which the works could potentially take place are assigned a blue box. The shaded box during March for the offshore cable pull is when onshore preparation works are likely to take place; the cable pull itself is predicted to be in April or August. The bird colours relate to:

- Red: most sensitive time period and when the largest numbers of the species were present;
- Orange: when the species is still expected to be present but are not in the most sensitive time period; and
- Green: when the species is either not present at all on the site or is present is very low numbers (less than 10% of the maximum number of the species recorded).

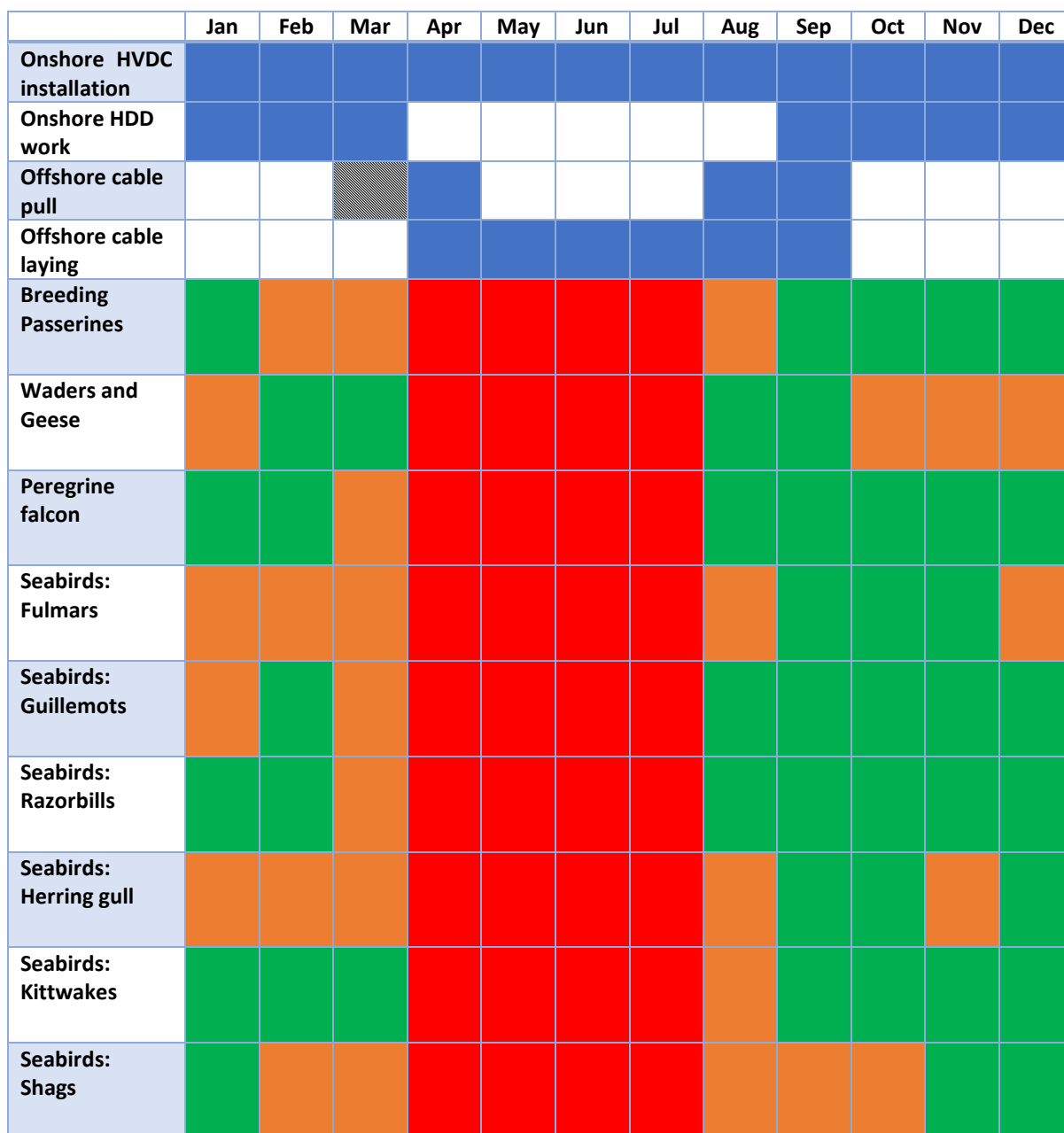


Figure 17.12: Bird Sensitivity and Construction Work Timing

As the cable laying may occur over the peak breeding months, the worst-case scenario will be taken forward for assessment of this activity that birds, both terrestrial and marine, may be disturbed during their breeding period.

17.5.5 Summary of Bird Species Recorded and their Conservation Status

Table 17.16 presents a summary of all the bird species recorded during all of the bird surveys, along with their conservation status. The maximum number recorded for each bird species is given. Their status in Britain relates to RB=Resident Breeder; WM=Winter Migrant; and MB=Migrant Breeder. IUCN codes relate to NT=Near Threatened and V=Vulnerable.

Table 17.16 Summary of birds recorded during all bird surveys.

BTO Code	Common Name	Scientific name	Status in Britain	Maximum number of individuals recorded	IUCN Red List	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Biodiversity List	Birds of Conservation Concern (BoCC)
B.	Blackbird	<i>Turdus merula</i>	RB,WM	1					
BH	Black-headed gull	<i>Chroicocephalus ridibundus</i>	RB,WM	1				X	Amber
BO	Barn owl	<i>Tyto alba</i>	RB	1 pellet			X		
BZ	Buzzard	<i>Buteo buteo</i>		1					
CA	Cormorant	<i>Phalacrocorax carbo</i>	RB,WM	22					
CU	Curlew	<i>Numenius arquata</i>	RB,WM	33	NT			X	Red
D.	Dunnock	<i>Prunella modularis occidentalis</i>	RB	7				X	Amber
E.	Eider	<i>Somateria mollissima</i>	RB,WM	12	NT				Amber
F.	Fulmar	<i>Fulmarus glacialis</i>	RB,WM	450					Amber
GB	Great black-backed Gull	<i>Larus marinus</i>	RB,WM	7					Amber
GO	Goldfinch	<i>Carduelis carduelis</i>	RB	7					
GU	Common Guillemot	<i>Uria aalge</i>	RB,WM	6219					Amber
GX	Gannet	<i>Morus bassanus</i>	RB,WM	10					Amber
HG	Herring gull	<i>Larus argentatus argenteus</i>	RB,WM	721				X	Red
HS	House sparrow	<i>Passer domesticus</i>	RB	1				X	Red
K.	Kestrel	<i>Falco tinnunculus</i>	RB,WM	3				X	Amber
KI	Kittiwake	<i>Rissa tridactyla</i>	RB,WM	4358					Red
L.	Lapwing	<i>Vanellus vanellus</i>	RB,WM	4	NT			X	Red
LB	Lesser black-backed gull	<i>Larus fuscus</i>	RB,WM	3					Amber
LI	Linnet	<i>Linaria cannabina</i>	RB,WM	4				X	Red
LR	Lesser redpoll	<i>Acanthis cabaret</i>	RB,WM	2				X	Red
MX	Manx shearwater	<i>Puffinus puffinus</i>	MB	1				X	Amber
NX	Great skua	<i>Stercorarius skua</i>	MB	1					Amber
OC	Oystercatcher	<i>Haematopus ostralegus</i>	RB,WM	5	NT				Amber
PE	Peregrine	<i>Falco peregrinus</i>	RB,WM	5		X	X	X	
PG	Pink-footed goose	<i>Anser brachyrhynchus</i>	WM	45					Amber
PU	Puffin	<i>Fratercula arctica</i>	RB,WM	71	VU				Red
RA	Razorbill	<i>Alca torda</i>	RB,WM	1178	NT				Amber
RB	Reed bunting	<i>Emberiza schoeniclus</i>	RB,WM	3				X	Amber

BTO Code	Common Name	Scientific name	Status in Britain	Maximum number of individuals recorded	IUCN Red List	EU Birds Directive: Annex 1	Schedule 1 Wildlife & Countryside Act 1981	Scottish Biodiversity List	Birds of Conservation Concern (BoCC)
RH	Red-throated diver	<i>Gavia stellata</i>	RB,WM	2		X	X	X	
RK	Redshank	<i>Tringa totanus</i>	RB,WM	2					Amber
RN	Raven	<i>Corvus corax</i>	RB	3					
S.	Skylark	<i>Alauda arvensis</i>	RB,WM	18				X	Red
SA	Shag	<i>Phalacrocorax aristotelis</i>	RB	192					Red
SN	Snipe	<i>Gallinago gallinago</i>	RB,WM	2					Amber
ST	Song thrush	<i>Turdus philomelos clarkei</i>	RB,WM	3				X	Red
SW	Sedge warbler	<i>Acrocephalus schoenobaenus</i>	MB	1					
TS	Tree Sparrow	<i>Passer montanus</i>	RB	1				X	Red
WR	Wren	<i>Troglodytes troglodytes</i>	RB	9					
WW	Willow warbler	<i>Phylloscopus trochilus</i>	MB	4					Amber
Y.	Yellowhammer	<i>Emberiza citrinella</i>	RB,WM	8				X	Red

17.6 Impact Assessment

17.6.1 Valuation of Key Receptors

This section provides a summary of the evaluation of the nature conservation interests identified from the field surveys and desk top study.

Table 17.17 Summary of Evaluation of Nature Conservation Interests.

