# 6 Ornithology

## Contents

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# 6 Ornithology

## 6.1 Introduction

### *Scope of Study*

6.1.1 This chapter assesses the effects of the Proposed Development on birds and complements the assessment of ecological effects presented in Chapter 7: *Ecology and Nature Conservation.*

6.1.2 This chapter describes the methods used to evaluate the bird interest at the Proposed Development site and to determine the nature conservation importance of this interest. It explains the ways in which birds may be affected by the Proposed Development and assesses the likely effects of the Proposed Development and their significance. In making an assessment of impacts, the chapter draws on information obtained through desk study, consultation, and field survey.

6.1.3 The assessment has been undertaken by BSG Ecology.

### *Description of the Site*

6.1.4 The Proposed Development site is located in the north-west of the northern tip of Yell. A gravel track runs from the head of Basta Voe to Cullivoe on the east coast of Yell (Dalsetter Hill Road, known locally as the Old Cullivoe Road). This track runs along much of the eastern edge of the site and the larger part of it has been identified as a suitable route for the eastern approach of a site access track. From the track, the site extends to just short of the western coastal cliffs and rocky exposures; to the head of Gloup Voe in the north and the head of Basta Voe to the south. The landscape is principally one of undulating peat moorland which ranges in elevation from 30 m to 110 m above sea-level (asl), with numerous waterbodies (from bog pools to small lochs) and small burns. The moorland includes areas of grassland and the whole application area is subject to sheep grazing.

6.1.5 As described in Chapter 2: *Design Iteration*, the Proposed Development has been subject to ten iterative design changes, from November 2017 to January 2019. Design development has included reduction of the site application area for the Proposed Development to avoid of the majority of the north-eastern and south-western lochs and lochans and routing of the site tracks and turbine locations to minimise impacts to the deeper peat deposits and limit the number of watercourse crossings. Other considerations have included avoidance of pool complexes, watercourses and gullies, wet peat, avian constraints including those relating to the RSPB reserve south of Gossa Water, the settlements at Gloup and Cullivoe; avoidance of Gossa Water Catchment area and key sensitive areas, including some of the more visually important landscape character areas (e.g. the south-west coastline at Gerherda and the open headland at North Neaps and the coastal edge at Vignon and Burgi Geos).

### *Definition of Terms*

6.1.6 For clarity of understanding, the following terminology is used in this chapter:

- The Proposed Development refers to the infrastructure , including 29 turbines, cabling, access tracks, borrow pit search areas, an on-site substation, temporary crane pads and compounds.
- The site is defined as the red line planning application boundary for the Proposed Development. The area occupied by the site is 1679.5 ha. The site boundary is shown in Figure 6.1.
- The Survey Area is defined as all areas within 500 m of the site boundary submitted for the EIA Scoping Request (refer to Chapter 2: *Design Iteration* and Figure 2.2). This perimeter is based on SNH (2017) recommendations to extend survey for birds to at least 500 m beyond the boundary of a wind farm development. The extent of the Survey Area is shown on Figure 6.1. The Survey Area extends to greater than 500 m north and south of the Proposed Development (due to subsequent contraction of the site). However, a small section of the site extends outside

of the Survey Area at Dalsetter to allow for site access, a construction compound and borrow pit search area. The Survey Area for raptors and red-throated diver *Gavia Stellata* extends beyond the 500 m perimeter of the site (following recommendations in SNH, 2017). For these surveys the Survey Area is referred to as 'Raptor Survey Area' (extending to 2 km beyond the Site boundary), and 'Red-Throated Diver Survey Area' (extending to 1 km beyond the site boundary).

6.1.7 The following terms have been used for the assessment of collision risk.

- The Collision Risk Height is defined as the distance between the minimum and maximum blade tip heights of the turbines. For the Proposed Development, the maximum blade tip height will be 200 m and the minimum swept height will be 40 m (based on a rotor diameter of 160 m). The collision risk height is therefore the linear range between 40 m and 200 m above ground level.
- The Flight Risk Area equals a rectangular area on the horizontal plane encompassing the turbines plus a 280 m 'buffer' zone (to account for the sweep of the blades (80 m) and observer error (200 m, as recommended in the relevant guidance (SNH, 2000; Band et al, 2007)). In this instance the Flight Risk Area was calculated to be 5009 m (the distance between turbines 1 and 20 plus 530 m (2 x 280 m buffer)) x 3600 m (the distance between turbines 14 and 29 plus 530 m). This was calculated using ArcGIS.
- The Collision Risk Volume is defined as the volume comprising the Flight Risk Area at Collision Risk Height.

## 6.2 Legislation, Policy and Guidelines

6.2.1 There are a number of national and local policies and guidance documents that relate to nature conservation and ecology within the planning process that are relevant to the Proposed Development. Reference to these provides an indication of the likely requirements and expectations of statutory authorities and others in relation to planning applications and nature conservation and ecology within a given area. There are also legislative requirements of new development. The relevant national and local planning policies are listed below.

### *Legislation*

6.2.2 In Scotland wildlife is afforded protection via a range of legal instruments. The key Acts and Regulations, which have been taken into account throughout this assessment, are as follows:

- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- The Conservation of Habitats and Species Regulations 2017 (as amended)[1];
- Wildlife and Countryside Act 1981 (as amended); and
- Nature Conservation (Scotland) Act 2004 (as amended).

6.2.3 The Conservation of Habitats and Species Regulations 2017 place duties on competent authorities (including Local Authorities and National Park Authorities) in relation to wild bird habitat. These provisions relate back to Articles 1, 2 and 3 of the EC Directive on the conservation of wild birds (2009/147/EC, 'Birds Directive'). Regulation 9A(2) & (3) require that "in the exercise of their functions as they consider appropriate" these authorities must take steps to contribute to the "preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds in the United Kingdom, including by means of upkeep, management and creation of such habitat…"

[1] In so far as they apply to Scotland, see Regulation 2 of 2017 Regulations for provisions relevant to Scotland.

6.2.4 In relation to the duties placed on competent authorities under the 2017 Regulations, 9A (8) states: "So far as lies within their powers, a competent authority in exercising any function [including in relation to town and country planning] in or in relation to the United Kingdom must use all reasonable endeavours to avoid any pollution or deterioration of habitats of wild birds (except habitats beyond the outer limits of the area to which the new Wild Birds Directive applies)."

6.2.5 The Wildlife and Countryside Act 1981 (the 1981 Act) as amended provides national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive) in Great Britain. The 1981 Act provides for the notification and confirmation of Sites of Special Scientific Interest (SSSIs), provides protection to all wild birds and special protection for certain species of birds, animals and plants listed in the Schedules of the 1981 Act.

6.2.6 Section 1 of the Nature Conservation (Scotland) Act 2004 (the 2004 Act) states that 'It is the duty of every public body and office-holder, in exercising any functions, to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions'. To assist with this objective Section 2(4) of the Act sets out the requirement to publish a list of flora and fauna considered to be of principal importance in Scotland.

6.2.7 The list required under Section 2(4) of the 2004 Act has now been published and includes a diverse range of habitats and species[2]. The measures required to protect these species and habitats are set out in the document 'Scotland's Biodiversity: It's in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland' (Scottish Executive, 2004). Biodiversity Targets are outlined in the 'Strategic Plan for Biodiversity 2011-2020' (Scottish Government, 2013). The two documents together comprise the Scottish Biodiversity Strategy.

### *Planning Policy*

6.2.8 The revised and updated Scottish Planning Policy (SPP) was adopted by the Scottish Government in 2014. The SPP sets out planning policies including those that relate to the protection of biodiversity. A summary of key policies within the SPP that relate to biodiversity are set out below.

6.2.9 The Scottish Planning Policy introduces a presumption in favour of development that contributes to sustainable development. This means that policies and decisions should be guided by a number of principles that are set out within the SPP, and these include the need to protect, enhance and promote access to natural heritage, including green infrastructure, landscape and the wider environment (summarised in Paragraphs 28 and 29).

6.2.10 In Paragraph 195, the SPP notes that planning authorities, and all public bodies, have a duty under the Nature Conservation (Scotland) Act 2004 to further the conservation of biodiversity. This duty must be reflected in development plans and development management decisions. They also have a duty under the Water Environment and Water Services (Scotland) Act 2003 to protect and improve Scotland's water environment.

6.2.11 International, national and locally designated areas and sites as outlined in the SPP (Paragraph 196) should be identified and afforded the appropriate level of protection in development plans.

6.2.12 Paragraph 200 relates to the sensitivity of wild land and states that plans should identify and safeguard the character of areas of wild land as identified on the 2014 SNH map of wild land areas. Paragraph 215 states that development may be appropriate in wild land in some circumstances; significant effects would need to be substantially overcome by siting, design or other mitigation.

6.2.13 Development management decisions should take account of potential effects on landscapes, the natural and water environment, including cumulative effects (Paragraph 202). Developers should seek to minimise adverse impacts through careful planning and design, considering the services which the natural environment is providing and maximising the potential for enhancement.

6.2.14 Planning permission should be refused where the nature or scale of proposed development would have an unacceptable impact on the natural environment. Direct or indirect effects on statutorily

[2] The list is published at: http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL

protected sites will be an important consideration, but designation does not impose an automatic prohibition on development (Paragraph 203).

6.2.15 Paragraph 207 identifies the need for "appropriate assessment" of any development plan or proposal likely to have a significant effect on Natura 2000 sites (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)).

**Local Policy**

6.2.16 The Shetland Local Development Plan 2014 (Shetland Islands Council, 2014) outlines the policies that protect biodiversity, geodiversity and landscape from the detrimental effects of development, as well as maximising potential benefits to natural heritage. Policy NH1 of the Plan requires consideration of the impacts of proposed developments on designated sites (both statutory and non-statutory). The policy states that where a development could have a significant effect on statutory sites, permission will only be granted where:

- "*An appropriate assessment has demonstrated that it will not adversely affect the integrity of the site, or*
- *There are no alternative solutions, and*
- *There are imperative reasons of over-riding public interest that may, for sites not hosting a priority habitat type and/or priority species, be of a social or economic nature*"

6.2.17 Policy NH5 of the Plan requires survey of proposed development sites for the presence of protected or otherwise notable species, and "*If such a species is present, a plan should be provided to avoid or mitigate any adverse impacts on the species, prior to determining the application."* The policy also states that "*the Council will apply the precautionary principle where the impacts of a proposed development on natural heritage are uncertain but potentially significant. Where development is constrained on the grounds of uncertainty, the potential for research, surveys or assessments to remove or reduce uncertainty should be considered*."

6.2.18 Policies NH3 and NH4 require consideration of impacts on ecosystem services, locally protected habitats and species and local conservation sites. Developers need to demonstrate avoidance of significant effects or overriding social, environmental or economic benefits to allow permission to be granted.

6.2.19 The Shetland Local Biodiversity Action Plan (LBAP), "Living Shetland", identifies locally important habitats and species, and aims to implement effective local action for national priorities identified in the Scottish Biodiversity Strategy. Living Shetland includes species specific action plans for eider *Somateria mollissima*, merlin *Falco columbarius*, skylark *Alauda arvensis*, red-necked phalarope *Phalaropus lobatus* and red-throated diver; and grouped action plans for arable birds and breeding waders.

## *Guidance*

6.2.20 Survey work to inform the assessment has been carried out in accordance with industry standard guidance, namely Scottish Natural Heritage (SNH) (2017) guidance "Recommended bird survey methods to inform impact assessment of onshore wind farms", and guidance for survey of raptors produced by Hardey *et al* (2013).

6.2.21 This chapter has been based principally on relevant parts of the 2018 Guidelines for Ecological Impact Assessment in the United Kingdom developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, September 2018). The ornithological assessment has been carried out with regard to the widely adopted guidance and advice published by SNH in the following documents:

- Assessing Significance of Impacts from Onshore Windfarms on Birds Outwith Designated Areas (SNH. 2006);
- Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action (SNH, 2000)

- Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model (SNH, 2018);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band et al (2007);
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012);
- Avoidance Rates for Wintering Species of Geese in Scotland at Onshore Wind Farms (SNH, 2013);
- Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas (SNH, 2018); and
- A review of disturbance distances in selected bird species (Ruddock & Whitfield, 2007).

6.2.22 Reference has also been made to the following document, which was published by the Council of Europe:

- Windfarms and Birds: An analysis of the effects of windfarms on birds and guidance on environmental assessment criteria and site selection issues (Langston & Pullan.2003).

6.2.23 In addition, the online database "Vogelverluste an Windenergieanlagen / bird fatalities at wind turbines in Europe" maintained by Tobias Dürr[3] (Dürr, 2019) has been consulted.

## 6.3 Consultation

### *Scottish Natural Heritage (SNH)*

6.3.1 Formal consultation with Scottish Natural Heritage (SNH) commenced in February 2016 and was ongoing throughout the survey period (April 2016 to August 2016 inclusive and October 2017 to August 2018 inclusive). The initial meeting in February 2016 and subsequent discussions aimed to agree the scope of the ornithology surveys and the locations of vantage points (VPs) and corresponding viewsheds. It was also noted during the meeting that the largest constraints on the Proposed Development were the proximity of the European designated sites and the various qualifying species for which they are designated, and that a list of target and secondary species should be created.

6.3.2 With regard to vantage point survey methods, SNH recommended that a minimum of 72 hours survey was undertaken, comprising 36 hours in the breeding season and 36 hours in the non-breeding season. SNH additionally offered to comment on the selection of vantage point locations, if provided with viewshed maps. With regards to the breeding bird walkover surveys, SNH stated there was no requirement to count cliff nesting seabirds which would fall within 500 m of the Proposed Development site, as they would be unlikely to use the site. With regard to wintering bird survey methods, SNH advised that two visits should be undertaken, once in late October/early November and once in February. These visits would aim to determine whether there were any build-up of wildfowl or waders within the site and a 500 m buffer.

6.3.3 As part of the consultation process, SNH highlighted the close proximity of the Otterswick and Graveland SPA, which is designated for its breeding population of red-throated diver. They also provided historic breeding records of this species within the Proposed Development site and wider area. In their scoping response dated August 2016 (see Appendix 4.4), SNH confirmed that they were "*satisfied from the results of one year's targeted vantage point observation that the proposal will have no likely significant effect on red-throated diver population of Otterswick and Graveland SPA and no further consideration of impacts on this site is necessary*"...

6.3.4 In consultation letters received December 2017 and February 2018 (see Appendix 4.4), SNH expressed their continued concerns regarding impacts of the Proposed Development on the qualifying red-throated diver population of the Bluemull and Colgrave Sounds Proposed Special

[3] http://ow.ly/wusS9 Most recently updated on 07 January 2019.

Protection Area (pSPA). They did however state that they are broadly content with the scope of ornithological surveys set out in the scoping report.

6.3.5 SNH also noted (in a letter to the Energy Consents Unit, dated 08 February 2018) that the Shetland Natural Heritage Zone (NHZ) is the appropriate scale for consideration of cumulative impacts. SNH advised that the key species for cumulative assessment should be red-throated diver, merlin, curlew *Numenius arquata* and dunlin *Calidris alpina schinzii*.