Ecological Receptor	Evaluation Rationale	Site Ecological Receptor Value
Designated Sites for Nature Conservation		
Buchan Ness to Collieston Coast SPA (includes marine extension)	The HVDC cables will pass under the cliffs by Buchan Ness to Collieston Coast SPA and the cable exit point offshore will be within the SPA's marine extension zone.	International
Bullers of Buchan Coast SSSI	The HVDC cables will pass under the cliffs by Buchan Ness to Collieston SPA, within which the Bullers of Buchan Coast SSSI sits.	National
Collieston to Whinnyfold Coast SSSI	This SSSI is further down the coast, but is part of the Buchan Ness to Collieston Coast SPA. As such, this SSSI is assessed within the SPA.	National
Ythan Estuary, Sands of Forvie and Meikle Loch SPA/Sands of Forvie and Ythan Estuary SSSI	The HVDC cable corridor and landfall site are approximately 20km from the designated site. No tern species were recorded in any of the seabird surveys, so the proposed development area is not thought to be utilised by these species. They are therefore excluded from further assessment. No non-breeding lapwings were recorded during the migrant surveys and a maximum of two redshanks and 12 eiders were recorded. The designated waders and eiders are therefore excluded from further assessment based on small numbers. Pink-footed geese were recorded once during the surveys in a flock of 45 birds. This species will be taken forward for assessment.	International: All scoped out except pink-footed geese.
Turbot Bank MPA	The Turbot Bank MPA is designated for sandeels; an important food source for many seabird species. This MPA was assessed within Chapter 15: Fish and Shellfish as not being adversely affected by the development, as such can be excluded from further assessment.	International: Scoped out of further assessment.
Troup, Pennan and Lion's Heads SPA	Located 60km northwest of the landfall site. Due to their foraging ranges, seabirds from this SPA could be foraging within waters close to the HVDC marine cable corridor during its installation.	International
Fowlsheugh SPA	Located 75km south of the landfall site. Due to their foraging ranges, certain seabird species from this SPA could be foraging within waters close to the HVDC marine cable corridor during its installation.	International
Outer Firth of Forth and St Andrews Bay pSPA	Located 145km south-west of the landfall site. Due to their foraging ranges, it is possible certain seabird species from the Forth Islands could be foraging within waters close to the HVDC offshore cable corridor during its installation.	International

Ecological Receptor	Evaluation Rationale	Site Ecological Receptor Value
Firth of Forth islands SPA	Located 185km south-west of the landfall site. Due to their foraging ranges, it is possible certain seabird species from the Forth Islands could be foraging within waters close to the HVDC offshore cable corridor during its installation.	International
Moray Firth pSPA	This is located 145km north-west of the landfall site and cable corridor. The breeding shag interest for this proposed SPA is the only relevant designated feature which needs evaluation. As the mean maximum breeding foraging range for shags is 14.5±3.5km this site can therefore be excluded from further assessment.	International: Scoped out of further assessment.
Other Sites		
Longhaven Cliffs Reserve	The cliffside of the Reserve is located within the SPA and as such the avian species recorded within this Reserve are assessed as part of the assessment of the SPA. The inland Reserve area, beside Station Farm and Blackhills, had no bird territories recorded inside and therefore is not considered for further assessment.	High Local: cliffside part of Reserve included.
Terrestrial bird species		
Passerines, Red list species: linnet, yellowhammer, skylark, lesser redpoll, tree sparrow, house sparrow, song thrush	These passerines are listed on the UK BAP listed species and on the red list in the UK for Birds of Conservation Concern.	Regional
Passerines, Amber list species: dunnoek, willow warbler	These passerines are on the amber list in the UK for Birds of Conservation Concern.	Moderate Local
Passerines, Green list species: sedge warbler, goldfinch, blackbird, reed bunting, wren.	These species were recorded in low numbers within the bird survey area. As it is not expected that there will be a significant loss of habitat within the local region due to the HVDC cabling, and as these species are in the green list of the BoCC, they will not be considered further.	Low Local: excluded from further assessment.
Corvids: Raven	Ravens are species of least concern in the UK BAP. Therefore, they will not be considered for further assessment.	Low Local: excluded from further assessment.
Waders, Red list: curlew, lapwing, oystercatcher	These species are on the IUCN Red list and as such should be considered in further assessment. However, the area of the landfall is not known to be an important area for any of these species and it is likely these species may be only occasional visitors to the fields.	High Local

Ecological Receptor	Evaluation Rationale	Site Ecological Receptor Value
Waders, Amber list: snipe	Snipe were recorded breeding and as they are on the Amber list of BoCC will be included for further assessment.	Moderate Local
Wader, Amber list: redshank	Redshank were recorded twice in the non-breeding period, but only 2 individuals were seen as a maximum. It is likely they are only occasional visitors to the fields. They are therefore excluded from further assessment.	Moderate Local: excluded from further assessment.
Migratory birds: geese (pink-footed geese)	Pink-footed geese were recorded only once during the bird survey in a flock of 45 birds. UK wintering population is around 360,000 birds. Small flocks of geese are most likely only occasional visitors to the fields in and close to the HVDC cable corridor. As pink-footed geese are one of the designated features of the Sands of Forvie SPA, they are included for further assessment.	High Local
Birds of prey: Peregrine falcon	Annex 1 listed species in the EU Birds Directive. However, in the UK their conservation status is Green in the BoCC. Due to their conservation status and their breeding presence within the bird survey area, they are included for further assessment.	Regional
Birds of prey: Buzzard	Buzzards are widespread and in the BoCC list are green species. Only one buzzard was recorded during the entire survey period. Therefore, this receptor will be excluded from further assessment.	Low local: excluded from further assessment
Birds of prey: Kestrel	3 Immatures were noted in September and 1 in October. 2 juveniles were recorded in October. No kestrel breeding sites were recorded within the survey areas. It is likely the immature birds will be passing through the site and using several fields in the area, kestrels are excluded from further assessment.	Low local: excluded from further assessment
Birds of prey: Barn owl	Schedule 1 species under Wildlife and Countryside Act. However, Barn Owls are currently green-listed in BoCC and with only one pellet being recorded in 2014 this receptor will be excluded from further assessment.	High local: excluded from further assessment.
Seabird species		
Main seabird species: Guillemot, Kittiwake, Fulmar, Razorbill, Herring gull, Shag	These species are either in the Red or Amber list of BoCC and due to the numbers recorded will be taken forward for further assessment.	Regional
Great-black backed gull	This species is Amber on the BoCC. A maximum of 5 nest sites were recorded across the whole Seabird Survey Site. The UK breeding population is estimated as being 17,000 pairs. Due to such low numbers being recorded in relation to the overall species population size, they are excluded from further assessment.	Low Local: excluded from further assessment.

Ecological Receptor	Evaluation Rationale	Site Ecological Receptor Value
Other gull species: lesser black-backed gull, black-headed gull	Both species are on the Amber list of the BoCC. However, only one non-breeding individual of each species was recorded in the entire year-long period. These species are therefore excluded from further assessment.	Low Local: excluded from further assessment.
Other seabird species recorded breeding, Red list: puffin	A maximum of 19 active burrows were recorded within the Seabird Survey Area. As the puffin is on the IUCN Red list and the BoCC list, it will be considered for further assessment.	High Local
Other seabird species recorded breeding, Green list: cormorant	A single cormorant was noted breeding, and a maximum of 22 non-breeders were noted within the Seabird Survey Area. As cormorants are in the green list of the BoCC, they will not be considered further.	Low Local: excluded from further assessment.
Other seabird species recorded at sea: gannet, manx shearwater, great skua	1 manx shearwater and 1 great skua were recorded across the entire year-long survey. Due to the low numbers of manx shearwater and great skua, these species will not be considered individually for further assessment.	Low local: excluded from further assessment.
Other seabird species recorded at sea: gannet	A maximum of 10 gannets were recorded at sea. Though they are only of low local value, as gannets are a designated feature of the Firth of Forth SPA, they are included for assessment.	Low Local.
Other Marine-Dependent Bird Species		
Eider	No birds were recorded breeding within the Seabird study area; a maximum of 12 were recorded on the water over the non-breeding period. In the breeding period, 1 female with 7 ducklings was recorded in July. The UK breeding population is estimated at 26,000 pairs and a UK wintering population of 60,000 birds. Due to such low numbers being recorded in relation to the overall species population size, they are excluded from further assessment.	Low local: excluded from further assessment.
Red-throated diver	2 red-throated divers were recorded in December 2016. This was the only occasion across the whole year-long survey when the divers were recorded. Though red-throated divers are an Annex 1 species, they are defined as being green in the BoCC. Their wintering population in 17,000 birds. Due to such low numbers being recorded in relation to the overall population size of this species, they are excluded from further assessment.	Low local: excluded from further assessment.

17.6.2 Installation Phase Impacts

Installation phase impacts are divided between impacts on terrestrial-based species (Section 17.6.2.1) and impacts on marine-reliant species (Section 17.6.2.2). A number of potential impacts (in the absence of secondary mitigation) have been identified in connection with the installation phase of the development, and these may be direct or indirect impacts. Note that for peregrine falcons they are included both in the terrestrial species and within the marine-dependent species under potential impacts on prey species.

Potential effects on terrestrial species:

- Habitat displacement for terrestrial species due to cable installation;
- Accidental nest site destruction during onshore cabling; and
- Disturbance due to noise, light, and human presence.

Potential effects on marine-dependent species:

- Disturbance due to vessel presence, noise, light, and human presence;
- Indirect effects on offshore prey species.
- Water quality effects offshore due to cable installation disturbance onshore: increased sediment loading causing increased turbidity during marine cable installation, and accidental pollution events.

17.6.2.1 Impacts on Terrestrial Species

There are a number of onshore activities which will potentially cause effects on the terrestrial bird species in the vicinity of the installation area. For further information on onshore construction activities, see Chapter 2: Project Description, Section 2.5.1. In summary, the onshore construction activities include: the A90 road junction and access road construction, the Road Crossing HDD site set up and HDD drilling, Joint Pits construction, Landfall HDD site set up and HDD drilling, HVDC cable laying, and the reinstatement of land.

17.6.2.1.1 Habitat Displacement

From the 2016 breeding bird survey, the bird territories most likely to be affected by any habitat displacement will be skylarks, as a total of 6 territories out of a total 18 territories were recorded as being close to the proposed A90 road junction and Access Road (Appendix F.1: Figure 13). The other species potentially affected are linnet, yellowhammer, song thrush, and snipe. For the A90 HDD site set up and drilling, the Joint Pits construction, and the HVDC cable installation, skylarks (18), linnet (4), yellowhammer (8), song thrush (3), snipe (2) and lapwing (4) all have the potential to be affected by these activities. The maximum number of confirmed territories of birds in relation to the species' overall populations in the UK are extremely low (Table 17.7). These activities may lead to a loss of habitat and disturbance of adjacent habitat for potential breeding habitat for these birds.

The cliffside HDD site set up and drilling are due to take place largely outside the breeding season. The HDD drilling work is predicted to take 4-6 months. Taking the worse-case scenario, the assessment assumes that this work is carried out over two winter periods. As the bulk of the work is expected to be carried out from October-February, there are not expected to be any effects on breeding terrestrial birds. There is the chance migratory waders, such as oystercatchers, curlew, lapwing, and pink-footed geese may be present over the winter months. However, the area by the landfall where the HDD site set up will be was not identified as an important area for them over the non-breeding period during

the bird surveys. In the autumn of 2016, a flock of 13 curlew was recorded feeding in the southern end of the bird survey area with a second flock of 20 nearby, outside the bird survey area. No oystercatchers or lapwings were recorded during the migratory bird surveys. The November bird survey recorded a flock of 45 pink-footed geese in the far north of the area, but this flock was not recorded as being near the HDD site set up and drilling site.

Any migratory waders or geese are likely only to be occasional visitors to the fields. As the drilling may continue into March, two terrestrial species may have returned to establish territories: song thrush and lapwings. In the BBS only one song thrush territory was recorded and four lapwing territories, though these lapwing territories were further towards Fourfields. The drilling work will have started before the birds return to breed, but if they do return they may be displaced from their usual breeding territory. This effect would be a temporary effect over one or possibly two breeding seasons as a worst-case scenario.

The peregrine falcon pair identified during the survey have their nest more than 500m from the nearest cable installation activity (the location of which is confidential), therefore are not expected to be affected by any breeding site displacement.

For the terrestrial breeding birds of **regional** importance for the passerine species and the peregrine falcon, and of **high local** importance for the breeding wader species, are only expected to experience displacement over two breeding seasons, the magnitude of the effect is defined as being **low**. This leads to a **minor, non-significant** effect.

For the migratory birds, the waders and geese of **high local importance**, the effect of displacement may be over two winter periods, which is defined as being of **low** magnitude. This leads to a **negligible, non-significant** effect. The same effect is predicted for any pink-footed geese from the Sands of Forvie SPA which could potentially be using the fields as feeding habitat during the day. This **international** receptor is expected to be **negligibly** affected, leading to an overall **minor, non-significant** result.

After the HVDC cable installation has been completed the land will be reinstated to its former use of farm land. The exception to this is the Access road which will remain widened from the original access track and the extension of the existing track may remain. This will decrease the field habitat by approximately 0.7 acres, which would mean a direct loss of potential breeding habitat for the passerine and wader species. However, given the area of the remaining existing farmland and the relatively small area of the widened and extended track, this is not likely to have a long-lasting adverse effect on the breeding terrestrial species in the area. The land reinstatement is therefore assigned as being of **low** magnitude, for the **regional to high local** species, which leads to a **minor, non-significant** effect.

17.6.2.1.2 Accidental Nest Site Destruction or Abandonment

It is highly unlikely, but it is possible that the onshore cabling could lead to an accidental nest site destruction of one of the terrestrial species or the disturbance of a nearby nest site could lead to breeding site abandonment for that season. The context of the existing environment should be taken into consideration in that the fields are currently used a farmland for animals to graze on. Therefore, the birds are unlikely to nest in the middle of the fields where their nest could be destroyed by animals. It is much more likely they are using the hedgerows, nearby walls, and bushes to the side of the fields to nest in. The cable corridor red line boundary is within the fields themselves rather than at the side, so it is unlikely birds will be nesting directly within the corridor. Nevertheless, taking a precautionary approach and in the absence of any secondary mitigation, the effect on the terrestrial species of

regional value with a loss of nest being of **medium** magnitude, would lead to a **moderate, significant** impact.

17.6.2.1.1 Disturbance Associated with Onshore Activities

Onshore cable installation activities will give rise to disturbance associated with an increase in noise, an increase in light and the presence of humans in the area may also cause disturbance.

Noise Pollution

Noise pollution can directly cause damage to birds' physiology (Kleist, Guralnick, Cruz, Lowry, & Francis, 2018; Ortega, 2012); or indirectly affect their communication ability, depending on the bird species (Ortega, 2012). Construction noise and traffic noise have been known to have effects on birdsong, particularly on lower frequency birdsongs (Slabbekoorn & Ripmeester, 2007). Noise modelling carried out in Chapter 22: In-air noise revealed that the existing noise environment, with the busy A90 nearby, is between 53dB by the cliffs and 64dB by the A90 during the day (Chapter 22: Table 22.6). The noisiest activity associated with the onshore works will be the HDD drilling activity (onshore landing), followed by the HDD drilling activity for the A90/disused railway (Chapter 22: Table 22.9). The noise due to these activities will be between 1 and 11dB above background levels for around 400m from the activities. This additional noise coupled with the human presence may deter terrestrial species from nesting in close proximity to the works.

Light Pollution

The working hours are predicted to be 7am-7pm for all activities except the cable pull which will be 24 hours. Therefore, it is likely lighting will be required at least at the start and the end of the day for the HVDC onshore cable installation work. For the HDD site set up and drilling work which will occur over the winter period, light will be needed for longer periods of time. For the onshore aspects of the cable pull activity, light will be required over the night time period. The lighting will be localised to the work areas and will only be required for as long as the construction takes place. Light pollution has been shown to have potential effects on birds in a number of ways: visual impairment (Raine, Borg, Raine, Bairner, & Cardona, 2007), disorientation (Evans, 1996), behavioural changes (Longcore & Rich, 2004), habitat preferences (De Molenaar, DA Jonkers, & Sanders, 2000) and foraging modifications (Santos et al., 2010). However, as the light will be localised in area, none of the terrestrial species are expected to be adversely affected by temporary, additional lighting.

Human Presence

An increase in the number of personnel on the farmland will occur due to the installation activities. This may cause disturbance in birds being put off nesting in the vicinity of activities taking place. This disturbance may be over two breeding seasons and for the HDD site set up and drilling works this will be over two winters.

Due to the temporary nature of the disturbance, and given the context of the existing environment, the disturbance effects on the terrestrial species are assigned as being of **low** magnitude, for the **regional** to **high local** species, which leads to an overall **minor, non-significant** effect.

The effect on the Sands of Forvie SPA on the designated terrestrial-based bird species is expected to be of **negligible** magnitude on this **international** receptor, due to the fact the noise, light, and human disturbance will be localised in nature. Therefore, this leads to be **negligible, non-significant** effect.

17.6.2.2 Impacts on Marine-dependent Species

There are a number of onshore and offshore activities which will potentially cause effects on the marine-dependent bird species on the cliffs and using the surrounding waters. For further information on installation activities, see Chapter 2: Project Description, Section 2.5.2. and 2.5.3.

In summary, the following activities which could affect the cliff-nesting seabirds are: the Cliffside HDD site set up and HDD drilling, cable pull set up and pull (onshore and offshore), and cable laying and protection activities at sea. Surveys of the laid cable could also cause potential temporary disturbance.

The HDD site set up is predicted to take around 6 weeks. The HDD drilling will take between 4-6 months during Year 1: September-March and if required can be completed during Year 2: September-March.

The cable pull activity requires two pulls. Three different time periods over which the cable pull may take place have been identified: Year 2: April 2021, Year 2: August 2021, Year 3: April 2022. The cable pull itself will take a maximum of 7 days and will be carried out for 24 hours during each of these days.

The numbers of vessels expected for each activity is provided in Table 17.18. Cable lay vessels are typically between 120-200m long, and travel around 250-600 metres per hour. The diving support vessel may be around 20-50m and will be largely stationary above the HDD exit, potentially anchored.

Impacts as a result of the above activities will be considered in turn.

17.6.2.2.1 Disturbance Due to Onshore Cable Installation Activities

The onshore activities associated with the HVDC cable laying which may impact upon the marine-dependent bird species include: the HDD site set up activity, the HDD drilling, the cable pull site set up activity. The cable pull itself is considered in its entirety under section 17.6.2.2.2. The disturbance of these activities primarily relates to noise and light pollution, and additional human presence near the clifftop.

Noise Disturbance

Further information on the noise modelling carried out can be found in Chapter 22: Noise and Vibration (In-air). The noise modelling of the HDD onshore activities demonstrated that for the vast majority of the Buchan Ness to Collieston Coast SPA, the noise produced will be the same as background levels recorded (Chapter 22, and drawing NCFFS-NCT-X-XG-0010-07). The background level at the closest noise monitoring location to the HDD onshore activities was 53dB during the daytime, and 54dB at night. For a small section of the cliff in section 2Z, the noise is predicted to increase by approximately 10dB. Images which show the noise dissipation along the cliffs is shown in Appendix H.3, Photo 2. During the ground investigation site visits (in January and February 2018), it was noted that there were frequent helicopter noises passing overhead near to the cliffs. These occasional louder noise events, coupled with the busy A90 close by to the seabird cliffs means that the seabirds are likely to be already accustomed to some anthropogenic noise.