### *RSPB*

6.3.6 Formal consultation was sought with RSPB Scotland in August 2016. In their scoping response letter (dated 26 August 2016 (see Appendix 4.4)), the RSPB expressed concern regarding the proximity of the proposed turbines and access tracks to known breeding sites for red-throated diver (at Litla water) and merlin (at Atli's Hill). They recommended the following conditions:

- No construction of Turbines 3 and 5 takes place during the period April-July inclusive, and of Turbines 13 and 15 during the period March-September inclusive, unless survey (approved by the planning authority) confirms that no merlin are nesting within 500 m of the former, and no red-throated diver are nesting within 500 m of the latter[4].
- A programme of post-construction bird monitoring.
- Establishment of a Habitat Management Group (HMG) to oversee (and make reasonable changes to) a Habitat Management Plan (HMP) and to review the data produced by the post-construction monitoring.
- The HMP (covering the full lifespan of the Proposed Development) should be submitted three months prior to commencement of construction.
- The annual monitoring reports should be submitted to the HMG, with information on Schedule 1 species remaining confidential.

6.3.7 In March 2018, further consultation was sought with RSPB Scotland following revision of the layout for the Proposed Development (see Appendix 4.4). It stated that the majority of the concerns raised in the first consultation letter remained valid, and reiterated them. It was noted that a number of other species of conservation interest are likely to be present at the Proposed Development site (including dunlin and golden plover *Pluvialis apricaria*). Additional concerns were:

- The site's proximity to the Bluemull and Colgrave Sounds pSPA, which is proposed for the foraging habitat it provides for breeding red-throated diver. It stated that the EIA should fully consider the effects of the Proposed Development on the pSPA.
- The potential for habitat loss and fragmentation by the infrastructure.
- Uncertainty as to whether a comparable control / reference site had been surveyed, in line with SNH guidance.
- The nature of electricity cabling and risk of bird collisions given the open nature of the site.
- Potential impacts of the Proposed Development on some mobile species that breed on the Yell RSPB reserve.

### *Shetland Bird Club (SBC)*

6.3.8 In January 2018 the SBC issued their scoping opinion which stated concerns (see Appendix 4.4) regarding the impact of the Proposed Development on breeding red-throated divers associated with the nearby SPAs, and on the local populations of merlin, dunlin, golden plover, whimbrel *Numenius phaeopus*, Arctic skua *Stercorarius parasiticus*, curlew, lapwing *Vanellus vanellus*, oystercatcher *Haematopus ostralegus*, snipe *Gallinago gallinago* and redshank *Tringa totanus*. The potential for adverse effects on the blanket bog habitat that supports these species was also highlighted.

[4] Note that the turbine numbers mentioned in this consultation response refer to previous design iterations and not the final layout or turbine numbers of the Proposed Development.

### *Shetland Amenity Trust (SAT)*

6.3.9 In comments received in December 2017 (see Appendix 4.4), SAT briefly discussed the presence of breeding red-throated diver in the area, as well as dunlin, golden plover and merlin. The presence of curlew, lapwing and skylark was also noted.

### *Shetland Islands Council (SIC)*

6.3.10 In formal consultation, the SIC requested that a number of comments made by other nature conservation organisations are taken into account (see Appendix 4.4).

- The impact on the adjacent Bluemull and Colgrave Sounds pSPA and red-throated diver (a qualifying species). In particular, the potential for collision with turbines, disturbance resulting in displacement from lochs and increased energetic demands (as a result of avoiding the turbine array) during the chick-rearing period. The EIA report must include sufficient information for a full HRA.
- Due regard is made to the conservation of; red-throated diver, merlin, golden plover and dunlin, particularly the risk of disturbance, displacement, barrier effects and collision with turbines. The EIA report must address mitigation (including the removal of turbines from particularly sensitive areas).

6.3.11 They stated that "*the planning service is broadly content with the proposed scope of ornithological and ecological surveys set out in the scoping report*", but that "*the applicant should however pay close attention to the comments made by the RSPB and SNH to the ECU*".

## 6.4 Assessment Methodology and Significance Criteria

### *Survey Area*

6.4.1 The extent of field survey was based on relevant industry standard guidance, as indicated in Table 6.1 below. The term Survey Area has been used to describe the Proposed Development site and the area extending to 500 m of the original (2016) site boundary (as described in Chapter 2: *Design Iteration*) (see Figure 6.1). For raptors and red-throated diver surveys, the Survey Area is referred to as 'Raptor Survey Area' (extending to 2 km beyond the original site boundary), and 'Red-Throated Diver Survey Area' (extending to 1 km beyond the original site boundary).

6.4.2 During consultation in March 2018, the RSPB suggested that, in addition to the recommended extent of field survey in industry standard guidance, survey work should also cover areas beyond the Proposed Development site as a proxy for comparison of bird activity. This was achieved as a result of a reduction of the site application area for the Proposed Development. The extent of the Survey Area therefore included land surrounding the Lochs of Lumbister (approximately 2.5 km south of the Proposed Development site), land at Grudale (approximately 1.5 km north of the Proposed Development site, and land at Sand Water (approximately 1 km north-east of the Proposed Development site).

**Table 6.1 - Definition of Survey Area in relation to survey type.**

| *Survey Type* | *Guidance followed* | *Survey Area* |
|---|---|---|
| VP survey | Scottish Natural Heritage (SNH) (2014)[5]. | 2 km viewing arcs covering the Proposed Development site and a 500 m perimeter of turbine locations. |

[5] This has since been updated (March 2017). However, the methods used remain consistent with the latest guidance.

| *Survey Type* | *Guidance followed* | *Survey Area* |
|---|---|---|
| Breeding Raptor Surveys | Hardey et al (2013); SNH (2014) | Suitable breeding habitat within 2 km of the Proposed Development site. |
| Moorland breeding bird surveys | SNH (2014) | All areas within the Proposed Development site and 500 m of the site boundary. |
| Red-Throated Diver surveys | SNH (2014) | Lochans with historical records of breeding, and all other waterbodies considered suitable for breeding within 1 km of the Proposed Development site. |

### *Desk Study*

6.4.3 An ornithological desk study was carried out to compile existing baseline data for the Proposed Development site and local area.

6.4.4 The presence of statutory designated sites, such as SPAs, SACs, Ramsar wetlands, SSSIs, National Nature Reserves (NNRs) or Marine Nature Reserves (MNRs), within 10 km of the site was established using the Magic website[6] and Scottish Natural Heritage (SNH) SiteLink website[7].

6.4.5 Existing records for protected or otherwise notable species were identified with use of the above data sources with a 10 km distance of the site centre. Only records from the last 10 years were considered relevant to the study. The initial desk study was undertaken in February 2016, with further checks to ensure information remained consistent[8].

6.4.6 The Shetland Biological Records Centre (SBRC) was subsequently asked to provide records birds within 5 km of the site boundary. The data was provided on 10 February 2019 and included the following:

- large counts of wintering wildfowl[9] since 2010;
- greylag goose *Anser anser* and red-breasted merganser *Mergus serrator* since 2010;
- red-throated diver data since 2010 and data from the 1994 and 2006 Shetland census;
- coastal seabirds and skuas since 2010 and seabird 2000 data;
- breeding waders since 2010; and
- merlin since 2010 (at 1 km resolution).

6.4.7 Data held by the National Biodiversity Network (NBN)[10] was also interrogated for local records of "target species" as defined in the following section.

6.4.8 The 2016 Beaw Field Wind Farm Environmental Statement (Peel Energy, 2016) was reviewed for ornithological information relevant to the Proposed Development site and surrounding area.

[6] http://magic.defra.gov.uk/
[7] https://gateway.snh.gov.uk/natural-spaces/
[8] Most recently in February 2019
[9] These were defined (by SBRC) as flocks greater than: 10 whooper swan, 40 greylag goose, 50 wigeon, and 20 goldeneye.
[10] https://spatial.nbnatlas.org/

### *Field Survey*

6.4.9 Bird surveys were carried out during the period April 2016 to August 2016 and September 2017 to August 2018 inclusive. Surveys were carried out at a variety of times and in different weather conditions to ensure data were collected that were fully representative of a range of behaviour patterns. The methods used for each survey are described in the following sections.

6.4.10 SNH (2017) guidance indicates that wind farm assessments should focus on 'target species.' SNH defines these target species as:

- Those protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended).
- Those listed on Annex 1 of the Council Directive 79/409/EEC on the Conservation of Wild Birds.
- Regularly occurring migratory species which are either rare or vulnerable, or warrant species consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas is relation to the proposed wind farm.
- Species occurring at the site in nationally or regionally important numbers.

6.4.11 SNH guidance goes on to note that consideration should be given to species of local conservation concern (e.g. in Local Biodiversity Action Plans), but that target species should be restricted to those likely to be affected by wind farms.

6.4.12 Pre-scoping consultation with SNH, combined with the results of the data study, identified that survey work to inform the assessment should account for the potential presence of 'scarce' diurnal raptors, skuas and other seabirds, divers and wading bird species within and adjacent to the Proposed Development site. Vantage Point (VP) surveys

6.4.13 SNH guidance advises that vantage point (VP) locations should be selected to achieve maximum visibility from the minimum number of survey locations. An arc of up to 180 degrees extending to 2 km from the observer can be effectively surveyed from each VP (subject to topography and any other constraints to effective survey).

6.4.14 SNH guidance further states that a minimum of 36 hours of survey effort should be completed at each VP during both the breeding season and winter periods, and that the timing of VP watches should be varied to ensure that all times of day are appropriately covered.

6.4.15 Six VPs were initially selected following review of aerial imagery and Ordnance Survey maps, and ground-truthed during a site visit in February 2016. The selected VP locations were approved through consultation with SNH prior to the commencement of surveys in April 2016. The locations of VPs are presented in Figure 6.1.

6.4.16 VP survey work was completed between April to August 2016 and September 2017 to August 2018 inclusive resulting in a total of 96 hours of observation from each of six VPs.

**Red-Throated Diver VP Survey**

6.4.17 During consultation in April 2016, SNH recommended that a seventh VP was established to the south-west of the site on the Stuis of Graveland. The purpose of the VP was to establish the possible presence of diver flightpaths between the Otterswick and Graveland Peninsula SPA (which is designated for breeding red-throated diver) and the site. The VP location was selected to give uninterrupted views of the peninsula and breeding lochans, in addition to a view across to the south-west corner and southern boundary of the site[11]. All diver flights to and from the peninsula were recorded between mid-April and mid-August to coincide with red-throated diver breeding season. The location of the VP is presented in Figure 6.8.

[11] The extent of the Proposed Development site has since reduced (see Chapter 2: Design Iteration) and, therefore, the 2 km viewing arc from the VP does not include the current site. However, it is considered that the VP location remains effective in determining whether or not birds move between SPA and the Proposed Development.

6.4.18 Watches from this VP were undertaken between mid-April and mid-August 2016, resulting in 36 hours of observation.

**Breeding Diver Surveys**

6.4.19 Focal breeding loch surveys were undertaken from 13 locations between May and August 2018. The surveys aimed to record flights to and from 24 historical breeding lochans[12] within the Proposed Development site and 1 km of the site boundary in accordance with survey methods recommended in SNH (2014). The work provided supplementary information to compliment data obtained during the VP survey work.

6.4.20 VPs were positioned to cover the maximum number of breeding lochans from a single survey point. All survey points were located a minimum of 500 m away from the breeding lochans with observers walking to the points and remaining below the horizon during surveys in order to minimise disturbance. The locations of the focal VPs are presented in Figure 6.2; breeding lochans are shown on Confidential Figure 6.32.

6.4.21 Surveys were undertaken at times of maximum activity for red-throated diver which includes late afternoon to one hour before dusk, and at around high tide. Sufficient observations were made to record a total of at least 20 incoming and outgoing flights to allow identification of regular flight routes.

**Breeding raptor surveys**

6.4.22 Surveys were conducted for moorland nesting raptors including hen harrier *Circus cyaneus*, merlin and short-eared owl, between April and July 2016 and April and July 2018 inclusive. The survey methods followed those recommended by SNH (2005), Hardey *et al.* (2009) and Sim *et al.* (2007) and involved walking transect routes focused on heather-dominated moorland habitat and any prominent features such as rock outcrops or fence lines within the Proposed Development site and a 2 km perimeter of it. The extent of the breeding raptor walkover survey is shown in Figure 6.1.

**Moorland breeding bird surveys**

6.4.23 A walkover technique based on the Brown & Shepherd (1993) method and as recommended by SNH (2014) was employed within the site and extending to a 500 m perimeter of it. The method involved approaching within 50 m of all parts of the survey area to record the presence of waders. Four visits were conducted during the period mid-April to early July in each of 2016 and 2018, with at least a week's gap between each of the surveys. The SNH (2014, and subsequent 2017) guidance recommends that four visits (three visits were suggested under earlier iterations of the guidance) should be completed over the breeding season, based on recommendations set out in Calladine *et al*. (2009)

6.4.24 In addition to recording evidence of breeding waders, the surveys also focused on identifying approximate numbers of breeding passerines to provide contextual information regarding the breeding bird community within the Proposed Development site.

**Wintering Bird Walkover Survey**

6.4.25 Wintering bird walkover survey visits were completed in November 2017 and March 2018 covering the site and a 500 m perimeter area. All parts of the survey area were approached to within 100 m to record use of the site and surrounding areas by wildfowl and geese, waders, raptors, and gulls.

## *Personnel*

6.4.26 This assessment has been undertaken by BSG Ecology.

6.4.27 Gareth Lang MSc ACIEEM (Senior Ecologist, BSG Ecology) is the principal author of this chapter. Roger Buisson PhD MCIWEM CEnv (Director, BSG Ecology) provided the technical review. The survey

[12] The selection of focal lochans was informed by historical breeding red-throated diver data provided by SNH during consultation in February 2016, and data collected during moorland breeding bird surveys at the site during 2016 and 2018.

work was undertaken by Michal Ostalowski (2016 breeding season), Newton Harper (2016 breeding season and 2017/18 winter season), Alan Taylor (2017/18 winter season), Simon Pinder (2018 breeding season) and Chris Dodd (2018 breeding season). Gareth is an experienced ornithologist and has undertaken numerous ornithological impact assessments for onshore wind farms in Wales. He regularly undertakes bird survey work at sites throughout the UK and has completed monitoring of goshawk *Accipiter gentilis* on behalf of the British Trust for Ornithology, held licences allowing nest monitoring of other Schedule 1 raptors, and is an active bird ringer. He is experienced in managing large ornithological data sets for wind farm and overhead line projects, and has particular expertise in the use of excel and GIS in managing large data sets.