To minimise disturbance on the breeding seabird species, and thus decrease the risk of any breeding site abandonment as a result of disturbance, the HDD activity has been specifically scheduled to avoid the main seabird breeding season (i.e. it is to take place between September to March). As there needs to be three holes drilled in total it is possible this might take two winters to achieve. The HDD site was also designed in such a way as to be as far back from the cliffs as possible and also for the noisiest apparatus (the fluid recycling tank and recycling) to be further back from the cliffs and buffered by

water storage tanks and mud pumps at either side to further reduce the noise, Figure 17.13. The distance from the noisiest apparatus to the beginning of the coastal slope is approximately 125m.

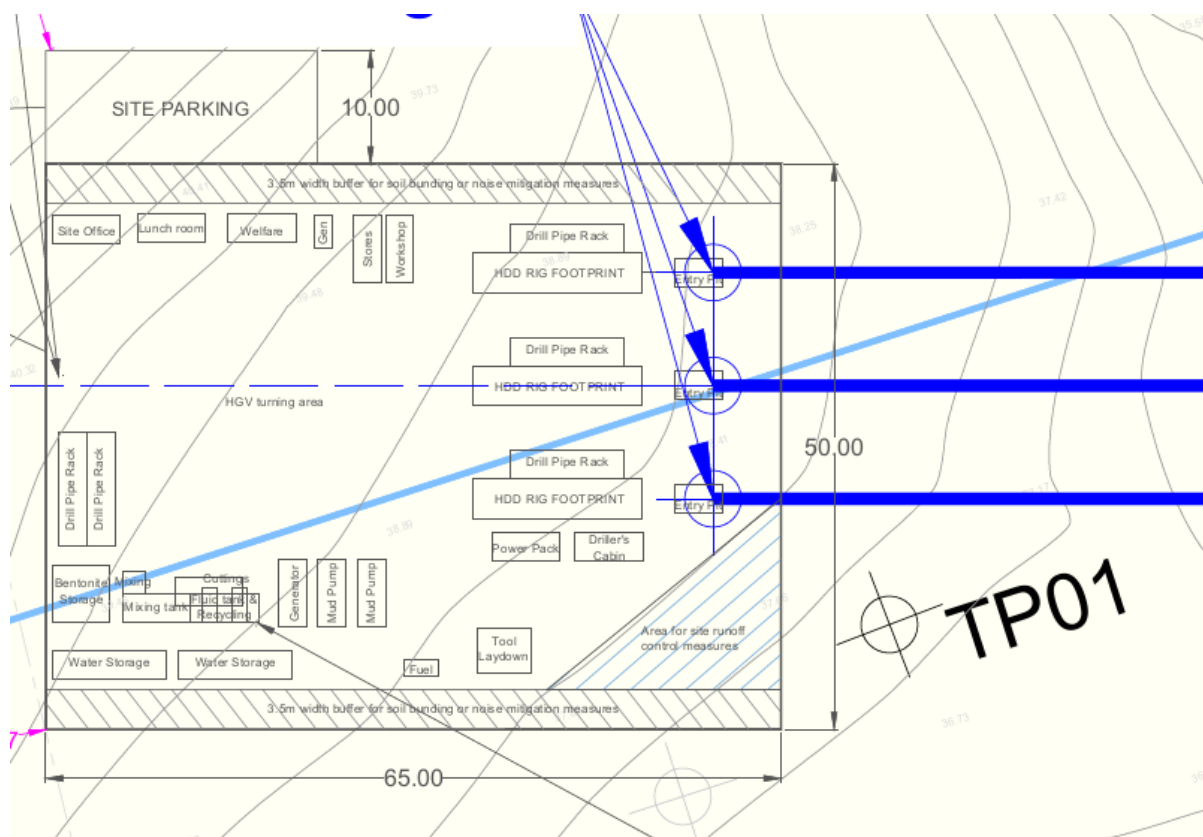


Figure 17.13 Indicative site set-up for the Landfall HDD

From the seabird colony count data, the nearest nests from the HDD site set up area are approximately 150m away. Using Drawing 0006-01 to identify which sections of the cliffs would be affected within the direct vicinity (within 100m) of the HDD land fall work, it was revealed that there are very few seabird species present over the winter months in the relevant sections (see Table 17.13, 100m totals), with only 7 fulmars and 4 herring gulls being noted in this area between September and March, and no other species present within 100m. Note that these fulmars and herring gulls were recorded in Section 2Z, the start of which is within 100m, but their nests are actually more than 150m from the HDD site set up, from field observations. Within 200m, the species most likely to be present are fulmars (21), herring gull (77), guillemot (1166), razorbill (24) and shag (9), as recorded on land during the seabird surveys.

The cable pull site set up is predicted to take 4 days. The set up will take place in March, just before the April cable pull (as assessed in section 17.6.2.2.2) or in August, before the August cable pull. In these months there are 3 fulmars and 4 herring gulls recorded in March, and 1 fulmar recorded in August, within 100m of the cable pull set up. Within 200m of the cable pull site set up there are fulmars (9), kittiwake (81), guillemot (524), razorbill (24), herring gull (61) and shag (9) recorded in March and 1 fulmar recorded and 145 kittiwakes recorded in August. Though there will be inter-annual variations in exact numbers, as seabirds are largely site faithful it is likely these numbers will be indicative of potential number of nests affected during the cable pull. In terms of these species' population numbers as a whole, these are very low numbers of seabirds potentially affected in the context of the

whole site, and therefore the cable pull site set up is not anticipated to have any effect on the seabird receptors.

Light Pollution

Light pollution has been shown to have potential effects on birds in a number of ways. The lighting will be localised to the work areas. The HDD landfall work is likely to take place between 7am-7pm. As this will take place over the winter months, it is likely light will be required for safe construction work. As the nearest nest site is over 150m from the HDD onshore site, it is unlikely that any birds loafing at a nest site over the winter period will be adversely affected by temporary lighting, especially considering most of the birds are loafing on or at the bottom of the cliffs themselves, rather than on the same level as the HDD site. From the diurnal study on seabirds using the Longhaven cliffs, it is noted that certain species may be present over the evening, night and early morning periods. Roosting shags, fulmars, and guillemots may all be present at night on the cliffs (Appendix F.2). Birds flying over the site may become disorientated because of the lighting, however measures will be put in place to ensure the lighting is directed in a downward manner to minimise lighting pollution.

Human Presence Disturbance

Disturbance related to the HDD land fall work and the cable pull set up work may also relate to there being additional human presence near to the cliffs. For the winter months, there are so few seabirds adjacent to the landfall area, as identified from the seabird surveys, that it is unlikely to have any effect. For the cable pull set up in March or possibly August, this takes place during the beginning and end of the breeding period months. Two important points need to be made. Firstly, the work area is placed more than 120m back from the beginning of the cliff slope and it is unlikely the work force need to go to the edge of the cliffs as part of their work. Secondly, there is already a public coastal path which runs along the cliffs. Therefore, birds are already used to occasionally seeing people walk past whilst on this coastal path. Furthermore, flushing distances identified from a literature review revealed most bird species flushing at distances less than 100m. It is not anticipated that additional personnel will therefore cause an effect on the seabird species.

Seabird Species

For the seabird species potentially affected by the HDD landfall work over the winter period, fulmars, herring gulls, guillemots, razorbills, kittiwakes and shags are given a **regional** value of importance. There could be noise and light disturbance over two winters in order to drill the holes, but as this will be temporary in nature and as the noise modelling revealed no increase above background levels in the immediate vicinity, the magnitude of impact is defined as being **low**, giving an overall effect of being **minor, non-significant**.

For the seabird species potentially affected by the cable pull site set up activity are fulmars herring gulls, guillemots, razorbills, shags, kittiwakes, these species are given a **regional** value of importance. The cable pull site set up is expected to take a short period of time from the and not impact on a large number of individual species in the context of the overall population numbers. Any effects will be temporary in nature and of **low** magnitude, giving an overall effect of being **minor, non-significant**.

Designated Sites and Nature Reserves

The sites which contain designated features that may be affected by the onshore activities as described above are:

- Buchan Ness to Collieston Coast SPA/SSSI: this site will potentially be disturbed during the HDD drilling activity and the cable pull site set up activity. The HDD drilling will take place outside the breeding season and therefore the qualifying features will not be affected due to this activity.

The cable pull site set up activity may take place in March, or during August, therefore will be within the start and end of the seabird breeding period. For fulmars and herring gulls, the proportion of birds of the SPA recorded within 100m of this activity is 0.22% and 0.13% as a maximum. Within 200m fulmars and razorbills were under 1% of the proportion of the SPA total. For kittiwakes, guillemots, herring gulls and shags, the proportions were 1.15, 2.72, 1.98, and 2.72% respectively. No significant effects are expected on any of the receptors. Therefore, no significant effects on any of the qualifying features are expected as a result of disturbance effects during onshore activities.

- A section of the Longhaven cliffs reserve may be subject to noise disturbance as a results of the HDD activities. The seabird species within the Reserve are considered as part of the Buchan Ness to Collieston Coast SPA.
- Designated sites outwith the HVDC cable corridor: any noise, visual and human presence disturbance during the installation will only occur in the direct vicinity of the site. Therefore, given the distance between the other designated sites and the HDD works, effects are expected to have no change on the sites.

Therefore, the effect on the **international** receptors are valued as having a **negligible** magnitude and a **minor, non-significant** effect. Effects on Longhaven cliffs as a high local valued receptor are expected to be **negligible** magnitude leading to a **negligible, non-significant** effect.