6.4.28 Roger has over 15 years' experience in a senior consultancy role managing projects that have a significant element requiring impact assessment (EIA and HRA) or have the potential to go to Public Inquiry or Hearing. A large proportion of his consultancy advice, to both the private and public sector, has been on assessing large infrastructure developments including wind farms (both onshore and offshore). Prior to working in environmental consultancy, Roger was employed by the RSPB working, over a period of 15 years, on reversing the declines of farmland birds, leading the team that advised on habitat management, providing technical support to casework staff responding to threats to sites important for birds and lobbying for changes to water and coastal management policies.

6.4.29 Simon is an experienced ornithologist with relevant survey experience extending back to 1995, most of which has involved work on Shetland. Simon has been a warden at a number of reserves throughout the UK, including Fair Isle in 2002. He is an experienced European Seabirds At Sea (ESAS) observer and trainer, and has surveyed breeding whimbrel on Shetland for the Viking Wind Farm development.

6.4.30 Michal is a very experienced ornithologist having over seven years' experience in environmental consultancy since moving to the UK from Poland. Michal has a strong focus on ornithology and has worked on a number of windfarm proposal throughout Scotland and is experienced in delivering all survey methods required to survey birds in all habitats in the UK. Michal is a highly qualified ecologist and keen naturalist and has volunteered for the RSPB.

6.4.31 Chris is a very experienced ornithologist and has worked on Shetland for 6 years (3 years on Noss and 3 on Fair Isle). He is a licenced bird ringer, and has volunteered for the RSPB. Chris also has experience of ecological consultancy work.

6.4.32 Newton has been based on Shetland since 2010, initially working for the RSPB before becoming a self-employed ornithologist. During his time on the Northern Isles, Chris has gained extensive experience of wind farm work on both Shetland and Orkney.

6.4.33 Allan is a very experienced ornithologist having over six years' experience in environmental consultancy, with a strong focus on ornithology surveys for a variety of developers. He has seven years' experience working in conservation, primarily with birds, for the National Trust, Scottish Natural Heritage and non-profit organisations. Allan has significant field survey experience, having worked on over 20 proposed wind farm sites across Scotland, and is experienced in all survey methods required to survey birds in all habitats in the UK.

### *Limitations to Methods*

6.4.34 Survey work was led by industry standard guidance and agreed through consultation with SNH.

6.4.35 Survey for nesting birds west of the Proposed Development site during the 2016 breeding bird survey work did not extend to the coastal cliffs. This approach was agreed with SNH during consultation in February 2016. However, these areas were fully searched during the 2018 survey work and, therefore, a greater number of coastal breeding species, such as oystercatcher, redshank and Arctic tern *Sterna paradisaea*, were recorded during 2018 than in 2016. Given that it had been agreed by SNH that these areas did not require survey, and that birds breeding within these areas are unlikely to be affected (through disturbance or displacement) due to the large separation from the Proposed Development, it is not considered that this has resulted in a constraint on the survey results or on the assessment.

6.4.36 Apparent occupied territories of great skua *Stercorarius skua* and Arctic skua within the site and survey area were not recorded during the 2016 breturbineding bird survey work. However, these were recorded in 2018 breeding bird survey work by a competent ornithologist with extensive experience with skuas. The assessment is therefore informed by one year of territory data for skuas and is supported by flight activity data collected in 2016. It is therefore not considered that the absence of two years' of territory counts has resulted in a constraint on the survey results or on the assessment.

6.4.37 On the commencement of VP survey work in 2016, the turbines proposed were of standard dimensions (with a maximum tip height of 125 m) to those in the current Proposed Development (with a maximum blade tip height of 200 m). As a result, the maximum height band used to record flight time of target species during VP work was defined as *greater than 126 m*. Therefore, flights within the upper part of the collision risk height (126 m to 200 m) and flights above collision risk height (greater than 200 m) were not separately recorded. This has not resulted in a constraint on the assessment, but has resulted in a greater number of flights being input to the collision risk model. The model output for collision risk of all species is likely to be slightly exaggerated as a result.

6.4.38 A small section of the Proposed Development site extends outside of the Survey Area for breeding waders at Dalsetter and includes part of the site access, a construction compound and a borrow pit search area. However, the area was surveyed for breeding raptors, and the majority was overlooked by VP survey. Therefore, any regular use of this area by breeding waders will have been identified during raptor and VP work, and it is considered that the absence of breeding wader walkover data for this area has not resulted in a constraint on the assessment.

## *EcIA Assessment Process*

6.4.39 The evaluation and assessment within this chapter has been undertaken with reference to relevant parts of the 2018 Guidelines for Ecological Impact Assessment in the United Kingdom developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, September 2018). Although this is widely considered to represent best practice for ecological assessment, the guidance itself recognises that it is not a prescription about exactly how to undertake an ecological impact assessment (EcIA); rather, it aims to "provide guidance to practitioners for refining their own methodologies".

### Important Ecological Features

6.4.40 A first step in EcIA is the determination of which ecological features (habitats, species, ecosystems and their functions/processes) are important. Important features should be subject to detailed assessment if they are likely to be affected by a Proposed Development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and / or resilient to project effects, such that there is no risk to their viability.

6.4.41 Ecological features can be important for a variety of reasons. Importance may relate, for example, to the quality or extent of designated sites or habitats, to habitat/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline.

### Evaluation: Determining Importance

6.4.42 The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case:

- International: European.
- National: United Kingdom.
- Country: Scotland.
- Regional: Shetland.
- County: Yell.
- Local: mid and north Yell.

- Site (the red line application boundary of the Proposed Development).

6.4.43 Taking into account the CIEEM guidance, features of less than Local importance are generally considered unlikely to trigger a mitigation or policy response in EcIA terms. However, where it is helpful to characterise and evaluate features within the site, this assessment also uses the term "site importance". This includes features which are assessed to be of value only in the context of the site (and its immediate zone of influence). Features of site importance are typically unlikely to require further assessment for the reasons set out above.

**Characterising and Quantifying Effects and Assessing their Significance**

The CIEEM (2018) guidelines state that ecological effects or impacts should be characterised in terms of ecosystem structure and function and reference should be made to: beneficial, adverse or neutral effects; extent; magnitude; duration; reversibility; timing and frequency; and cumulative effects. The guidelines provide a list of "aspects of ecological structure and function to consider when predicting impacts and effects" (Box 16). The terms impact and effect are used within this chapter in accordance with the following definitions (as provided by the guidelines):

- Impact: Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing an area of grassland.
- Effect: Outcome to an ecological feature from an impact. For example, the effects on a curlew population from loss of an area of grassland.

Following the characterisation of effects, an assessment of their ecological significance is made. The guidelines promote a transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued.

**Significant Effects**

6.4.44 The decision about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation and / or policy (CIEEM, 2018).

6.4.45 Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of this assessment, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'. A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. The EcIA guidelines (CIEEM, 2018) state that "A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant adverse ecological effects can be lawfully permitted following EIA procedures". The assessment of significance is based on professional judgement.

**Mitigation**

6.4.46 Where significant effects have been identified, the mitigation hierarchy has been taken into account, as suggested in the 2018 EcIA Guidelines, which set out a sequential approach of avoiding significant effects where possible, applying mitigation measures to minimise unavoidable significant effects and then compensating for any remaining significant effects. Once avoidance and mitigation measures, and any necessary compensation measures, have been applied, and opportunities for enhancement incorporated, residual significant effects have then been identified. This approach is reflected across UK planning policy at a national level.

6.4.47 Where mitigation and compensation has been proposed, this is proportionate with the geographical scale at which an effect is significant. When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. "For example, mitigation and compensation for effects on a species population significant at a county scale should

ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved" (CIEEM, 2018 Paragraph 5.28).

**Ecological Zone of Influence**

6.4.48 The Ecological Zone of Influence (EZoI) is defined as the area within which there may be ecological features subject to effects from the Proposed Development. Such effects could be direct, e.g. habitat loss resulting from land-take, or indirect, e.g. noise or visual disturbance causing a species to move out of the EZoI. The EZoI was determined through:

- Review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- Identification of sensitivities of ecological features, where known;
- The outline design of the Proposed Development and approach to construction; and
- Through liaison with other technical specialists involved in the assessment, e.g. hydrologists and noise specialists.

6.4.49 A 10 km EZoI has been adopted for the species considered in this assessment as it encompasses all sites that could potentially be affected by those impact mechanisms that are most wide-ranging. Potential impact mechanisms are:

- Habitat loss and disturbance;
- Noise / vibration related disturbance;
- Visual disturbance;
- Increased mortality.

6.4.50 Habitat loss and disturbance is only likely to have an effect on receptors within or close to the Site boundary. With the exception of the access track that runs north from Basta Voe, all other infrastructure will be at least 200 m from the Site boundary. As the nearest European site is 0.3 km to the south-east of the Site (Bluemull and Colgrave Sounds pSPA) it is considered very unlikely that habitat loss and disturbance will occur within this or any other European site.

6.4.51 Noise and vibration related disturbance is only likely to have an effect on receptors within an EZoI that is defined by the spatial extent over which noise and vibration impacts are predicted to arise. An assessment of noise related impacts has concluded that any effects will either be neutral or minor for all Noise Sensitive Receptors[13] during the construction and decommissioning phases of the Proposed Development (Energy Isles Wind Farm Environmental Statement, Chapter 8 Noise, Table 8.16). The same conclusion is reached for the operational phase of the development (Energy Isles Wind Farm Environmental Statement, Chapter 8 Noise, Table 8.18).

6.4.52 Similarly the extent of visual impacts will also be limited by the distance over which people and machinery might be seen. This is likely to be constrained by topography and vegetation and, taking a precautionary view, this is unlikely to extend more than 1 km.

6.4.53 Whilst noise, vibration and visual disturbance effects arising from the development are likely to be limited in their spatial extent, a further consideration is the mobility of birds. For example, qualifying species from European sites may fly across the Site or utilise habitats within the Site, i.e. the Site includes land that is functionally linked to a European site. It is therefore possible that qualifying birds that visit the Site or commute across it could be affected by the Proposed Development, thereby affecting the integrity of a European site.

6.4.54 A 10 km EZoI is considered to be precautionary as the identified impact mechanisms are unlikely to extend this far. If birds are breeding within the Proposed Development site it is reasonable to

[13] Noise Sensitive Receptors identified within Chapter 8 of the Energy Isles Wind Farm Environmental Statement are either single dwellings or representative of a group or cluster of dwellings

suggest they will typically use areas within 10 km of it for provisioning: if birds range beyond 10 km this is likely to be to areas of sea as opposed to land.

6.4.55 A 10 km EZoI is also considered to be precautionary with reference to industry guidance for assessing the impacts of proposed wind farm developments on birds (SNH, 2017). The SNH guidance states: 'depending on the species using the area, there may be a need for further species or species group-specific survey to establish nest, roost or display sites up to 6 km from the proposed development site'. In the case of red-throated diver the recommended survey area is 1 km.

**Collision Risk Analysis**

6.4.56 The risk of birds colliding with operating wind turbines has been assessed using the methods described by Band et al (2007).

6.4.57 Prediction of collision risk involves extrapolation of flight-data obtained during VP surveys, to calculate the number of flights likely to occur through the rotor swept area when the Proposed Development becomes operational. There are two variations of the model: the first assumes that flight activity occurs randomly across the airspace (and is applicable to many raptors); the second assumes that flights are direct and well defined (and is often most applicable to swans and geese).

6.4.58 The analysis follows the following process:

- Bird flights for which data can be used to model collision risk are identified (i.e. those within the flight risk area).
- The length of time that each flight occurred within the collision risk volume is determined.
- The proportion of time that each species might occupy the collision risk volume in a year period is calculated.

6.4.59 Worked collision risk analysis for target bird species is contained in Appendix 6.1.

# 6.5 Baseline Conditions and Evaluation of Resources

6.5.1 This section sets out the findings of consultation, baseline ornithological survey work and desk study. It then goes on to assess the interest of the identified ecological resources.

6.5.2 It has been possible to "scope out" of the assessment, at this stage, some species that are not likely to be significantly affected (for example by virtue of the design or operation of the Proposed Development, or because they are very commonplace and / or of very low conservation value) unless there are other reasons to consider them further (for example, they may be legally protected or require special care and therefore require particular mitigation measures to be adopted when developing or operating the Proposed Development site).

6.5.3 For birds, the decision as to whether to scope species in or out of further assessment considers their known susceptibility to collision with wind turbines, their importance in nature conservation terms, and their level of use of the turbine locations and the airspace above them based on survey and desk study.

6.5.4 Where it has been possible to scope out a particular receptor, the rationale for doing so is outlined in the following text.

### *Designated Sites*

6.5.5 The desk study identified 13 statutory sites of nature conservation interest within 10 km of the Proposed Development site. These include: four Special Protection Areas (SPAs), one Marine Protection Area (MPA), and ten Sites of Special Scientific Interest (SSSIs), and are presented below in Table 6.2. There are no RAMSAR sites within 10 km of the Proposed Development site. The locations of these statutory sites are presented in Figure 6.3.