17.6.2.2.2 Disturbance Due to Marine Cable Installation Activities

During the cable pull, marine surveys, and cable laying activities there will be a number of vessels required which may result in the following disturbance:

- Disturbance due to displacement from foraging habitat; and
- Disturbance due to noise and light pollution from the vessels.

The number of vessels required for each cable installation activity is shown in Table 17.18. The (*) for the guard vessel in the cable pull relates to the fact that this guard vessel is likely to be between 2-4km from the HDD exit, most likely by the Pilot Station, rather than closer to the cliffs as the other vessels are. Guard vessels will be stationary for up to 3 months, until the cable is fully protected. The number of work boats associated with the cable pull activity is assessed as being five as a worse case scenario. More information on the individual activities can be found in Chapter 2: Project Description. Indicative timings for the duration of activities within UK waters (up to the UK EEZ line) as well as an approximate duration of vessel activity inside the Buchan Ness to Collieston Coast SPA are also given. It is likely that the cable pull and cable installation will take place during the spring and summer months (April-September). The site set up for the cable pull is likely to take place at the beginning of the breeding season (March) or at the end (August) but as this is related to an onshore activity has been assessed within Section 17.6.2.2.1.

Table 17.18 Expected number of vessels required for each marine cable installation activity.

Activity	Vessels required	Duration within UK waters	Approximate total duration inside Buchan Ness to Collieston Coast SPA
Cable pull at HDD exit (during summer)	Cable lay vessel (1) Diver support vessel (1) Work boats (up to 5) Guard vessel* (1)	1 week per cable pull. Two cable pulls to take place. Gap of 4-12 months inbetween each pull.	2 weeks
UXO Survey	Survey vessel (1)	3 months	2 days
Marine Route surveys	Survey vessel (1)	3 months	2 days
Route clearance	Clearance vessel (1)	1 month	< 1 day
Pre-lay grapnel run	Clearance vessel (1)	1 month	< 1 day
Cable installation: laying and trenching	Cable lay vessel (1) Cable trenching vessel (1) Guard vessel (1 every 10-15km) Survey vessel (1) Chase vessel (2)	4 cable lay campaigns in UK waters, each taking 1 month and with a gap of at least 4 months inbetween. Survey vessel to follow behind trenching vessel.	2 days
Further cable protection measures	Rock-placement vessel (1) Survey vessel (1) Guard vessel (1)	2 months per cable.	1 day
As-built survey	Survey vessel (1)	1 month	< 1 day

The type of cable laying and trenching vessels employed will depend on the winning Contractor, however cable lay vessels being used currently are between 120m and 200m long. When cable laying the vessels travel at speeds of between 250 and 600 metres per hour. Survey vessels are likely to be between 50-80m long. Guard vessels are normally smaller vessels, between 20-50m. Work boats are likely to be small zodiac boats, or similar, with a small outboard engine.

Vessel disturbance of habitat

Vessels have the potential to cause disturbance to seabirds utilising the waters near the installation activities. Different species have different vulnerabilities associated with disturbance due to vessels, both on sea (as summarised in Furness et al. (2013)) and on land (summarised in Table 17.9). From the field surveys, and from the foraging range information gathered, the species most likely to be potentially affected by vessel presence during the cable installation activities are: fulmars, kittiwakes, herring gull, guillemots, razorbill, and shag. Additionally, from the vantage point surveys, the maximum number of puffins observed in the breeding period was 5 (July) and for gannets was 10 (March) at sea. For the cable laying activity, the seabird species which demonstrate little or minor responses to vessel disturbance (from Table 17.9) are fulmars, kittiwake, herring gulls, puffins, and gannets. Species which may be more prone to vessel disturbance are guillemots, razorbills and shags (Table 17.9). The vessel disturbance will be temporary in nature and will not occur over long periods of time (Table 17.18).

Seabirds tend to raft together in groups on the sea, which means that if a vessel passes through a raft, it has the potential to flush a number of birds all at once. For the marine installation activities, the vessel speeds will be extremely slow and steady due to the nature of the work they are carrying out, with a predicted speed of 250m-600m per hour for the cable laying vessel. It has been previously

demonstrated that the slower the vessel speed, the less likely disturbance is to occur for certain seabird species (Ronconi & Clair, 2002). The effect of the vessel's presence would be disturbance of potential foraging or resting habitat on the sea, thus causing the birds to have to move elsewhere, most likely within a few hundred metres away. However, any disturbance is likely to only be in the direct vicinity of the vessel's path and given the ability of the seabirds to forage across large areas, it is unlikely that disturbance of a small section of this habitat will have a large impact on them. The second effect would be that the disturbance may result in birds having less time to forage and cause them to expend additional energy, for example if they are flushed and had to relocate. The effects on energy budgets are extremely unlikely to result in population dynamic effects (i.e. increased adult mortality or impacts on reproduction).

For the cable pull, the species potentially affected by disturbance will be those within close proximity to the HDD exit. From the surveys, no birds were recorded within 100m of this point. Within 200m kittiwakes (41 in March, 66 in August), guillemot (412 in March, 2 in August), razorbill (16 in March), herring gulls (31 in March) and shags (7 in March) were recorded.

As identified in Chapter 19: Navigation and Shipping, and in Chapter 20: Commercial Fisheries, the bay where the HDD exit is situated, as well as the cable corridor itself, is known to be a busy area for shipping activity. From AIS data analysed, the majority of the boats or ships closer in to the cliffs are below 50m in size, however it is not uncommon for vessels of lengths between 80-120m to be within 100m of the cliffs (Appendix J1). Furthermore, the area of Longhaven Bay is a known anchorage for many vessels: 3 oil and gas vessels (between 80-86m in length) have been recorded anchoring close in to the cliffs (Appendix J1; Figure 6.22). The analysis on vessel numbers also revealed that throughout the year the average daily number of vessels using the consenting corridor up to the UK EEZ is consistently over 50 per day, with the busiest month for vessels being August (96 per day). Fewer vessels will be closer to shore, though there is a high density of vessels using the area close by the cliffs; predominantly fishing vessels but also recreational vessels and oil and gas vessels (Appendix J1: Figure 6.11). For the cable pull activity, the vessels will be largely stationary, with the cable laying vessel itself being stationed approximately 280m from the cliff edge. Therefore, the effects on species nesting on the cliffs are not likely to flush from their nests due to the cable lay vessel coming to 280m from the cliffs. The diving support vessel will be directly above the HDD exit, which is 200m from the cliffs. Therefore, for most species sitting on a nest, they are unlikely to be flushed as a result of the vessels required for the cable pull (in accordance with disturbance distances identified in Table 17.9).

The birds will also have some degree of acclimatisation to vessels and recreational boats coming in close to the cliffs. Therefore, any disturbance distances are likely to be reduced even further.

Vessel disturbance due to noise and light

For the cable pull and the cable laying activities, these will require work lights to be on the vessels during any night-time working. The lights will be directed towards the working area only.

The noise assessment revealed that for the majority of the Buchan Ness to Collieston Coast SPA there is no increase above background levels (Chapter 22: Noise and Vibration (In Air) and Drawing NCFES-NCT-X-XG-010-10). However, for sections 3A, and 3B the noise produced is above background levels by 11dB (from around 54dB up to 65dB) for a concentrated area around the HDD exit and associated vessels. Appendix H.3 demonstrates the noise predicted for the cable pull activity. The 3D images produced clearly show that the noise dissipates to background levels within a short distance from the cable pull activities. The cable pull is likely to take place in April or August. The seabird survey data

revealed that in April a total of 1 fulmar, 27 kittiwake, 524 guillemot, 105 razorbill, 12 herring gulls, and 10 shags were recorded on land within 200m of the HDD exit. In August a total of 66 kittiwake (all juvenile) and 2 guillemot were noted on the cliffs. In August much lower numbers are recorded, and therefore fewer birds would potentially be affected by the cable pull activity if it were to be carried out in this month.

In the context of their overall population numbers (Table 17.6), the numbers of birds recorded in the surrounding cliffs to the cable pull activity are low to non-existent numbers of individuals.

The cable pull activity will not cause a significant increase in noise at the seabird cliffs. Given the distance from the HDD exit and the nearest seabird nest sites is over 200m, it is highly unlikely that noise disturbance due to the cable pull activity would be of such a magnitude as to cause nest abandonment.

The cable pull will take place over 24 hours for up to 7 days for each pull, and will therefore require some additional lighting. This lighting will be directed and only used in the vicinity of the work area. The light and noise disturbance at the HDD exit activities (cable pull) will be temporary in nature but may be present across two different breeding seasons.

For cable laying, as the cable laying vessel moves further away from the cliffs, the effect of additional light on the cliff nesting birds will decrease. As identified in Chapter 19: Navigation and Shipping, and from ad hoc sightings recorded whilst visiting the landfall site, it is known that Long Haven Bay is an anchorage due to its sheltered nature. The seabirds along this cliff are therefore likely to be accustomed to large vessels (up to 100m) being close in to the cliffs with lights on and engines running.

The cable laying and trenching will be moving from the HDD exit point out to the UK EEZ line, and beyond. The cable laying vessel does not produce a large amount of noise and the context of the existing environment should be taken into consideration. As demonstrated in Chapter 19: Navigation and Shipping, this part of the North Sea is busy with fishing vessels, cargo vessels and others. It is likely birds are used to both hearing and seeing boats within the same area in which they are foraging.

Seabird Species

For the cable laying activity, the species potentially affected by the vessel noise and light disturbance, and the displacement of foraging habitat are those within foraging range of the cable installation corridor: fulmar, kittiwake, guillemot, razorbill, shag, herring gull, puffin, and gannet. Fulmars, guillemot, kittiwake, razorbill, herring gull, shag are all assessed as being of **regional** importance, puffins as **high local**, and gannets as **low local**. The impact is expected to be **temporary** and of a **low** magnitude given the context of the existing environment, giving an overall **minor, non-significant** effect. Of all the species, given their vulnerability to vessel movements, shags are the species which could be temporarily affected whilst at sea, but as the impact is temporary in nature, it remains of minor non-significance.