**Table 6.2 - Nature Conservation Designations (bird related sites only) within 10km of the Proposed Development site**

| Name | Designation | Qualifying interest/Designated Feature | Distance (km) /Bearing from Site Boundary |
|---|---|---|---|
| Fetlar to Haroldswick | MPA | Supporting (foraging) habitat for black guillemot *Cepphus grille*)#. | Adjacent, SE |
| Bluemull and Colgrave Sounds | pSPA | Supporting (foraging) habitat for red-throated diver. | 0.3 SE |
| East Mires and Lumbister | SSSI | Blanket bog habitats supporting a nationally important assemblage of moorland breeding birds. | 2 S |
| Otterswick and Graveland | SPA | Red-throated diver (breeding), 27 pairs representing at least 2.9% of the breeding population in Great Britain (1992-1996). | 3 SW |
| Graveland | SSSI | Supports a nationally important breeding population of red-throated diver, with around 1% of the British breeding population. | 3.1 SW |
| Fetlar | SPA | Supporting populations of European importance of Annex I species:<br>Arctic Tern , 520 pairs representing at least 1.2% of the breeding population in Great Britain (three year mean, 1994-1997)<br>Red-necked Phalarope *Phalaropus lobatus*, 30 pairs representing at least 75.0% of the breeding population in Great Britain (count, as at mid-1990s)<br>Supporting populations of European importance of migratory species:<br>Dunlin, 90 pairs representing at least 0.8% of the breeding Baltic/UK/Ireland population (count, as at late 1980s-early 1990s)<br>Great Skua, 512 pairs representing at least 3.8% of the breeding World population (count, as at 1992)<br>Whimbrel, 65 pairs representing <0.1% of the breeding Europe/Western Africa | 3.9 SE |

| Name | Designation | Qualifying interest/Designated Feature | Distance (km) /Bearing from Site Boundary |
|---|---|---|---|
| | | population (count, as at late 1980s-early 1990s).<br><br>Supporting a seabird assemblage of international importance: 22,000 individuals including: Arctic Skua, fulmar *Fulmarus glacialis*, great skua, Arctic tern, red-necked phalarope. | |
| Herma ness, Saxa Vord and Valla Field | SPA | Supporting populations of European importance of Annex I species:<br><br>Red-throated diver, 28 pairs representing at least 3.0% of the breeding population in Great Britain (1994-1996)<br><br>Supporting populations of European importance of migratory species:<br><br>Gannet *Morus bassanus*, 12,000 pairs representing at least 4.6% of the breeding North Atlantic population (count, as at 1994)<br><br>Great skua 630 pairs representing at least 4.6% of the breeding world population (count, as at 1997)<br><br>Puffin *Fratercula arctica*, 25,400 pairs representing at least 2.8% of the breeding population (count, as at 1987)<br><br>Supporting a seabird assemblage of international importance: 52,000 individual seabirds including: common guillemot (*Uria aalge*), kittiwake *Rissa tridactyla*, shag *Phalacrocorax aristotelis*, fulmar, puffin, great skua and gannet. | 6.1 NE |
| Valla Field | SSSI | Supports nationally important numbers of breeding red-throated diver, representing almost 2% of the British population and great skua representing 1.6% of the British population. | 6.1 NE |
| Hascosay | SSSI | Blanket bog habitats supporting high densities of breeding dunlin. | 6.4 SE |
| North Fetlar | SSSI | Breeding bird assemblage including around 20% of the total British population | 6.5 SE |

| Name | Designation | Qualifying interest/Designated Feature | Distance (km) /Bearing from Site Boundary |
|---|---|---|---|
| | | of whimbrel around 3% of the British population of great skua and 4% of the British population of Arctic skua. Other breeding species include red-throated diver, rednecked phalarope, dunlin, snipe, golden plover and lapwing.<br>A population of Arctic tern is also present within the SSSI, which fluctuates considerably from year to year. | |
| Hill of Colvadale and Sobul | SSSI | Large aggregations of whimbrel (about 2.8% of the British breeding population) and Arctic skua (about 1.6% of the British breeding population). Dunlin, curlew and golden plover also breed. | 7.2 E |
| Easter Loch | SSSI | Whooper swan *Cygnus cygnusi* (non-breeding) | 7.4 E |
| Lamb Hoga | SSSI | Notified as part of Fetlar SPA for the following species: Arctic skua (breeding), Arctic tern (breeding), dunlin (breeding), fulmar (breeding), great skua (breeding), red-necked phalarope (breeding), whimbrel (breeding). | 9.5 SE |

6.5.6 SPAs are of **International (European)** and SSSIs and MPAs of **National (United Kingdom)** Importance. This reflects the role of SPAs in maintaining a network of internationally important sites for biodiversity (the Natura 2000 network established under the EC Habitats and Birds Directives), the role of SSSIs in providing the best examples of the UK's flora, fauna, or geological or physiographical features (notified under the Wildlife and Countryside Act 1981), and MPAs in managing and protecting Scotland's seas (designated under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009).

6.5.7 All but one of the sites listed in Table 6.3 above are classified (in the case of SPAs) or notified (in the case of SSSIs) for species of birds that have been recorded using the Proposed Development site. The exception is the Fetlar to Haroldswick MPA which has been notified as supporting habitat for black guillemot. This species typically nests among rocks at the base of cliffs and forages on open sea. It is possible that the cliffs on the western coast of Yell support breeding black guillemot; however, the species has not been recorded within the Survey Area during work in 2016, 2017 and 2018 and, if present locally around the coast, would not be expected to pass over the site at all. Impacts on the features of the Fetlar to Haroldswick MPA are therefore very unlikely, and the site is **not considered further** in this assessment.

6.5.8 The Easter Loch SSSI is notified for its wintering population of whooper swan. Although survey work at the Proposed Development site has recorded whooper swan, observations of this species were limited to one flight of two birds, and two observations (of two birds and one bird respectively) in areas beyond 900 m of the site boundary during the spring passage period (see following section). Given the low recorded use of the area surrounding the Proposed Development site, it is considered

unlikely that whooper swans regularly use the site, or the airspace over it. In addition, the separation distance between the site and SSSI (7.4 km) will limit any functional linkage between the two areas, and impacts on the SSSI as a result of the Proposed Development are unlikely to occur. Therefore, the Easter Loch SSSI is **not considered further** in this assessment.

## *Species*

### Wildfowl

Greylag Goose

6.5.9 Greylag geese *Anser anser* were the most frequently encountered large wildfowl during the work, and were recorded throughout the survey period. A total of 154 flights totalling 475 individuals were recorded during the VP surveys with a peak count of 17 birds recorded on 03 November 2017. The total recorded flight time for greylag goose was 3 hours, 9 minutes and 33 seconds, of which 40 minutes and 31 seconds was spent within the Collision Risk Volume [14]. Flight activity was greatest around the Hill of Bakkanlee in the northern part of the Proposed Development site, with birds recorded making regular flights between the Hill and Gloup Voe. Other localised concentrations of activity were recorded around lochans in the south-western part of the site, and up to 3 km beyond the southern site boundary. Greylag goose flightlines are presented in Figure 6.4.

6.5.10 A maximum count of 31 territories was recorded within the Survey Area[15] (22 of which were recorded within the Proposed Development site) during breeding bird walkover surveys in 2018 (Figure 6). Forty-three territories were recorded within the Survey Area[16] during the 2016 survey work (21 within the site). Greylag goose territory locations are presented in Figure 6.4.

6.5.11 Greylag goose were recorded on both winter walkover survey visits in 2017/18. Two birds were recorded on Gossa Water during the first visit in November 2017. All other winter records were beyond the Proposed Development site boundary: seven groups south of the site around Dalsetter, and three north of the site at North Neaps. A maximum count of 19 birds was recorded on the Loch of Colvister (approximately 2 km south of the site) in November 2017. The location of wintering greylag goose registrations are presented in Figure 6.31.

6.5.12 SBRC provided 30 records of greylag goose from within 5 km of the Proposed Development site boundary since 2010. The largest flocks were present at Breckon (72 birds in September 2011, approximately 1 km north-east of the site), and Lund (on Unst) (including counts of 86 and 70 birds, both November 2013, approximately 3.6 km north-east of the site). The record at Breckon is the closest to the site boundary, with additional records within 2 km at Gloup, approximately 1.4 km north of the site (42 birds in September 2011); Stonganess, approximately 1.7 km east of the site (1 pair, probable breeding in 2014); and Selafirth, approximately 2 km south of the site (40 birds, in September 2011).

6.5.13 Greylag goose is a fairly common resident breeding and wintering bird on Shetland (SBC, 2018), with counts of 3121 birds recorded in winter (Mitchell & Brides, 2017; count during November 2016). The species has seen an increase in range of 748 % recorded between the 1968-72 Breeding Bird Atlas, and the 2007-2011 Bird Atlas (Balmer *et al*, 2013). Balmer *et al* state that increases in wintering range are particularly noticeable in Orkney and Shetland, with a reported rate of increase on Shetland of approximately 17 % to 20 % per annum (Harvey *et al*, 2012). Greylag goose is likely to be in Favourable Conservation Status in Shetland.

[14] All flights durations provided in this text relate to the summed duration of each flight, and do not account for the number of birds in each flight. For the purpose of collision risk analysis, the duration of each flight is multiplied by the number of birds in the flock giving a sum of the total flight time for all individuals.

15 An additional 24 territories were recorded beyond 500 m of the Proposed Development site.

16 An additional two were noted at approximately 1 km and 1.3 km south of the site respectively

6.5.14 Greylag goose is Amber listed (Hayhow *et al*, 2017) on account of non-breeding localisation[17] and non-breeding population of international importance[18] within the UK. Musgrove *et al* (2013) gives UK population estimates of 46,000 breeding pairs, and 230,000 wintering individuals. The European population size is estimated to be 259,000-427,000 breeding pairs, and 825,000-1,180,000 wintering individuals (BirdlLife International, 2004).

6.5.15 A peak count of 22 breeding pairs and 503 wintering birds within the Survey Area represents approximately 0.05 % and 0.2 % of the UK breeding and wintering population respectively; and 0.01 % and 0.06 % of the European breeding and wintering population respectively.

6.5.16 It is likely that wintering birds on Shetland are part of the Icelandic population, which has been estimated at 90,471 individuals during a count in 2016 (Mitchell & Brides, 2017). The birds recorded within the Survey Area may therefore represent 0.6 % of the Icelandic population. Mitchell & Brides (2017) suggest that hunting of this species in Iceland (around 30,000 to 60,000 birds are shot annually) and a recent increase in the number of birds shot in Orkney, has levelled the population at 80,000 to 100,000 birds.

6.5.17 Given the size and expansion of the Regional (Shetland) and National (UK) populations of greylag goose, and implemented population controls, it is unlikely that the site has more than a **Local** level importance for greylag goose.

Barnacle Goose

6.5.18 A flight of 26 barnacle geese *Branta leucopsis* was recorded on 8th October 2017 during VP surveys. The flock was recorded heading south-west from Gossa Water in the south-western part of the site and was timed at 140 seconds entirely below collision risk height. No further observations of this species were made during the work in 2016 or 2017/2018.

6.5.19 No records were returned by SBRC for barnacle goose.

6.5.20 Barnacle goose is a fairly common migrant on Shetland (SBC, 2018), with an estimated peak abundance of 32 birds within the Shetland NHZ (Wilson *et al*, 2015).

6.5.21 Barnacle goose is included in Annex I of the EC Birds Directive[19] and is Amber listed in the UK (Hayhow *et al*, 2017). The UK wintering population is estimated to be 94,000 (Musgrove *et al* 2013) and the European population size is estimated to be 633,000-804,000 wintering individuals (BirdlLife International, 2004).

6.5.22 Given the infrequency of recorded use of the Survey Area by barnacle geese, it is unlikely that this species passes through the airspace over the Proposed Development site with any regularity. The recorded flight was not noted to pass within collision risk distance of the nearest turbine (approximately 940 m distant from the nearest turbine centre) and, therefore, collision risk cannot be assessed for this species. The importance of the site for this species is likely to be **negligible**. Barnacle goose is **not considered further** in this assessment.

Whooper Swan

6.5.23 Two whooper swan *Cygnus Cygnus* were recorded in a flight on 03 November 2017 during VP surveys. The flight was recorded for 125 seconds entirely below collision risk height, approximately 700 m south of the site boundary. Low numbers (two birds in April 2016 and one in April 2018) were recorded within the Survey Area during breeding bird walkover surveys. These were located at Beena Water (approximately 930 m south of the Proposed Development site boundary) and at the Lochs of Lumbister (approximately 2.2 km south of the site boundary) respectively. No birds were noted within the site boundary during the work.

[17] Species were considered localised if more than 50% of the UK population was found at ten or fewer sites in the non-breeding season

[18] Species were considered of international importance if the UK holds at least 20% of the European population in the wintering season

[19] Directive on the Conservation of Wild Birds 79/409/EEC. Adopted by EU member states in 1979 and amended in 2009.

6.5.24 SBRC provided fifteen records of whooper swan from within 10 km of the Proposed Development site since 2010. The largest flocks were present at Kirk Loch near Breckon approximately 1.8 km north-east of the site (including a count of 26 birds in October of 2010 and counts of 31 and 23 birds both in November 2010). A further seven records (between 2010 and 2017) were returned for this same location, with counts ranging from 13 to 19 birds. The records at Kirk Loch near Breckon are the closest to the site boundary, and there is one additional record within 2 km at Sellafirth approximately 1.8 km south-east of the site (10 birds in February 2010).

6.5.25 Whooper swan is a scarce breeding resident and fairly common migrant and winter visitor on Shetland (SBC, 2018), with an estimated peak abundance of 32 birds within the Shetland NHZ (Wilson *et al*, 2015). A range increase of 35 % is reported for this species in the UK between the 1968-72 Breeding Bird Atlas, and the 2007-2011 Bird Atlas (Balmer *et al*, 2013). Balmer *et al* states that confirmed breeding on Shetland could reflect an increase in the Icelandic breeding population and expansion of range. Whooper swan are a notified feature of the Easter Loch SSSI which is approximately 7.2 km east of the site on Unst. The SSSI citation indicates that Easter Loch has regularly held more than 1 % of the British wintering population of whooper swan. Robinson *et al* (2004) indicates that between 50 and 100 birds had been present during counts in 1995/1996 and 1999/2000. Robinson *et al* (2004) also states that Yell supports a passage flock of around 30 birds during peak periods. Whooper swan is likely to be in Favourable Conservation Status in Shetland.

6.5.26 Whooper swan is protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) and included in Annex I of the EC Birds Directive. It is also Amber listed in the UK (Hayhow *et al*, 2017). The UK wintering population of whooper swan is 15,000 individuals (Musgrove *et al* 2013), and the European population size is estimated to be 25,300-32,800 breeding pairs and 99,500-136,000 wintering individuals (BirdlLife International, 2004).

6.5.27 The timing of the observations made within the Survey Area, and information presented by Robinson *et al* (2004), suggest that the birds recorded during the survey work were on passage and did not overwinter on the site. The level of activity within the airspace over the Proposed Development site is insufficient to allow a valid assessment of collision risk to be made for whooper swan, and it is unlikely that birds overwintering on Easter Loch regularly pass over the site. Therefore, despite the national protection of whooper swan, the importance of the site for this species is likely to be **negligible**. Whooper swan is **not considered further** in this assessment.

Goldeneye

6.5.28 Goldeneye *Bucephala clangula* were recorded on lochans twice during VP surveys in April and June 2018; however, no flights were recorded for this species. Birds were also recorded during breeding bird walkover surveys in May 2018 and a wintering bird walkover survey on 26 and 27 February 2018 (two birds at Sandy Water, approximately 1.1 km south of the site). Goldeneye are a common winter visitor on Shetland (SBC, 2018) with occasional sightings into late July and August likely to be of wandering individuals (Pennington *et al*, 2004).

6.5.29 Three records were returned by SBRC for goldeneye. The records are all located at Kirk Loch near Breckon, approximately 1.8 km north-east of the Proposed Development site (including counts of 20 birds in December 2012, 20 birds in December 2015 and 21 birds in November 2016).

6.5.30 Goldeneye is Amber listed in the UK (Hayhow *et al*, 2017). Shetland supports over 1% of the UK wintering population of goldeneye, which has a small but rapidly expanding breeding population in Scotland owing to the provision of nest boxes at suitable lochs (Pennington *et al*, 2004). The absence of suitable nesting locations (trees with suitable cavities or nest boxes) on Shetland precludes breeding by this species. The recorded low level use of the Proposed Development site by wandering birds during the spring, and absence of winter period observations suggest that this species is unlikely to use the site regularly. Therefore, the importance of the site for goldeneye is likely to be **negligible**. Goldeneye is **not considered further** in this assessment.

Red-breasted merganser

6.5.31 One flight of red-breasted merganser was recorded within 500 m of the Proposed Development site on 02 July 2018. A further three flights of this species were recorded around lochans to the south of the Survey Area between June and July 2018. One bird was recorded on Gossa Water in the south-

western part of the site, and a further three were recorded within the Survey Area (but beyond the site boundary) during breeding bird walkover survey in 2018. Two birds were recorded at Gossa Water during a winter walkover survey in February 2018. Four birds were also noted at Mares Pool (adjacent to the northern boundary of the site) during winter walkover survey in November 2017, and two birds were present in the same location during walkover in February 2018.

6.5.32 SBRC returned nine records of red-breasted merganser within 10 km of the Proposed Development site since 2003. All records relate to breeding pairs, the nearest of which is at Stonganess approximately 1.5 km east of the site.

6.5.33 Red-breasted merganser is a scarce breeding resident on Shetland (SBC, 2018). Breeding population estimates (pairs) of red-breasted merganser are 2400 (UK) and 70,100-120,000 (Europe) (Musgrove *et al* 2013; BirdlLife International, 2004).

6.5.34 The low level of activity reported during the survey work suggests that red-breasted merganser use the lochans on and adjacent to the Proposed Development site in low number during the breeding season. However, breeding is unlikely to have occurred in 2016 and 2018. No flights of this species were recorded over the site during the VP work. The importance of the site for red-breasted merganser is likely to be **negligible** and this species is **not considered further** in this assessment.

Eider

6.5.35 Four pairs of eider were recorded in the southern part of the Survey Area: one pair on each of Stony Water, Beena Water and Sandy Water, approximately 850 m south of the site, and one pair at the Lochs of Lumbister, approximately 2.2 km south-west of the Proposed Development site. Eider were not recorded breeding within the site

6.5.36 SBRC returned nine records of eider from within 10 km of the Proposed Development site since 2012. The number of birds observed range between 117 and 1,118 individuals. The records are all located south-east of the site, the nearest of which are at North Sandwick approximately 3.9 km from the site boundary.

6.5.37 Eider is a common breeding resident on Shetland (SBC, 2018) and Amber listed in the UK (Hayhow *et al*, 2017). Breeding population estimates (pairs) are 27,000 (UK) and 791,000-955,000 (Europe) (Musgrove *et al* 2013; BirdLife International, 2004). Eider are a Shetland LBAP species. The Species Action Plan for eider states that the main factors of population decline are: oil spills, disturbance, predation (of nesting females and chicks), mussel farming, and fish farming.

6.5.38 The level of activity reported during the survey work suggests that eider is likely to breed locally, but no evidence of breeding was recorded within the site. No flights of eider were recorded over the site during the VP work. The importance of the Proposed Development site for eider is likely to be **negligible** and this species is **not considered further** in this assessment.

Mallard

6.5.39 Three pairs of mallard *Anas platyrhynchos* were recorded breeding on lochans within the Proposed Development site during breeding bird walkover survey work in 2018, and an additional three pairs were recorded outside of the Survey Area. No records were returned by SBRC for mallard.

6.5.40 Mallard is a common breeding resident on Shetland (SBC, 2018) and Amber listed in the UK (Hayhow *et al*, 2017). Breeding population estimates (pairs) of mallard are 61,000–146,000 (UK; Musgrove *et al* 2013) and 2,850,000-4,610,000 (Europe: BirdlLife International, 2004).

6.5.41 Given the status of the breeding populations of mallard on Shetland and in the UK, the extensive availability of suitable breeding lochans available locally, and the low-level use of the Proposed Development site recorded for this species during the survey work, the importance of site for mallard is likely to be at the level of the **Site**.

**Divers**

Red-throated Diver

6.5.42 Red-throated diver was frequently recorded throughout the Proposed Development site between April and September either from vantage point surveys or during the breeding bird walkover surveys.

6.5.43 A total of 417 flight lines (totalling 669 flights by individuals) were recorded during VP survey work, all flights were recorded between 05 April 2016 to 01 September 2016, and 30 March 2018 to 24 August 2018. Red-throated divers were recorded in flight for a total of 12 hours, 23 minutes and 16 seconds; of which, 6 hours, 11 minutes and 20 seconds (90 flights) was spent within the Collision Risk Volume. Red-throated diver flight lines are presented in Figure 6.6.

6.5.44 A further 16 red-throated diver flight lines were recorded during the Red-Throated Diver VP Survey work (overlooking the Otterswick and Graveland SPA). Two birds were recorded heading north from the Whale Firth approximately 500 m east of the SPA boundary on 11 August 2016. However, it is unclear whether the birds entered the site or continued to follow the coastline beyond the VP viewshed. No other flights by red-throated diver were observed to head toward, or appear to originate from, the Proposed Development site. Eight flights were made by birds moving between the Whale Firth and the Otterswick and Graveland SPA; one flight was made by two birds heading west into Yell Sound from the SPA; and six flights were of birds making short flights entirely within the SPA. Flightlines recorded during the Red-Throated Diver VP Survey are presented in Figure 6.8.

6.5.45 Breeding Diver Survey work undertaken between May-August 2018 recorded a total of 258 flight lines (425 individuals). The combined duration of all flights was 7 hours, 41 minutes and 45 seconds[20].

6.5.46 Activity levels were greatest around Gossa Water and surrounding lochans in the south-western part of the Proposed Development site (118 flights), surrounding the Knowe of Houllanginga and Mare's Pool in the north-western part of the site (106 flights), and around Kussa Waters immediately beyond the north-eastern boundary of the site (32 flights).

6.5.47 The Breeding Diver Survey work recorded approximately 30 flights[21] that appeared to originate from or head towards the Basta Voe section of the Bluemull and Colgrave Sounds pSPA. One flight was recorded heading south from the Burn of Gossawater within the Proposed Development site and continuing into Basta Voe on 19 June 2018. An additional 77 flights recorded during VP survey work from VPs 1 to 6 were of birds moving between the site, or areas adjacent to it, and Basta Voe.

6.5.48 The majority of birds flying from lochans on Flonga Field in the northern part of the Proposed Development site were observed to head north onto Gloup Voe; those flying from Fulga Water and Grud Water in the southern part of the site, and from lochans at the Hill of Vigeon and Hill of Houllanginga in the western part of the site typically flew west to foraging waters west of Yell. Flightlines recorded during the Breeding Diver Survey work are presented in Figure 6.7.

6.5.49 The breeding bird survey work resulted in 10 confirmed pairs of red-throated diver in 2016 and 11 in 2018 (noted either with young or positively identified nest sites). Of these, four confirmed breeding pairs were recorded within the site (all in 2018). An additional 20 possible/probable diver territories (not confirmed breeding) were recorded within the Survey Area in 2016 (three within the site) and 13 recorded in 2018 (two within the site). One bird was recorded at Gloup Voe immediately beyond the northern boundary of the site during a winter walkover survey visit in early November 2017. The locations of confirmed and unconfirmed breeding red-throated diver are presented in Confidential Figure 6.32.

[20] This data has not been entered into the Collision Risk Analysis model as the methods with which the data were collected varied from those used for the flightline VP survey work. The aim of the focal breeding lochan work was to identify activity around known breeding lochans and provide supplementary information to compliment data obtained during the VP survey work.

[21] Inferred from the heading of recorded flightlines using Arc GIS

6.5.50 SBRC provided 140 records for red-throated diver from within 10 km of the Proposed Development site since 1994 (82 records since 2006). All of the records except for two are for a single pair of birds (the other two are for two pairs of birds).

6.5.51 Records included 18 pairs within the Proposed Development site (13 from 1994 and 5 from 2006), with breeding confirmed for all but one record. Twenty-six further records were returned within 2 km of the site between 1995 and 2017. These included: twenty records for breeding pairs, two records of pairs probably breeding and four records for pairs possibly breeding.

6.5.52 Red-throated diver is included in Annex I of the EC Birds Directive and protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended). Its breeding population in the UK is 1,300 pairs (Musgrove *et al* 2013) and in Europe is 42,100-93,000 pairs (BirdlLife International, 2004). The population of breeding red-throated diver in the Shetland NHZ is approximately 407 pairs (Wilson *et al*, 2015), which supports the highest density of breeding red-throated divers in the UK (33%) (Balmer *et al*, 2013). Red-throated diver is also a Shetland LBAP species. The species Action Plan states the current limiting factors on the Shetland population as: disturbance, predation, loch size, egg collectors, dropping water levels and lack of food supply. Species action plan objectives include the provision of artificial nest sites in lochs where development will affect the water levels.

6.5.53 Survey work on the Shetland population in 1983 indicated a population of 700 pairs (Gomersall *et al*, 1984), with declines noted by further surveys in 1994 with an estimate of 424 pairs (Gibbons *et al*, 1997). The largest declines during this period were observed on Yell (72 pairs, 52 %), with South Mainland and Fetlar showing stable numbers. However, Pennington *et al* (2004) indicates that increases in productivity have been observed on Yell between 1981 and 2000 (using Shetland Bird Ringing Club data), and a general trend of increasing breeding success noted on all monitored Shetland islands between 2007 and 2016 (SBC, 2018). Dillon *et al* (2009) suggest that the apparent decline of the Shetland breeding population observed since the 1983 estimate could reflect natural fluctuation in breeding activities between years, and is within the margin of error in the detection of breeding attempts by surveyors. National surveys completed in 2006 recorded a higher number of individual adults and lochs occupied on Shetland than in the 1994 surveys, indicating an overall increase in the population (Dillon *et al*, 2009). Increases in the number of breeding pairs were recorded on the Outer and Inner Hebrides (139.2 % and 143.8 % respectively), and on mainland Scotland (14.4 %) between the 1994 and 2006 surveys, giving an overall increase in the UK breeding population of 33.7 %. Despite these reported increases, more recent studies by Okill (2017) and O'Brien *et al* (2018) have reported poor breeding seasons and a decline in recent breeding success in all Northern Isles. The Conservation Status of red-throated diver in Shetland is therefore uncertain.

6.5.54 The Otterswick and Graveland SPA and Hermaness, Saxa Vord and Valla Field SPA (located approximately 3 km south-west and 6.1 km north-east of the Proposed Development site respectively) are classified for their breeding populations of red-throated diver. The SPA descriptions for these designated sites states that the Otterswick and Graveland SPA supports 27 pairs representing at least 2.9% of the breeding population in Great Britain (1994-1996); and Hermaness, Saxa Vord and Valla Field SPA supports 28 pairs representing at least 3.0% of the breeding population in Great Britain (1994-1996).

6.5.55 Red-throated divers have been shown to exhibit strong breeding site fidelity. Okill (1992) demonstrated that the majority of birds return to the same loch to breed, and those that didn't were found on the nearest suitable breeding loch (greatest distance of 1.05 km, closest 0.11 km of a sample of 24 birds). Dispersal of birds from their natal loch was found to be far greater in females than in males, with females dispersing up to 68 km and males up to 4.4 km (Okill, 1992). Recruitment of immature / 1$^{st}$ year birds to and from the SPA populations is therefore likely to occur. However, interchange between the Proposed Development site and SPA populations is likely to be dilute, and restricted to female birds. Stroud *et al* (2001) suggests that the populations of breeding red-throated diver within the Otterswick and Graveland SPA and Hermaness, Saxa Vord and Valla Field SPA are 27 and 28 pairs respectively. Taking a mean success of nests within monitored areas on Shetland between 2007 and 2016 (reported in SBC, 2018) as 0.58, the SPA birds will fledge approximately 31.9 birds per year, of which approximately half (16 birds) will be female. Dillon *et al*, (2009) indicate that 600 lochs were occupied by red-throated diver in Shetland during the 2006

National survey; on this basis, 1 female from the SPA populations may be recruited into each one of 600 lochs in Shetland once in every 37.5 years. This assumes that all lochs within Shetland are recruited to equally, that all fledged birds survive to breeding age and all return to Shetland which, of course, will not be the case. However, it does demonstrate the low likely functional linkage between the site and SPA populations. In addition, the Red-Throated Diver VP Survey work did not record regular flights between the Site and the Otterswick and Graveland SPA and, following review of this data, SNH have agreed (in their scoping response dated 15 December 2017; Appendix 4.4) that no impacts on the SPA are likely.

6.5.56 Further interchange of adult birds is unlikely (due to the species' tendency for site fidelity) and so the degree of functional linkage between the Proposed Development site and SPA populations is likely to be low.

6.5.57 The Bluemull and Colgrave Sounds pSPA has been selected as an important foraging area for breeding red-throated diver, falling within the foraging range of a high concentration of nesting birds in Yell and South Unst.

6.5.58 Survey work in 2016 and 2018 recorded birds moving between the Proposed Development site and the Bluemull and Colgrave Sounds pSPA, indicating that the population breeding within the site use the airspace over the pSPA, and possible forage within it. This supports survey work conducted by Black *et al* (2015) to inform selection of the pSPA, which recorded birds flying from north Yell to forage in Bluemull and Colgrave Sounds. Further radio tracking studies conducted by Black *et al* (2015) on mainland Shetland indicate that red-throated diver undertake regular foraging trips of up to 9 km from the nest site during the breeding season. Given this, red-throated divers breeding within the site may be within foraging flight range of all parts of the pSPA.

6.5.59 Given the high proportion of the UK population represented in Shetland, and the recorded activity within the Proposed Development site, it is considered that the site is of at least National (UK) Importance for red-throated diver. Despite the lack of a distinct linkage between the population within the site and the Otterswick and Graveland SPA or Hermaness, Saxa Vord and Valla Field SPA, birds within the site are likely to use the Bluemull and Colgrave Sounds pSPA and, therefore, the population within the Proposed Development site can be considered to form part of the pSPA population. On this basis, the site is likely to be of **International** (**European)** importance for red-throated diver.

**Waders**

Curlew

6.5.60 Curlew were recorded within the Proposed Development site throughout the survey period, with the majority of records occurring within the breeding season. A count of 52 flights, totalling 76 individuals (19 flights involved flocks of between 2 and 4 birds), were recorded during VP surveys. A total of 54 minutes and 46 seconds of flight time was recorded during the work; of which, 12 minutes and 30 seconds was recorded within the Collision Risk Volume. Flight activity was concentrated in the northern part of the site at the Hill of Bakkanalee and Sandwater Hill, at Gossa Water in the southern part of the site, and around Sandy Water, approximately 700 m south of the site. Curlew flightlines recorded during the VP work are presented in Figure 6.9.

6.5.61 A total of 22 breeding territories were recorded during the 2016 breeding bird walkover survey; of these, 11 were recorded within the Proposed Development site. Eleven of the total recorded breeding territories (six within the site) were indicated by birds singing or alarming during the April visit only (and not recorded on subsequent visits). These birds are likely to have failed to breed. Fourteen territories were noted during survey work in 2018, of which, four were recorded within the site. Curlew territories recorded during the breeding bird survey work are presented in Figure 6.10.

6.5.62 Curlew were recorded on both winter walkover survey visits, with groups of up to 12 birds present at Mares Pool (immediately north of the site boundary). A flock of seven birds were noted at the South Burn of Vigon in the north-eastern part of the Proposed Development site during the walkover visit on the 26 and 27 February 2018. Curlew registrations recorded during the winter walkover survey work are presented in Figure 6.10.