Designated Sites and Nature Reserve

The sites which contain designated features that may be affected as described above are:

- Buchan Ness to Collieston Coast SPA/SSSI: no significant effects on any of the qualifying features are expected as a result of vessel disturbance effects during construction. The proportion of the qualifying species recorded within 200m of the HDD exit activity, from the whole site population, is less than 3% for all species.

- A section of the Longhaven cliffs reserve may be subject to noise disturbance as a result of the HDD exit activities. The seabird species within the Reserve are considered as part of the Buchan Ness to Collieston Coast SPA assessment.
- Designated sites outwith the HVDC cable corridor: vessels within the cable corridor will be minimal. No significant effects on any of qualifying features are expected as a result of vessel disturbance effects during construction. In the context of the North Sea, an additional 1-3 vessels required for the cable installation at any one time is not expected to impact greatly on any of the other designated sites. No effects due to cable pull HDD exit activities will be present for the sites outwith the HVDC corridor due to the distances involved, and therefore do not need assessed.

Therefore, the effect on these **international** receptors are valued as having a **negligible** magnitude and a **minor, non-significant** effect. Effects on Longhaven cliffs as a high local valued receptor are expected to be **negligible** magnitude leading to a **negligible, non-significant** effect.

17.6.2.2.3 Indirect Effects on Prey Species

Chapter 15: Fish and Shellfish identified potential impacts on the fish and shellfish species within the cable 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 are relevant. The loss of habitat in relation to these fish species spawning grounds was found to be of no change, negligible, or of minor significance. The introduction of new habitat, due to rock placement along certain sections of the cable installation corridor, was found to have no change for the sandeels, as this is not suitable habitat for their spawning grounds as they require a sandy substrate. For saithe and whiting, the introduction of more rock habitat has been found to have a beneficial effect, thought of minor significance. The increase in sediments due to the cable installation, or changes to water quality, were not found to have any lasting adverse effects on any of the fish species.

Seabird Species

As no effects on fish species are predicted, in turn no effects are expected for the seabird species. Therefore, the **regionally** valued species will experience **negligible** effects as a result of indirect prey effects, leading to a **negligible, non-significant** effect.

Peregrine Falcon

Though the peregrine falcon is not a marine-dependent species, it is appropriate to assess it in the context of being associated with the seabirds on the cliffs. If there were to be any adverse effects on the seabird populations at the cliffs this could in turn effect the breeding peregrine falcons. However, as no effects are predicted and given the large area over which peregrines can hunt for seabird eggs and chicks along the cliffs, no effects on peregrines are expected. This **regionally** valued receptor will experience **negligible** effects as a result of indirect prey effects, leading to a **negligible, non-significant** effect.

Designated Sites

As no effects on fish species or seabird species are predicted, in turn no effects are expected for any of the designated site species. Therefore, the **internationally** valued sites will experience **negligible** effects as a result of indirect prey effects, leading to a **minor, non-significant** effect.

17.6.2.2.4 Water Quality Effects

There are three main activities associated with the cable installation which could have water quality effects relevant to the seabird receptors at the site. Firstly, there could be an effect on water quality as a result of the release of the drilling fluids and solids from the HDD exit holes. Secondly, there could be an effect on water quality as a result of the cable installation techniques employed which can lead to increased sediment loading due to jet-trenching, mechanical trenching, or ploughing activity. Thirdly, there could be an accidental release of contaminants from the cable laying vessel or associated support vessels.

Drilling Fluid Release

As discussed further in Chapter 11: Water Quality (offshore), there will be a total release of drilling fluid solids (17.3m³ in total) of bentonite for all three HDD holes. Bentonite is a non-toxic material and due to the small volume of solids expected to be released, it is thought this will disperse quickly due to wind and waves. Therefore, from an ornithological perspective, this topic does not require further assessment.

Increased Suspended Solids Loading

As the cable installation techniques have not yet been determined, there could be varying degrees of sediment plumes depending on the technique used and the substrate type. After the cable has been trenched the sediment is likely to settle back down. It should also be noted that the shallowest depth of cable lay occurs at the HDD exit point which is 26m. Thereafter, most of the cable laying occurs at depths of between 35m-150m depths. In assessing what species may be affected by increased sediment loading, those species which dive to depths beyond 35m are most vulnerable, and those species which rely on visual foraging for their prey detection. From Table 17.10, these are: guillemot, razorbill, shag and puffin. Of these species, the most likely species to be foraging close inshore are the shags, therefore it is the shags which are the species potentially affected by the increased sediment loading and hence turbidity due to the HDD exit work and cable laying within the waters closer to the cliffs. From the seabird surveys a total of 33 shags were recorded within 500m of the HDD marine exit point (Table 17.14). Due to the fact the increase in sediment loading will be temporary in nature and the fact that the sediment should redispense itself onto the seabed, it is not likely there will be large effect on the seabird species foraging within the vicinity of the cable installation corridor. The effects will be localised in nature. Furthermore, due to the vessel disturbance during the cable pull and cable laying activity, it is unlikely that the seabirds will be foraging in the direct vicinity of the cable laying activity anyway.

Accidental Release of Pollutants

The accidental release of oil and other marine pollutants is an extremely unlikely event during construction and, provided the mitigation laid out in Chapter 11: Water Quality (offshore), is followed, any potential accidental releases are not likely to have long-lasting effects. Direct effects include:

- Contamination of their feathers leading to a loss of water proofing, and displacing air from between the feathers, affecting the animal's thermoregulation and buoyancy. This can lead to death through hypothermia, and the inability to dive, fly, or forage; and
- Poisoning resulting in sickness or death, through the ingestion or inhalation of the contaminants. Ingestion occurs through preening and foraging in contaminated areas.

Indirect effects include:

- Displacement from foraging areas if species avoid the contaminated area;
- A reduction in prey availability if prey species are affected by the contamination event; and
- Long-term accumulation of contaminants such as poly aromatic hydrocarbons, through foraging on contaminated prey items, leading to illness, reduction in reproductive success, and increased mortality rates.

Any pollution event that did accidentally occur would have potentially larger consequences during the chick fledging period, particularly for the guillemots and razorbills, whose chicks fledge by jumping into the surrounding sea and following their parent out to sea. Their feathers and size would make them more vulnerable to a pollution event effect. This would mean a detrimental effect on the individual could occur if a pollution event occurred during the more sensitive chick fledging time for auk species, i.e. July and August. The periods of time when the vessel is likely to be closest to the seabird cliffs are April and August. Therefore, there could be an effect on chicks if a pollution event was to occur in August, as in April the adults will still be on eggs or will not yet have laid. The numbers of guillemot and razorbill young recorded on the cliff in August was 7 and 1 respectively, but this is likely to be an underestimation of how many young fledged from the cliffs prior to the August survey, so caution is advised in using these values.

Seabird Species

For guillemots, razorbills, shag, and puffins, which are the species most likely to be affected by water quality effects, their value is placed as **regional** for all but puffins which are of **high local** importance. Provided mitigation measures are in place the water quality effects are assessed as being temporary in nature and are therefore low in magnitude, resulting in an overall **minor, non-significant** effect.

For all the seabird species identified as being within foraging range of the cable installation corridor: fulmars, guillemot, kittiwake, razorbill, herring gull, shag are all assessed as being of **regional** importance, puffins as **high local**, and gannets as **low local**. The impact of an accidental pollution event is highly unlikely giving the mitigation measures which will be put in place, but if it occurred it would not be expected to have population consequences for any of the species, given the quantities that would be involved. Therefore, for all species except guillemots and razorbills, the effect is expected to be **temporary** and of a **low** magnitude giving an overall **minor, non-significant** effect.

For guillemots and razorbills if a pollution event was to occur in the period of the season when the chicks are on the sea (i.e. July and August), this could have an impact on the individual seabirds, though still not on a population level. The impact is still defined as being low, as it could have an impact in the short-term (1-5 years) but would not be expected to detrimentally affect the baseline character of the site. Therefore, the effect is of **low** magnitude giving an overall **minor, non-significant** effect.

Designated Sites

The sites which contain designated features that may be affected as described above are:

- Buchan Ness to Collieston Coast SPA/SSSI: no significant effects on any of the qualifying features are expected as a result of water quality effects during construction. Therefore, it is unlikely that the designated site would be adversely affected by any water quality issues.

- Longhaven Cliffs Nature Reserve could also be affected by accidental pollution events but as for the Buchan Ness to Collieston Coast SPA, no significant effects on the site are expected due to water quality.
- Designated sites outwith the HVDC cable corridor: Any water quality effects are expected to be localised in nature and are not expected to impact on any other designated site. No significant effects on any of qualifying features are expected as a result of water quality effects during construction.

Therefore, the effect on the Buchan Ness to Collieston Coast SPA/SSSI, an **international** receptor, it is valued as having a **negligible** magnitude and a **minor, non-significant** effect. Effects on Longhaven cliffs as a high local valued receptor are expected to be **negligible** magnitude leading to a **negligible, non-significant** effect. For all other designated sites outwith the boundary there is expected to be **no change** for these **internationally** designated receptors, therefore having a **non-significant** effect.

17.6.3 Operational Phase Impacts

Once the cable is installed onshore, there are not expected to be any long-lasting or disturbance effects on the onshore terrestrial bird species. Therefore, any effects of the operation on the terrestrial birds are expected to be of **negligible** magnitude and hence of **negligible, non-significance**.