6.5.63 SBRC returned 84 records of curlew from within 10 km of the site since 1993. Most records were for counts of breeding pairs (or probable breeding) and apparently occupied territories. However flocks were recorded at Kirk Loch near Breckon approximately 1.8 km north-east of the Proposed Development site (six counts of 51 to 76 individuals between 2010 and 2017), Loch of Papi approximately 2.1 km north-east of the Site (75 birds in September 2010), and at Lund (on Unst) approximately 4.3 km north east of the site (60 birds in November 2010). Twenty-six records are from within 2 km of the site, located at Breckon, Cullivoe, Stonganess and Sellafirth. The nearest records are located at Loch of Brough approximately 0.4 km east of the site and include one breeding pair in 2006, and six probable breeding pairs between 2003 and 2009.

6.5.64 Curlew is Red listed in the UK (Hayhow *et al*, 2017) on account of its declining population throughout the British Isles. It is a common breeding resident on Shetland (SBC, 2018) with a current breeding population of 4,227 pairs in the Shetland NHZ (Wilson *et al*, 2015). The UK population is estimated to be 68,000 breeding pairs / 150,000 wintering individuals (Musgrove *et al* 2013); and 212,000-292,000 breeding pairs / 480,000-625,000 wintering individuals in Europe (BirdlLife International, 2004). Despite contraction of range of 17 % in Britain between the 1968-72 and 2007-2011 Bird Atlases, the population density in Shetland remains high (Balmer *et al*, 2013). The Conservation Status of curlew in Shetland is uncertain.

6.5.65 Breeding waders are included in the Shetland LBAP. The Action Plan includes objectives to prevent further declines of breeding wader populations, and to improve the condition and extent of wader breeding habitats.

6.5.66 Given the national declines of this species, breeding strongholds, such as Northern England, Eastern Scotland and the Northern Isles are of National Importance for this species. The number of territories recorded within the site and surrounding areas comprise approximately 1.2 % of the Shetland NHZ population. Therefore, it is reasonable to conclude that the site is of importance for curlew at a **National (UK)** Level.

Whimbrel

6.5.67 Whimbrel were recorded during VP survey work in May and July 2016 and in August 2018. Thirteen flight lines (involving a total of 69 individuals) were recorded, with peak counts of 14 and 21 birds noted on 03 August 2018. A total flight time of 7 minutes and 54 seconds was recorded, of which 6 flights with a combined duration of 4 minutes and 52 seconds passed within the Collision Risk Volume. Whimbrel flightlines recorded during VP survey work are presented in Figure 6.11.

6.5.68 Three breeding territories (one in 2016 and two in 2018) were recorded at the Lochs of Lumbister approximately 2 km south of the Proposed Development site during the breeding bird survey work. Whimbrel territories recorded during breeding bird survey work are presented in Confidential Figure 6.33.

6.5.69 SBRC returned 51 records for whimbrel within 10 km of the Proposed Development site since 1992. All records relate to breeding pairs or apparently occupied territories. One apparently occupied territory record was reported from within the site boundary (located in the north-west corner of the site) dated 2002. A further eight records are from within 2 km of the site boundary, including records of seven breeding pairs to the north, east and south of the Site (recorded between 1992 and 2005), and one record of an apparently occupied territory (in 2002) approximately 0.2 km west of the Site.

6.5.70 Whimbrel is a Schedule 1 species listed in the 1981 Act. Whimbrel breed throughout the tundra of northern Europe, with a population of 343,000-402,000 pairs (BirdlLife International, 2004). The UK population is estimated to be 400-500 pairs (Musgrove *et al*, 2013),

6.5.71 The breeding range of whimbrel in the UK is restricted to northern Scotland, with 76% of the range confined to the Shetland Islands (Balmer *et al*, 2013). The estimated population within the Shetland NHZ is 290 pairs (more than 50 % of the UK population); however, numbers in outlying parts of mainland Shetland are likely to have been under-represented in this estimate (Wilson *et al*, 2015). Pennington *et al* (2004) suggest that the highest densities are found on Unst and Feltar which have historically supported 106-115 pairs (Unst) and 70-81 pairs (Feltar). Yell has supported small numbers, with a peak of 39 pairs reported in the 1980's (Pennington *et al*, 2004). The UK population

is declining (Richardson, 1990) and thought to be susceptible to climate change (Wilson *et al*, 2015). The Conservation Status of whimbrel is, therefore, likely to be unfavourable. However, studies of whimbrel on Shetland undertaken by Grant (1991, 1992) have shown that whimbrel nest in densities as high as elsewhere in their European range, and consistently fledged large numbers of chicks – in excess of that needed to balance adult mortality.

6.5.72 Whimbrel is a qualifying feature of the Fetlar SPA (supporting 65 pairs; <0.1 % of the International population). The SPA is 3.9 km south-east of the site. Given the proximity of the Proposed Development site to the SPA, it is possible that the local population recruit into the SPA population (and *vice versa*). However, given the low local population (as indicated through survey work and desk study data), local recruitment of SPA birds is likely to be infrequent. In addition, adult whimbrel show a high degree of site fidelity (Grant, 1991, 1992) further limiting the likelihood of a functional linkage between the site and the Fetlar SPA.

6.5.73 Despite the low level of activity recorded for whimbrel during the survey work, the Proposed Development site is likely to be of value owing to its location within the species' core UK breeding range. Impacts on whimbrel at the site may result in UK level effects since the local population is likely to form a significant proportion of the National population. The site is therefore considered to be of importance for whimbrel at the **National (UK)** level.

Dotterel

6.5.74 Two dotterel *Charadrius morinellus* were recorded during the breeding bird walkover survey in May 2018 near the Burn of Blackies Glen in the western part of the Proposed Development site. No breeding attempts were recorded within the survey area. No records were returned by SBRC for dotterel.

6.5.75 The Shetland bird report (SBC, 2018) state that dotterel are a very scarce migrant in Shetland, with recent records including juveniles on Yell during October 2015 (SBC, 2017). SBC (2017) indicates that the only previous record on Yell was in August 1987. Dotterel is a Schedule 1 and Annex I species (respectively under the 1981 Act and the Birds Directive), and Red listed in the UK (Hayhow *et al*, 2017). The UK population of dotterel is declining (by approximately 57% between 1987/88 and 2011) and thought to continue this trend due to the effects of climate change (Hayhow *et al*, 2017). However, despite its status in the UK, the very limited use of the site by dotterel suggests that the site it is likely to be of negligible importance for the species. Dotterel are therefore **not considered further** in this assessment**.**

Dunlin

6.5.76 Dunlin were only recorded during the breeding season with a total of 19 flights (24 individuals) recorded during VP survey work. A total of 8 minutes and 49 seconds of flights were recorded during the VP work, 1 minute 2 seconds of which was recorded within the Collision Risk Volume over two flights (both involving single birds). Dunlin flightlines recorded during VP survey work are presented in Figure 6.12.

6.5.77 Breeding bird walkover survey work recorded a maximum of 67 in 2016 and 82 in 2018 breeding territories of dunlin within the Survey Area. Of these, 32 (in 2016) and 41 (in 2018) were recorded within the site. Dunlin territories recorded during breeding bird survey work are presented in Figure 6.13. Dunlin were not recorded during the winter walkover survey work.

6.5.78 SBRC provided 193 records were returned of Dunlin within 10 km of the Proposed Development site since 1993. The largest count of birds was located at North Sandwick, approximately 3.4 km south east of the Site (14 counts of apparently occupied territories in 2016). One count of an apparently occupied territory was returned from within the site boundary (recorded in July 2009). A further six records were within 2 km of the site boundary: one count of probable breeding (recorded in 2013) near to Breckon, approximately 1 km north east of the site, and five counts of apparently occupied territories west of Stonganess (three records in 2006 and two in 2016).

6.5.79 Dunlin is a common breeding summer visitor on Shetland (SBC, 2018). The estimated Shetland NHZ breeding population is 2,054 pairs (Wilson *et al*, 2015). Breeding populations in the UK are 8,600–10,600 pairs (Musgrove *et al* 2013), and in Europe are 426,000-562,000 pairs (BirdlLife International,

2004). The Conservation Status of dunlin is likely to be favourable in Shetland. However, the UK population has seen a decline of around 40 % over 25 years (between 1989/1990 and 2014/15) (Hayhow *et al*, 2017). Dunlin are an Annex I species[22] and Amber listed in the UK (Hayhow *et al*, 2017).

6.5.80 Dunlin is a classification feature of the Fetlar SPA (approximately 4.4 km south-east of the Proposed Development site) which supports 90 breeding pairs (1 % of the UK population). Given the proximity of the SPA to the site, it is considered likely that birds breeding within the site and local area form part of the SPA population. Dunlin are known to undertake considerable extended passage, and are not known to show a strong breeding site fidelity (Hardy & Minton, 1980). Therefore, the site is likely to support birds making up a wider population. Given the observed contractions of the UK breeding population, and location of the Site within the core breeding range of the species, it is considered likely that the site is of **National (UK)** Importance for dunlin.

Golden Plover

6.5.81 Golden plover were recorded within the Proposed Development site throughout the survey period, with the majority of records within the breeding season. A total of 67 flights, totalling 151 individuals, were recorded during VP surveys. The total recorded flight time was 1 hour, 13 minutes and 10 seconds; 19 minutes and 3 seconds of which was spent within the Collision Risk Volume. Flights appeared to be concentrated around the Hill of Bakkanalee in the northern part of the site, at lochans near Fugla Field in the western part of the site, and near the lochs of Lumbister, approximately 2 km south of the site. Golden plover flightlines recorded during VP survey work are presented in Figure 6.14.

6.5.82 Forty-three territories were recorded in the Survey Area (thirteen within the site) during the 2016 breeding bird survey work. In 2018, 50 breeding territories were recorded within the Survey Area (15 within the site). Golden plover flightlines recorded during breeding bird survey work are presented in Figure 6.15.

6.5.83 A flock of 105 birds were recorded in the northern part of the Survey Area (north of the site boundary) during the first winter walkover survey in November 2017. This registration is shown on Figure 6.31.

6.5.84 SBRC provided 160 records for golden plover within 10 km of the Proposed Development site centre since 1992. The largest flocks were recorded at Kirk Loch near Breckon approximately 1.8 km north-east of the site (88 birds in August 2017 and 70 birds in October 2017), Loch of Papi approximately 2.1 km north-east of the site (five separate counts of 56 to 300 birds, between 2010 and 2017), and north of Lund (on Unst) approximately 4.8 km north east of the site (six separate counts of between 80 and 220 birds in 2010). Ten records are from within the site boundary, including nine breeding pairs recorded in 1992 and one count of an apparently occupied territory in July 2009. Twenty-five records were returned within 2 km of the site, two of which were < 0.1 km from the site boundary (each relating to breeding pairs recorded in June 1992).

6.5.85 Golden plover are an Annex I species and a common breeding summer visitor on Shetland (SBC, 2018), with an estimated breeding population in the Shetland NHZ of 5,665 pairs (Wilson *et al*, 2015). The UK breeding population is approximately 38,000–59,000 pairs (Musgrove *et al* 2013), and in Europe is 630,000-860,000 (BirdlLife International, 2004). The core breeding range of golden plover in the UK is in Scotland, with highest densities present in the Northern Isles (Balmer *et al* 2013). Elsewhere in the UK, the breeding range of the species has seen a contraction of one fifth over the last 40 years (Balmer *et al*, 2013), and the species is considered to be at risk of climate related decline (Hayhow *et al*, 2017). The Conservation Status of golden plover on Shetland is uncertain.

6.5.86 The Proposed Development site comprises suitable breeding habitat for golden plover, and is situated within the core breeding range of the species. Given that the highest densities of breeding birds occur in the northern isles of Scotland, the importance of the site for golden plover is likely to extend beyond the Regional (Shetland) and Country (Scotland) levels. Impacts on birds using the site

[22] Annex I refers only to the schinzii sub-species which breeds in south-eastern Greenland, Iceland, Britain, the Baltic States and southern Scandinavia.

may have effects at the UK population level, although, given the extent of the species' breeding range outside of the UK, these are unlikely to have significance at the European level. The value of the site for golden plover is therefore considered important at the **National (UK)** level.

Lapwing

6.5.87 Two lapwing were in flight during VP survey on 22 May 2016. The birds were recorded heading south-west onto the Proposed Development site over the Hill of Bakkanalee for a duration of 75 seconds, all of which was below collision risk height. Lapwing flightlines recorded during VP survey work are presented in Figure 6.16.

6.5.88 Lapwing were recorded in small numbers during breeding bird walkover surveys. One territory was recorded during breeding bird survey work in 2016, located approximately 2 km south of the Proposed Development site near the Lochs of Lumbister. Four breeding territories were recorded between 400 m and 600 m beyond the northern boundary of the site in 2018. Lapwing territories recorded during the breeding bird survey work are presented in Figure 6.16.

6.5.89 SBRC returned 18 records of lapwing within 10 km of the Proposed Development site centre since 1993. All records relate to confirmed breeding pairs or apparent occupied territories. Two of the records were within 2 km of the site, at Loch of Brough approximately 0.4 km east of the site (1 pair (probably breeding) in 2004, and 2 breeding pairs in 2006).

6.5.90 Lapwing is a common breeding summer visitor on Shetland which supports more than 1 % of the UK breeding population (SBC, 2018). The breeding population of lapwing in the UK is estimated to be 140,000 pairs (Musgrove *et al* 2013), and in Europe is 1,590,000-2,580,000 pairs (BirdlLife International, 2004). Lapwing are Red listed in the UK, with a reported 10 year decline of 32 % (between 2004/05 and 2014/15) (Hayhow *et al*, 2017). The Conservation Status of lapwing on Shetland is likely to be unfavourable given the UK-wide declines in this species.

6.5.91 The breeding habitat preferences of this species on Shetland include moderately grazed in-bye or more heavily grazed margins if in-bye and moorland (Pennington *et al*, 2004). The majority of the habitats within the site are suboptimal for breeding lapwing, with suitable nesting sites in intensely-grazed open areas vulnerable to predation by skuas. It is considered likely that the majority of the County (Yell) population breed on coastal pasture and in areas of active farmland, and so it is unlikely that site is valuable for the local population. This is evidenced by the survey results, with very little flight activity being noted, and no recorded breeding within the site. The value of the site for lapwing is therefore considered to be of **negligible** importance and lapwing is not considered further in this assessment.

Oystercatcher

6.5.92 Oystercatcher were recorded on an occasional basis during VP surveys with 15 flights totalling 18 individuals noted, all of which were recorded in 2018. Birds were recorded in flight for a total of 5 minutes 32 seconds; of which 45 seconds was spent within the Collision Risk Volume (refer to Figure 6.17).

6.5.93 A count of 17 breeding territories was recorded within the Survey Area in 2016 and 39 breeding territories were recorded in 2018[23]. Three territories were recorded within the Proposed Development site during the breeding season work, these were: one recorded in 2016 near Knowe of Houllanginga in the central part of the site; and two recorded in 2018 near Mare's Pool in the northern part of the site, and near the Burn of Midge Glen in the north-western part of the site. The majority of territories recorded during 2018 were associated with maritime heath habitats at the heads of the cliffs to the west of the site. Oystercatcher territories recorded during the breeding bird survey work are presented in Figure 6.18.

6.5.94 SBRC provided 121 records for Oystercatcher within 10 km of the Proposed Development site centre since 1993. The largest flock recorded was at Loch of Papi approximately 2.2 km north-east of the

[23] The cliffs along the western coastline of Yell were not scanned during the 2016 work, but were counted in 2018. A large proportion of the local breeding population of oystercatcher breed on coastal maritime grassland (Simon Pinder, pers. comm.), and this accounts for the discrepancy between years.

site boundary (62 birds in July 2011). All other records were for breeding pairs (maximum count of three pairs) or for apparently occupied territories (maximum count of six territories). Twenty-seven records were within 2 km of the site boundary, the nearest of which are located at Loch of Brough, approximately 0.4 km east of the site (eight separate counts of between 1 and 3 breeding pairs from 2003 to 2011).

6.5.95 Oystercatcher is a common breeding summer visitor on Shetland, which supports more than 1 % of the UK breeding population (SBC, 2018). The breeding population of oystercatcher in the UK is estimated to be 110,000 pairs (Musgrove *et al* 2013), and in Europe is 284,000-354,000 pairs (BirdlLife International, 2004). Oystercatcher is Amber listed in the UK (Hayhow *et al*, 2017). The Conservation Status of this species on Shetland is likely to be favourable.

6.5.96 Although oystercatcher breeds in a wide range of habitats, they tend to favour heavily grazed grassland and clifftops on Shetland (Pennington *et al*, 2004). The availability of higher quality nesting sites at the coast is likely to reduce the dependency of breeding birds on the site; however, areas immediately surrounding lochans and burns are likely to regularly support low numbers of breeding birds. The value of the site is therefore likely to extend beyond the level of the site itself. However, given that the majority of the local population appear to favour habitats outside of the site boundary, it is unlikely that the value of the site will reach the County (Yell) level. It is therefore considered that the site is of **Local (mid and north Yell)** importance for oystercatcher.

Redshank

6.5.97 A total of 29 flights (45 individuals) of redshank were recorded during VP survey work. Flight activity within the site was concentrated around the Hill of Bakkanalee and Scordaback in the northern part of the site, and around Gossa Water in the south-western part of the site. Flights were also noted around lochans 1 km to the south of the site. A total flight time of 12 minutes and 54 seconds was recorded for redshank, 3 minutes and 20 seconds of which was spent within the Collision Risk Volume. An additional 27 observations of non-flying birds were made during the VP survey work. All but one observation (of two birds together during a watch from VP4 on 23 Feb 2018) involved single individuals. Redshank flightlines recorded during the VP survey work are presented in Figure 6.16.

6.5.98 Six breeding territories were recorded within the Survey Area during the 2016 breeding bird walkover survey; two of which were within the site. Twenty territories (eight within the site) were recorded during the 2018 survey work. Redshank territories recorded during the breeding bird survey work are presented in Figure 6.16.

6.5.99 SBRC returned 30 records of redshank within 10 km of the Proposed Development site since 1993. All records were for one to two breeding pairs or apparently occupied territories. Nine of the records were within 2 km of the site boundary, all located to the east and north-east of the site. The nearest record to the site was located at Loch of Brough, approximately 0.4 km from the site boundary (one count of probable breeding in 2004).

6.5.100 Redshank is a common breeding resident on Shetland (SBC, 2018), with breeding estimates of between 1,037 and 2,288 pairs (Harvey, 2003). The breeding population of redshank in the UK is estimated to be 25,000 pairs (Musgrove *et al* 2013), and in Europe 340,000-484,000 pairs (BirdlLife International, 2004). Redshank is Amber listed in the UK (Hayhow *et al*, 2017).

6.5.101 Pennington *et al* (2004) indicate that redshank typically nest in margins of moorland, mires with long vegetation or wet fields with a large coverage of rushes. These habitats are common within the site, along with suitable foraging opportunities alongside lochans and burns. However, the habitats are typical of the local landscape, and widely represented throughout Yell and Shetland. It is therefore unlikely that the site is important at the County (Shetland) or Regional (Yell) level. It is considered that the site is important for redshank at the **Local (mid and north Yell)** level.

Ringed Plover

6.5.102 One flight of ringed plover *Chatradrius hiaticula* (one bird) was recorded approximately 1.9 km south of the Proposed Development site during the VP survey work on 16 May 2018, and a total of 15 breeding territories were recorded during the 2016 breeding bird survey work. Of these, one territory was recorded within the site near the water works on the Burn of Dalsetter. Territories

outside of the site boundary were typically associated with the western coastline of Yell, with the exception of one territory on the shore of the Sand Water lochan, approximately 630 m north-east of the site, and the territory at the water works within the site. Pennington *et al* (2004) suggest that ringed plover on Shetland are not exclusively coastal breeders, and have been found regularly using man-made habitats such as roadside hard shoulders, airstrips, industrial sites and quarries (as reflected by the record within the site). Ringed plover territories recorded during the breeding bird survey work are presented in Figure 6.16.

6.5.103 Thirty-one records of ringed plover were provided by SBRC within 10 km of the Proposed Development site since 1993. All records relate to single (probable) breeding pairs. Eleven records are from within 2 km of the site boundary, and include: ten records at Stonganess approximately 1.7 km east of the site (six breeding pairs recorded between 2006 and 2014, and four apparently occupied territories recorded between 2007 and 2016), and one record at Gloup approximately 1.3 km north of the site (one apparently occupied territory in June 2007).

6.5.104 Ringed plover is a fairly common breeding summer visitor on Shetland (SBC, 2018), with and estimated breeding population of between 800 and 1000 pairs (Prater, 1989). The breeding population of ringed plover in the UK is estimated to be 5,300–5,600 pairs (Musgrove *et al* 2013), and in Europe is 140,000-213,000 pairs (BirdlLife International, 2004). Ringed plover are red listed in the UK, with a reported 20 year decline of 59 % (between 1989/90 and 2014/15) (Hayhow *et al*, 2017). The Conservation Status of this species on Shetland is likely to be unfavourable.

6.5.105 With the exception of some manmade features (such as the waterworks at Dalsetter) providing opportunistic nesting opportunities for ringed plover, the Proposed Development site does not provide optimal breeding habitat for ringed plover. It is expected that the highest densities of breeding birds locally would be associated with coastal areas beyond the site, and this is borne out by the survey results. The absence of recorded flights through the airspace over the site indicates that the site is unlikely to be used regularly by this species, and is also unlikely to be within a commuting route for foraging birds. However, breeding within the site has been recorded and, therefore, will contribute to the status of the local population. The value of the Site is therefore considered to be of importance at the **Local (mid and north Yell)** level.

Ruff

6.5.106 A flight of twelve ruff *Philomachus pugnax* was recorded from VP surveys on 21st September 2018. The recorded flight duration was 27 seconds, entirely below collision risk height at Sandwater Hill, in the north-east corner of the site. No records were returned by SBRC for ruff.

6.5.107 Ruff is a Schedule 1 species under the 1981 Act and Red listed in the UK (Hayhow *et al*, 2017). The species is a scarce breeder in the UK (Musgrove *et al* 2013), with breeding historically recorded in Shetland in 2003 (Balmer, 2013). The most recent UK breeding record was in 2006 in north-west England. The species is a fairly common migrant in Shetland, typically recorded in August and September (SBC, 2018), and it is likely that the bird recorded in 2018 was on passage. Recent records provided by Shetland Bird Club include passage flocks of 17 at Breckon (approximately 1.5 km north-east of the site) during August 2015, and 16 at Burravoe (approximately 2.5 km north-east of the Proposed Development site) in September 2015 (SBC, 2017).

6.5.108 It is unlikely, given the results of the survey work, that ruff pass through the site on regular basis. Although they are a fairly common migrant in Shetland, they are not regularly recorded in large numbers (Pennington *et al*, 2004). The value of the site to ruff is likely to be **negligible** and, therefore, ruff is **not considered further** in this assessment.

Turnstone

6.5.109 One turnstone (*Arenaria interpres*) was noted at Gloup Voe, approximately 150 m north of the Proposed Development site during a breeding bird walkover survey in April 2016. Turnstone is a winter visitor in the UK, with a UK population of 51,000 (Musgrove *et al* 2013). Turnstones typically depart their winter grounds in April or May (Balmer *et al*, 2013). Turnstone is Amber listed in the UK (Hayhow *et al*, 2017).

6.5.110 Five records for turnstone were provided by SBRC for within 10 km of the Proposed Development site since 2010. The largest flock was recorded at Loch of Papi, approximately 2.2 km east of the site (70 birds in January 2014). The nearest record to the site was located at Kirk Loch, approximately 1.8 km north-east of the site (50 birds in October 2017). The remaining three records were located north of Lund (on Unst) (including counts of 65 birds in January 2010, 57 birds in January 2012 and 52 birds in March 2014).

6.5.111 The absence of records from VP surveys indicate that turnstone do not regularly pass within the site, and are likely to remain on the coast. It is therefore considered that the site is of **negligible** value for turnstone, and this species is **not considered further** in the assessment.

Woodcock

6.5.112 An individual woodcock (*Scolopax rusticola*) was recorded near Rulesgill in the northern part of the site during a breeding bird walkover survey in April 2016. Breeding woodcock are absent from many of the Scottish islands (Balmer *et al*, 2013) including Shetland, in which it is a fairly common migrant and scarce winter visitor (SBC, 2018).

6.5.113 It is unlikely, given the infrequency of records during the survey work, that woodcock use, or overfly the site with any regularity. It is therefore considered that the site is of **negligible** value for woodcock, and this species is **not considered further** in the assessment.

Snipe

6.5.114 Snipe were not considered as target species during the VP work. This species is typically under recorded by vantage point survey work due to their skulking behaviour during daylight hours and tendency not to fly unless flushed. However, snipe were recorded in good numbers during each of the breeding bird walkover surveys, with territory counts of 47 (26 within the Proposed Development site) in 2016 and 79 (43 within the site) in 2018. Snipe territories recorded during the breeding bird survey work are presented in Figure 6.19.

6.5.115 SBRC provided 189 records for snipe from within 10 km of the Proposed Development site since 1993. All records relate to breeding birds, with a maximum count of ten pairs per record. Fourteen records were from within 2 km of the site boundary, the nearest of which were located at Loch of Brough approximately 0.4 km east of the site. Breeding pairs were recorded at this location in 2005 (three pairs) and in 2007 (two pairs). One apparentl occupied territory was recorded at Loch of Brough in 2016, and probable breeding was recorded here in 2003 (2 counts), 2008 (1 count), 2009 (1 count), 2010 (2 counts) and 2011 (1 count).

6.5.116 Snipe is a common breeding summer visitor on Shetland (SBC, 2018), with an estimated population of 6,728 pairs in the Shetland NHZ (of a total 34,594 pairs in Scotland; Wilson *et al*, 2015). Musgrove *et al* (2013) report an estimate of 80,000 pairs in the UK, and breeding population estimates in Europe (BirdlLife International, 2004) are 2,670,000-5,060,000 pairs. Snipe is Amber listed in the UK (Hayhow *et al*, 2017). Recent population declines have occurred in lowland populations in the UK; however, Balmer *et al* (2013) suggest increases in Scotland of 30% between 1995 and 2010. The Conservation Status of snipe on Shetland is likely to be favourable.

6.5.117 The habitats within the Proposed Development site provide suitable breeding habitat for snipe, and this is reflected by the density of territories recorded during the survey work. The Shetland Bird Club reports a maximum count of 21 apparent occupied territories on Noss in 2006, with a count of 16 territories in 2016 reported to be the highest in six years (SBC, 2017; 2018). It is likely that snipe occur in other parts of Shetland in similar densities to those recorded on site, as the habitats present are ubiquitous throughout the isles. Harvey (2003) reported territories in 36 of 49 1 km squares visited during a bird survey organised by SBRC in 2002. However, the density of territories within the site remains high when compared to reports of breeding snipe occurrence on other islands within Shetland, and it is reasonable to conclude that the site is important for breeding snipe to the level of the **Region (Shetland)**. The importance of the site is unlikely to extend beyond this given the extent of the population throughout Scotland.

**Skuas and Gulls**

Great Skua

6.5.118 Great skua were recorded commonly during the VP surveys between April and October and were recorded in such large numbers that, following agreement with SNH[24], were recorded as secondary species during the 2018 breeding season. A total number of 568 flight lines totalling 680 individuals were recorded throughout the site between April and August 2016 and between September 2017 and March 2018. A total flight time of 8 hours, 11 minutes and 2 seconds was recorded. Of the total recorded flights, 169 passed within the Collision Risk Volume with a combined duration of 7 hours, 27 minutes and 1 seconds.

6.5.119 Flights were recorded throughout the Survey Area, with highest concentrations of activity noted at Hill of Bakkanalee in the northern part of the Proposed Development site and the Lochs of Lumbister to the south of the site. Great skua flightlines recorded during the 2016 breeding season VP survey work are presented in Figure 6.20. Flightlines recorded during the 2017/18 winter VP work are presented in Figure 6.21.

6.5.120 A total of 91 apparent occupied territories were recorded during the 2018 breeding bird walkover survey, with 46 territories occurring within the Proposed Development site. The highest concentrations were recorded on the higher elevations in the centre west of the site near Knowe of Houllanginga, and around the Lochs of Lumbister to the south of the site. Great skua territories recorded during the 2018 breeding bird survey work are presented in Figure 6.22.

6.5.121 SBRC returned 92 records for great skua within 10 km of the Proposed Development site since 2002. Ninety-one of the records were for counts of apparently occupied territories, and one record was for eight roosting birds. The largest count was recorded within the site boundary, on the west side of the site (23 counts of apparently occupied territories in May 2002). Twenty-one apparent occupied territories were recorded at this location again in June 2017.

6.5.122 Great skua is Amber listed in the UK (Hayhow *et al*, 2017). Balmer *et al* indicate that more than half of the world population of great skua are found in northern Scotland and Ireland, with highest densities found on Shetland. The current population estimate within the Shetland NHZ of 10,377 apparent occupied territories, which equates to approximately 80 % of the Scottish population (Wilson *et al*, 2015) and between approximately 60 % and 63 % of the European breeding population (estimated at 16,300-17,200 pairs; BirdlLife International, 2004). An estimate of apparent occupied territories on Yell resulting from the Seabird 2000 surveys between 2000 and 2002 was 388, with highest numbers found to occur on Foula (2293), south Mainland (1455) and Unst (1385) (Pennington et al, 2004).

6.5.123 The NHZ population estimate suggests a population increase of approximately 52 % between the national Seabird 2000 survey (undertaken in 1998 - 2005) and the 2006 - 2013 Seabird Monitoring Program data. Hayhow *et al* (2017) also report an increasing UK population of 53 % over 20 years (between 1996 and 2015) (Wilson *et al*, 2015). However, despite the overall increases in range of this species in the UK, great skua remain sensitive to fluctuations in food availability, with localised population declines on Orkney between 2000 and 2010, and low productivity years reported on Shetland for the late 1980's, early 2000's and 2011 (Balmer *et al*, 2013). The Conservation Status of great skua on Shetland is likely to be favourable.