For the marine cable installation, similarly, by in large once the cable is installed into the seabed there are not expected to be any long-lasting or disturbance associated with the operation of the HVDC cables. However, there will need to be occasional repairs made over the course of the cables' lifespan (40 years) and there may be effects on the seabird's prey items associated with the cable's operation. The following are potential impacts as a result of the operational phase of the marine installation work:

- Disturbance and displacement due to inspection or required repairs of subsea cable; and
- Indirect effects on offshore prey species.

17.6.3.1.1 Disturbance Due to Repairs

It has been predicted that as a worst-case scenario once every three years one of the cables may need to be repaired. This would involve a vessel to travel to the fault location and there would then be temporary disturbance of the localised area of the sea directly above where the repair needs to take place. It is likely that any repairs would be carried out in a short space of time. Therefore, any effects on the seabird species defined as having **regional, high local, or low local** sensitivity, would be of **negligible** magnitude, leading to a **negligible, non-significant** effect. Similarly, the designated sites defined as being of **international** importance would experience **negligible** magnitude of impact, leading to a **minor, non-significant** effect.

17.6.3.1.2 Indirect Effects on Prey Species

Chapter 15: Fish and Shellfish identified potential operational effects on fish and shellfish species as a result of the HVDC cable installation. These included effects such as sediment heating, electro-magnetic fields. No significant impacts were found for any of the fish or shellfish species as a result of these potential impacts. Therefore, any effects on the seabird species defined as having **regional, high local, or low local** sensitivity, would be of **negligible** magnitude, leading to a **negligible, non-significant** effect. Similarly, the designated sites defined as being of **international** importance would experience **negligible** magnitude of impact, leading to a **minor, non-significant** effect.

17.7 Mitigation Measures

The Schedule of Mitigation lays out primary and tertiary mitigation in place for ornithological receptors, including a Breeding Bird Protection Plan. All vessels during installation will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations. It is recognised that mitigation will be put in place to prevent pollution, minimise noise and minimise effects on prey species identified in Chapters 11, 15 and 22 on Water Quality, Fish and Shellfish, and Noise (in-Air) respectively, will assist in the minimisation of impacts on Ornithology.

17.7.1.1 Impacts on Terrestrial Species: Installation

17.7.1.1.1 Pre-works Surveys

Immediately prior to and during the construction phase, surveys will be undertaken to locate nesting birds. Active nest sites will be protected by imposing construction appropriate exclusion zones, which may vary in size depending on the species of bird. This is to ensure that there is not any accidental nest site destruction or no breeding site abandonment due to disturbance. Though the peregrine nest is located 500m from the works, if it is found that this nest site moves to being closer to the cable corridor, then steps will be made to ensure no disturbance of this Schedule 1, legally protected species occurs.

17.7.1.1.2 Sensitive Timing of Activities

Installation activities have the potential to disturb breeding birds. It will not be possible to schedule all works to occur outside the breeding season but where practicable works will be carried out outwith the breeding bird season, or at least started prior to the season. However, if any vegetation clearance is required for the HVDC cable installation, this will occur outside of breeding periods.

17.7.1.1.3 Light Minimisation

Where light is required it will be directional and only within the working area where it is required.

17.7.1.2 Impacts on Terrestrial Species: Operation

No significant effects are expected during the operational of the HVDC cabling, and therefore no mitigation measures need to be put in place.

17.7.1.3 Impacts on Marine-Dependent Species: Installation

No significant effects are predicted on the seabird receptors as a result of the marine installation, therefore no additional mitigation is specifically required. However, certain mitigation measures will be put in place to minimise any potential impacts on the seabirds.

17.7.1.3.1 Sensitive Timing and Location of Activities

Installation activities have the potential to disturb breeding birds. The activity with the most potential for disturbance of the seabird receptors is the HDD drilling. This activity has been specifically programmed to be outwith the bird breeding season and therefore this is embedded mitigation. Furthermore, the location of the HDD site has specifically taken into consideration the seabird receptors from the design of the landfall site (see Chapter 2: Project Description), and the site was placed as far back from the cliffs as possible. The noisiest apparatus (the fluid recycling units) were also placed as far back as possible within the site compound and with further apparatus surrounding them (for example water tanks) to buffer the sound further.

17.7.1.3.2 Seabird Observer Onboard Vessel During Cable Pull Activities

For cable pulling works, where there will be small crafts in the water, a seabird observer will be utilised to ensure that vessels travel at slow speeds around the cliffs and that the vessels do not travel through any substantial rafts of birds.

17.7.1.3.3 Light Minimisation on Vessels

During the cable pull and cable installation activity measures will be put in place to ensure that the vessel lighting is only for the work area required. Where possible, and where safe to do so, light from any windows on the vessel will be covered at night to decrease the light emission of the vessel.

17.7.1.1 Ongoing Assessment and Improvement

The HDD drilling works will be carried out throughout the winter period when fewer birds are present. During the first HDD drilling work there will be observations of birds made, particularly those at the cliffs, and their behaviour noted. This will help identify whether or not they show any signs of disturbance. If they are, then the source of the issue will be investigated. If it is noise or light pollution related, then and where practicable additional steps will be taken to minimise effects for the subsequent drilling activities.

There will be two cable pulling operations, carried out months apart, hence there is an opportunity to observe the first cable pull to understand if any disturbance was caused and to identify areas for improvement if necessary for the second pull. The use of time lapse photography by a suitably qualified ecologist, as utilised in the baseline assessment, coupled with seabird observer recordings during key activities will be utilised.

17.7.1.1 Impacts on Marine-dependent Species: Operation

No significant effects are expected during the operational of the HVDC cabling, and therefore no mitigation measures need to be put in place.

17.8 Residual Effects

17.8.1 Onshore Activities

The only significant effect predicted for the terrestrial bird species is if a nest were to be accidentally destroyed as part of the onshore HVDC cabling, or if a bird was caused to abandon its breeding attempt due to disturbance of its nest site. With pre-construction surveys carried out by a suitably qualified ecologist, this should ensure that any nests present will be detected and suitably protected. Appropriate buffer zones will be put in place if any nests are to be found. Furthermore, any vegetation removal required will take place outside the bird breeding season, which will further reduce the risk of any bird nests being destroyed accidentally.

17.8.2 Marine Installation Activities

No significant effects were predicted for the seabird receptors or designated sites as a result of the marine installation, due to the embedded mitigation already within the project and the temporary nature of the works close in to the cliffs.

17.9 Cumulative Impacts

17.9.1.1 Onshore Impacts

The only onshore project to be considered is the NorthConnect HVDC Converter Station and HVAC cabling. No residual effects were identified as being significant in relation to the bird species

(NorthConnect, 2015). Therefore, no cumulative impacts between the NorthConnect project construction stages are predicted.

17.9.1.2 Marine Installation

Seabirds are wide-ranging in their foraging across the sea and there may be cumulative impacts arising as a result of the construction or operation of other marine developments. Effects are considered in relation to the installation phase of the NorthConnect HVDC cabling, but not for the operation phase as once installed the subsea cables are not expected to have any impact on the seabird receptors.

As identified in Chapter 6: Cumulative Effects and agreed with Marine Scotland, the following marine developments have been considered as part of this assessment:

- **Moray East/West Offshore Windfarm Development (100km)**
- **Inch cape offshore windfarm (110km)**
- **Neart na Gaoithe offshore Windfarm (130km)**
- **Seagreen Phase 1 wind farm (110km)**
- **Beatrice offshore windfarm* (100km)**
- **European offshore wind development centre EOWDC, Aberdeen Bay* (40km)**
- **Hywind Scotland pilot park offshore wind farm* (20km)**
- **Kincardine Offshore Windfarm, 8 6MW floating turbines* (50km)**
- Aberdeen harbour dredge and harbour extension project* (40km)
- Peterhead port authority Harbour masterplan* (3km)
- **North Sea Network Link Interconnector cable (130km)**
- **NorthConnect HVDC subsea cable (rest of the North Sea: from UK median line-start of Norwegian fjord) (220km)**

Those projects which do not overlap in construction phases are marked with an * in the above list. Windfarm projects which would be operational during the time when the NorthConnect project would be under construction are also included as there could be potential effects on seabird species. Those non-wind farm projects which do not overlap in construction periods are in non-bold text, and do not require further consideration.

The potential effects during NorthConnect's installation on the remaining projects (marked in bold in the above list) are then considered in turn for each scoped-in seabird species. As the most sensitive season for seabirds is during the breeding period where they are tied to their breeding site, it is the breeding site foraging distances as identified in Table 17.7 which will help determine whether or not any cumulative effects exist.

Table 17.19 Summary of cumulative projects and seabird species effects from offshore windfarms. Grey indicates where no effect was noted for the species.

Species	Project name							
	Moray East/West offshore wind farm	Inch cape offshore wind farm	Neart na Gaoithe offshore wind farm	Seagreen Phase 1 windfarm	Kincardine windfarm	Beatrice offshore windfarm	Hywind windfarm	EOWDC
Fulmar						Minor effect of displacement.		
Guillemot		Minor displacement predicted during operation of wind farm		Minor effects predicted during impact piling operations due to indirect disturbance of prey items.	Entanglement in mooring lines, non -significant effect predicted.	Minor effect of displacement.		
Razorbill		Minor effects predicted during impact piling operations due to indirect disturbance of prey items. And minor displacement predicted during operation of wind farm	Displacement and barrier effects during breeding period	Minor effects predicted during impact piling operations due to indirect disturbance of prey items.	Entanglement in mooring lines, non -significant effect predicted.	Minor effect of displacement.	Minor effect of disturbance of foraging habitat.	

Species	Project name							
	Moray East/West offshore wind farm	Inch cape offshore wind farm	Neart na Gaoithe offshore wind farm	Seagreen Phase 1 windfarm	Kincardine windfarm	Beatrice offshore windfarm	Hywind windfarm	EOWDC
Herring gull	Collision risk during operation.			Collision risk during operation.		Collision risk during operation.		Collision risk during operation.
Kittiwake		Minor displacement predicted during operation of wind farm		Collision risk during operation.	Collision risk.	Minor effect of displacement.		
Shag								
Gannet	Moderate collision risk identified	Minor displacement predicted during operation of wind farm	Cumulative displacement impact during breeding season with other Firth of Forth windfarms	Collision risk during operation.	Entanglement in mooring lines, non -significant effect predicted. Collision risk.			
Puffin				Minor effects predicted during impact piling operations due to indirect disturbance of prey items.	Entanglement in mooring lines, non -significant effect predicted.			

Table 17.20 Summary of effects identified from non-offshore windfarm projects.

Species	North Sea Link	NorthConnect from UK EEZ line to Norwegian Fjord
Fulmar	Moderate impact predicted for accidental spillage.	Temporary effect of habitat disturbance could take place during cable installation.
Guillemot	Minor impacts of increased sediment loading during cable laying and on prey items during installation. Moderate impact predicted for accidental spillage.	
Razorbill	Minor impacts of increased sediment loading during cable laying and on prey items during installation. Moderate impact predicted for accidental spillage.	
Herring gull	Moderate impact predicted for accidental spillage.	
Kittiwake	Moderate impact predicted for accidental spillage.	
Shag	Minor impacts of increased sediment loading during cable laying and on prey items during installation. Moderate impact predicted for accidental spillage.	
Gannet	Minor impacts of increased sediment loading during cable laying and on prey items during installation. Moderate impact predicted for accidental spillage.	Temporary effect of habitat disturbance could take place during cable installation.
Puffin	Minor impacts of increased sediment loading during cable laying and on prey items during installation. Moderate impact predicted for accidental spillage.	

17.9.1.2.1 Cumulative Impacts of Habitat Displacement

Collision risk modelling revealed that herring gull, gannets, and kittiwakes have been predicted as being vulnerable to collision for some of the offshore wind farms listed above (see Table 17.19). Collision impacts are not relevant for the installation of marine cables, however if any of the seabird species were to be displaced due to the NorthConnect project such that they could come into contact with the offshore wind farms, then cumulative effects could result. However, with no residual effects on habitat displacement predicted for the NorthConnect project and any habitat displacement resulting from vessel presence likely to be extremely limited, unlikely to exceed 1km from the cable installation vessel, no cumulative effects with other projects are expected due to habitat displacement.

Similarly, due to habitat displacement being within a local area, no cumulative effects between the UK NorthConnect cable installation and the Norwegian NorthConnect cable installation are predicted.

17.9.1.2.2 Cumulative Impacts of Disturbance to Prey Items

Some of the offshore wind farms and the North Sea Link cable predicted potential effect on prey items as a result of the installation. The predicted effects on prey from the projects laid out in Table 17.19 were expected to be non-significant. Any effects on prey are predicted to be localised in nature. NorthConnect is not contributing towards an additional effect on prey items as there was no significant effect on prey items found during the impact assessment of prey items. Therefore, there is no cumulative effect between the NorthConnect project and any other project.

17.9.1.2.3 Cumulative Impacts of Increased Sediment loading

The effects of increased sediment loading are very localised in nature. Furthermore, not all the species predicted to be affected by turbidity changes in other projects overlap in foraging range distances. Therefore, no cumulative effects with increased sediment loading are expected.

17.9.1.2.4 Cumulative Impacts of Water Quality Changes

The North Sea link predicted an impact with accidental spillage. As this would be localised in nature, and due to the distances between the two projects (130km), no cumulative impacts would be expected for any of the scoped-in species. The likelihood of either North Sea Link or NorthConnect individually having a loss of contaminant of a magnitude that would lead to potential significant effects on avian receptors is considered extremely unlikely because of stringent mitigation measures put in place. As such the probability of both projects suffering such a loss of containment at the same time is highly improbable. Thus, there are no cumulative impact effects predicted with any of the projects and NorthConnect project.

17.10 Summary

This chapter has considered the potential impacts of construction and operation of the NorthConnect Development on relevant ornithological receptors. The summary of the effects is shown in Table 17.21. The NorthConnect HVDC cable installation is expected to cause temporary, non-significant disturbance during the construction period for any nesting birds in the onshore farmland and along the coastline. Operationally, no effects are predicted on the ornithological receptors once the cable is installed. No cumulative impacts are predicted with any other developments.

Table 17.21 Summary of Ornithological Impacts and Mitigation.

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Buchan Ness and Collieston Coast SPA/SSSI and Collieston to Whinnyfold Coast SSSI	International	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Negligible Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Negligible Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with drilling fluid release.	Negligible Negative Short Term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Negligible Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following procedures laid out for pollution prevention in the SoM.	Negligible Negative Short Term Permanent	Minor: Non-Significant
		Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
Troup, Pennan and Lion's Head SPA	International	Installation	Disturbance to marine-based species due to vessel disturbance.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Troup, Pennan and Lion's Head SPA	International	Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
		Installation	Disturbance to marine-based species due to vessel disturbance.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor Non-Significant
Fowlsheugh SPA	International	Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
		Installation	Disturbance to marine-based species due to vessel disturbance.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor Non-Significant
Outer Firth of Forth and St Andrews Bay pSPA	International	Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
		Installation	Disturbance to marine-based species due to vessel disturbance.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor Non-Significant
SWT Longhaven Cliffs Reserve	Regional	Installation	Disturbance of marine-based species due to human presence, noise and light pollution.	Negligible Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Negligible Negative Short Term Reversible	Minor Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Passerines (red-list species)	Regional	Installation	Disturbance due to habitat displacement, noise, light pollution and human presence.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used. Breeding Bird Protection Plan put in place.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Accidental nest site destruction during construction.	Medium Negative Permanent	Unlikely	Moderate: Significant	Pre-construction surveys. Following measures laid out in the SoM.	Low Negative	Minor Non-Significant
Passerines (amber-list species)	Regional	Installation	Disturbance due to habitat displacement, noise, light pollution and human presence.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used. Breeding Bird Protection Plan put in place.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Accidental nest site destruction during construction.	Medium Negative Permanent	Unlikely	Moderate: Significant	Pre-construction surveys. Following measures laid out in the SoM.	Low Negative	Minor Non-Significant

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Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Waders (red list species)	High Local	Installation	Disturbance due to habitat displacement, noise, light pollution and human presence.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used. Breeding Bird Protection Plan put in place.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Accidental nest site destruction during construction.	Medium Negative Permanent	Unlikely	Moderate: Significant	Pre-construction surveys. Following measures laid out in the SoM.	Low Negative	Minor Non-Significant
Waders: snipe	Moderate Local	Installation	Disturbance due to habitat displacement, noise, light pollution and human presence.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used. Breeding Bird Protection Plan put in place.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Accidental nest site destruction during construction.	Medium Negative Permanent	Unlikely	Moderate: Significant	Pre-construction surveys. Following measures laid out in the SoM.	Low Negative	Minor Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Peregrine falcon	Regional	Installation	Disturbance due to habitat displacement, noise, light pollution and human presence.	Low Negative Short Term Reversible	Unlikely	Minor: Non-Significant	Directed lighting for construction area only used. Breeding Bird Protection Plan put in place.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Indirect effects on prey items	Negligible Negative Short Term Reversible	Unlikely	Negligible: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Negligible: Non-Significant
Fulmar	Regional	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with drilling fluid release.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Low Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Low Negative Short Term Permanent	Minor: Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Fulmar	Regional	Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
Guillemot	Regional	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with drilling fluid release.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Low Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Low Negative Short Term Permanent	Minor: Non-Significant
		Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Razorbill	Regional	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with drilling fluid release.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Low Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Low Negative Short Term Permanent	Minor: Non-Significant
		Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
Herring gull	Regional	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Low Negative Short Term Reversible	Minor Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Herring gull	Regional	Installation	Increased sediment loading and water quality effects associated with drilling fluid release.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Low Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Low Negative Short Term Permanent	Minor: Non-Significant
		Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
Shag	Regional	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with drilling fluid release and cable laying activities.	Low Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Low Negative Short Term Reversible	Minor: Non-Significant

Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Shag	Regional	Installation	Accidental release of pollutants from vessels.	Low Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Low Negative Short Term Permanent	Minor: Non-Significant
		Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
Puffin	High Local	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Low Negative Short Term Reversible	Certain	Minor: Non-Significant	Directed lighting for construction area only used.	Low Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with drilling fluid release.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Low Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Low Negative Short Term Permanent	Minor: Non-Significant

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Receptor and Value		Phase	Predicted Impact	Impact Magnitude	Likelihood of Impact	Significance (Absence of Secondary Mitigation)	Mitigation Summary	Residual Impact Magnitude	Significance of Residual Effect
Puffin	High Local	Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Certain	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant
Gannet	Low Local	Installation	Disturbance of marine-based species due to vessel presence, human presence, noise and light pollution.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	Directed lighting for construction area only used.	Negligible Negative Short Term Reversible	Minor Non-Significant
		Installation	Increased sediment loading and water quality effects associated with cable laying activities.	Negligible Negative Short Term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short Term Reversible	Minor: Non-Significant
		Installation	Accidental release of pollutants from vessels.	Negligible Negative Short Term Permanent	Unlikely	Minor: Non-Significant	Following SoM procedures laid out for pollution prevention.	Negligible Negative Short Term Permanent	Minor: Non-Significant
		Operation	Disturbance to marine-based species during cable repair operations.	Negligible Negative Short-term Reversible	Unlikely	Minor: Non-Significant	No specific mitigation required.	Negligible Negative Short-term Reversible	Minor Non-Significant

Key

	Significant Effect
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