6.5.124 The population of great skua breeding within the Proposed Development site represents approximately 11.9 % of the Yell population (assuming the population has remained stable since the 2002 estimate), 0.4 % of the Shetland NHZ population, and 0.28 % of the European Population. It is likely that the site also provide a supporting role for a larger proportion of the European population given the number of additional territories present locally (91 were recorded within the Survey Area), and the numbers breeding within the site are likely to fluctuate between years.

6.5.125 Great skua are a feature of the Fetlar SPA (3.9 km distant from the site) and Herma ness, Saxa Vord and Valla Field SPA (6.1 km distant from the site), which support 512 pairs (3.8 % of the World population) and 630 pairs (4 % of the World breeding population) respectively. Great Skua exhibit a

[24] Agreement by email on 16 March 2018

strong site fidelity (Hammer *et al,* 2014), therefore, interchange of breeding adults between the site and SPAs is likely to be limited. However, given the breeding density of great skua, both within the site and within the SPA populations, the likelihood of recruitment of juvenile birds between sites is high.

6.5.126 Given the high proportion of the European population present within and immediately surrounding the Proposed Development site, and possible interchange of juvenile birds between the site and the Fetlar and Herma ness, Saxa Vord and Valla Field SPAs, it is considered likely that the site is important at the **International** (**European)** level.

Arctic Skua

6.5.127 Arctic skua were frequently recorded during VP survey work and breeding bird walkover surveys between May and August in both 2016 and 2018. A total of 116 flight lines were recorded (including a total of 190 individuals) with a peak count of six birds recorded together twice in July 2018. The total duration of flights (13 flights) passing within the Collision Risk Volume is 16 minutes and 13 seconds.

6.5.128 Flight activity within the Proposed Development site boundary was greatest at Hill of Bakkanalee and Scordaback in the northern part of the site, and around Fugla Field in the western part of the site. A concentration of flight lines is also apparent around the Lochs of Lumbister approximately 2 km south of the site. Arctic skua flightlines recorded during the VP survey work are presented in Figure 6.23.

6.5.129 A total of 16 territories were recorded during surveys in 2018, with 3 occurring within the Proposed Development site. The territories within the site were at Hill of Markamouth (in the western part of the Site), Amfra Mires (at the centre of the site), and near the Burn of Gossawater (near the southern boundary of the site). Nine of the sixteen territories recorded during the work were associated with the western coastline of Yell, and four were present at the Lochs of Lumbister. The success of territories recorded was not determined. Arctic skua territories recorded during the 2018 breeding bird survey work are presented in Figure 6.24.

6.5.130 SBRC returned 130 records of Arctic skua from within 10 km of the Proposed Development site since 1999. Of these, 129 relate to single apparently occupied territories, and one record for three territories (west of Colvister, approximately 2.4 km south of the Site). Twenty records were returned from within the site boundary (eighteen counts in May 2002, one count in June 2002 and one count in June 2017).

6.5.131 Scotland is at the southern extent of the circumpolar breeding range for Arctic skua. The UK population is estimated to be approximately 2100 breeding pairs (all within Scotland), and comprises 1 % of the world population (Musgrove *et al* 2013). Arctic skua are Red listed in the UK on account of their national population decline. They are likely to have an unfavourable Conservation Status on Shetland.

6.5.132 The current Shetland NHZ breeding population is estimated to be 516 apparent occupied territories, which represents a decline of approximately 54 % on Shetland since 2000 (Wilson *et al*, 2015). A population estimate for Yell following the Seabird 2000 surveys is given as 117 (Pennington *et al*, 2004) but, given the decline noted above, numbers are likely to have reduced in recent years. Wilson *et al* (2015) indicates a decline of 76 % between 1996 and 2015, and this is also reflected in estimates provided by Balmer *et al* (2013) and declines described in Pennington *et al* (2004). The factors driving declines in this species are likely to include decreasing food availability (Balmer *et al*, 2013; Perkins *et al*, 2018), predation by great skua (Pennington *et al*, 2004; Perkins *et al*, 2018) and climate change (Wilson *et al,* 2015). The Shetland Bird Club reports that of 37 apparent occupied territories observed on Fair Isle in 2016, 27 failed at the chick stage due to predation by great skua (SBC, 2018)

6.5.133 The Seabird 2000 surveys estimated a population of 96 apparent occupied territories on Fetlar (Pennigton *et al*, 2004). Monitoring data for selected areas on Fetlar provided in SBC (2018) indicates that a peak apparent occupied territory count of 7 was recorded in 2008 and 2009, dropping to 4 territories by 2013. None of the territories in the monitored areas have successfully fledged any chicks since 2009 (when 2 chicks were fledged).

6.5.134 Adult Arctic skuas demonstrate site fidelity and typically return to the same nesting location year after year. However, studies in Scotland have found many instances of immature birds settling in a colony up to 150 km from natal one (Cramp, 1983), and therefore recruitment to and from the population within the site and local area is likely to occur. The importance of the Proposed Development site is unlikely to extend to the European level due to the relatively low density of apparent occupied territories (when compared with the territories present locally) but, given the limited extent of the breeding range of this species within the UK, it is considered the site is of **National (UK)** importance for Arctic skua.

Arctic Tern

6.5.135 Arctic tern were frequently recorded during VP work and breeding bird walkover surveys between May and August in both 2016 and 2018. A total of 69 flight lines by 127 individuals were recorded, with a peak count of seven birds noted in flight concurrently on 21 July 2016. A total of 10 flights passed within the Collision Risk Volume with a combined duration of 10 minutes and 40 seconds. Arctic tern flightlines recorded during the VP survey work are presented in Figure 6.25

6.5.136 Five breeding colonies were recorded during the breeding bird walkover survey in 2016, all beyond the site boundary. The largest colony was located close to Head of Bratta and comprised 62 individuals, the others were located at Fugla Geo (30 individuals), Singa Tain (30 individuals), west of Gloup Voe (16 individuals) and at Kussa Waters (7).

6.5.137 In 2018 a total of seven breeding colonies were recorded along the coastline west of the Proposed Development site, four of which were within 500 m of the site boundary (none were present within the site). The colonies recorded within 500 m of the site comprised 4-10 pairs (near Eagittle), 1 pair (near Burgi Geos), 9 pairs (between Burgi Geos and Swinga Taing) and 1-40 pairs (at Swinga Taing) respectively[25]. The three colonies beyond the 500 m perimeter of the site were between 650 m and 2 km south west of the site and comprised 30, 10 and 1 pairs respectively. Arctic tern territories recorded during the breeding bird survey work are presented in Figure 6.26.

6.5.138 Twenty-eight records of Arctic tern were returned by SBRC from within 10 km of the Proposed Development site since 1999. One record was returned from within the site boundary (at the edge of the north-west corner of the site) and related to one individual flushed in June 2000. Additional records within 2 km of the site were at Stonganess approximately 2 km east of the site boundary (22 birds flushed in May 2000 and five breeding pairs recorded in summer 2006); at Dalsetter approximately 1.2 km south of the Site (17 birds flushed in May 2000); at Gloup approximately 0.7 km north of the Site (14 birds flushed in June 2000); and to the west of the Site, approximately 0.4 km away (1 bird flushed and 140 birds flushed, both in June 2000). The record of 140 birds (approximately 0.4 km west of the Site) was the largest count provided.

6.5.139 Arctic tern is an Annex I species listed in the Birds Directive and Amber listed in the UK (Wilson *et al*, 2015). They are likely to be in unfavourable Conservation Status in Shetland. Arctic tern are a common breeding summer visitor to Shetland (SBC, 2018) which supports 10 % of the UK breeding population (the UK breeding population is estimated to be 53,000 pairs, Musgrove *et al,* 2013). Pennington *et al* (2004) indicate that Shetland supported approximately 55 % of the UK population in 2000, but that populations had fluctuated historically and have been shown to be associated with trends in sandeel (*Ammodytes* sp.) population around Shetland. Counts on Fair Isle have demonstrated the scale of such fluctuations, with over 2800 pairs recorded in 2001, falling to 115 pairs recorded in the following year (presumed in response to sandeel availability) (Pennington *et al*, 2004). Predation by otter (*Lutra lutra)* is also likely to impact on populations. The Shetland Bird Report (SBC, 2018) notes of 72 nests recorded on Noss in 2016, only five young were fledged successfully; the remainder were predated by otter.

6.5.140 Individual artic turns move between colonies regularly and therefore populations prove difficult to monitor (Balmer *et al*, 2013). However, censuses of the Shetland population between 1970 and 2000 have recorded clear declines, with an estimated loss of 25 % of the Shetland population over this period. The Fetlar SPA has fared particularly poorly, with 2,372 pairs recorded in 1980, reducing to 143 pairs in 2000 (Pennington *et al*, 2004).

[25] Ranges in colony counts relate to variation between survey visits.

6.5.141 No colonies were recorded within the Site during the 2016 and 2018 survey work. However, colonies are present within 500 m of the Site boundary and concentrations of flight activity were noted around lochs surrounding the Site, including at Gloup Lochs (adjacent to the north-eastern corner of the Site), Kussa Water (150 m north-east of the Site) and at Sandy Water (1 km south of the Site), indicating foraging activity or breeding attempts made inland. Therefore, it would be reasonable to expect birds to pass within the airspace over the Site whilst moving around colonies and inland foraging areas.

6.5.142 However, it is concluded that land within the Site is not functionally linked to the Fetlar SPA for Arctic tern as it does not provide an important role in maintaining or restoring the population of qualifying species at favourable conservation status within these European sites. Desk study and survey data indicate that Arctic tern does not breed or feed within the Site, only commuting across it.

6.5.143 The Proposed Development site is considered to be of importance to Arctic tern at the **County (Yell)** Level. This evaluation reflects the (declining) conservation status Arctic tern and the presence of breeding colonies within 500 m of the site boundary, but likely absence of a functional link between the north Yell and wider (including the Fetlar SPA) populations.

Fulmar

6.5.144 A total of 58 fulmar flight lines comprising 92 individuals were recorded during the VP survey work. The combined flight duration was 1 hour 40 minutes and 22 seconds, of which, 36 minutes and 12 seconds (16 flights) was recorded within the Collision Risk Volume. Fulmar flightlines recorded during the 2016 breeding season VP survey work are presented in Figure 6.27.

6.5.145 Fulmar territories were confined to the coastal cliffs to the north and west of the Proposed Development site, and no attempt was made to determine the number of apparent occupied territories in either year. No evidence of breeding activity was recorded within the site and moorland habitats within the Survey Area.

6.5.146 SBRC returned twenty-three records for fulmar within 10 km of the Proposed Development site centre since 1999. The largest flock was recorded north of Houlls Water, approximately 4.6 km south west of the site boundary (1,812 birds in June 1999). Ten records were returned from within 2 km of the site boundary, along the coast to the west, north and east of the site. These records include counts of between 4 and 1,268 birds from 1999-2001.

6.5.147 Fulmar is Amber listed in the UK (Hayhow *et al*, 2017). It is the most abundant breeding bird on Shetland which supports approximately 34 % of the UK population (Pennington *et al*, 2004). The number of apparent occupied territories on Shetland reached 182,105 in 1998 – 2002; however, a decline of around 15 % had been recorded between 2000 and 2002 (Pennington *et al*, 2004). Hayhow *et al* (2017) indicate that the UK population had declined by approximately 31 % between 2000 and 2015. This trend may be linked to a reduction in whitefish fishing in the North Sea, low recruitment of sandeels (Balmer *et al*, 2013), and climate change (Hayhow *et al*, 2017). However, seabird monitoring conducted by the Shetland Oil Terminal Environmental Advisory Group (SOTEAG) has recorded fluctuations between years and colonies, with total counts within colonies monitored appearing[26] to have increased between 2007 (1565 total apparent occupied sites; 169 at Burravoe, Yell) and 2016 (1626 apparent occupied sites; 214 at Burravoe, Yell). Notwithstanding this, the long term trend between the Seabird 2000 and 2016 census counts show a decline at all monitored Shetland coastlines of between 10 % - 15 % (SBC, 2018). The Conservation Status of fulmar on Shetland is likely to be unfavourable.

6.5.148 Fulmar is a qualifying feature of the Fetlar SPA. However, it is unlikely the Proposed Development site and cliff habitats within 500 m of it would support birds originating from colonies at Fetlar, or have any other functional linkage to the SPA. This is because fulmar are known to show a strong breeding site fidelity (Dunnet *et al*, 1963), and whilst they undertake long foraging trips and disperse widely when not breeding (Cramp, 1977), such activities are typically pelagic, with birds rarely

[26] The breadth of fluctuations is greater than the apparent trend.

settling on land away from their natal colony (e.g. Edwards *et al*, 2013). Individuals within the SPA population are therefore unlikely to pass over the site regularly.

6.5.149 The Proposed Development site is considered to be of **County (Yell)** importance to fulmar, as its proximity to breeding colonies is likely to result in frequent use of the airspace above it. The importance of the site is unlikely to extend beyond this level as it is not likely to support breeding fulmar given the habitats present and absence of suitable nesting sites.

Gulls

6.5.150 Five species of gull were recorded breeding within the Proposed Development site and 500 m survey buffer during breeding bird surveys in 2018[27]. These were: black-headed gull *Larus ridibundus* (one territory), common gull *Larus canus* (nine territories), great black-backed gull *Larus marinus* (five territories), herring gull *Larus argentatus* (three territories) and lesser black-backed gull *Larus fuscus* (two territories). Two of the nine territories of common gull were recorded with in the site. These were located near Grud Waters in the south-western part of the aite. The remaining territories for all gull species were located beyond the site boundary, primarily on coastal cliffs west of the site, with one black-headed gull territory present inland at Sand Water approximately 612 m north-west of the site. Territories of gull species recorded during the breeding bird survey work are presented in Figure 6.28.

6.5.151 Five records of lesser black-backed gull, seventeen records of herring gull and twenty-five records for great black-backed gull were returned by SBRC since 1999. These records were located at Lund (on Unst) approximately 3.9 km east of the Proposed Development site (2 birds flushed in 2001), on Linga approximately 4.6 km south east of the site (1 breeding pair in June 2000), and south of Belmont (on Unst) approximately 5.4 km east of the site (126 birds flushed in summer 2006, 28 birds flushed in 2008 and 22 birds flushed in July 2013).

6.5.152 The largest flock of herring gull was recorded south of Belmont (on Unst) approximately 5.4 km east of the Proposed Development site (360 birds flushed in Summer 2006). Seven herring gull records were located within 2 km of the site, along the coast to the west and north of the site (including counts of between one and 18 adult birds, and up to three breeding pairs, recorded between 1999 and 2001).

6.5.153 The largest flock of great black-backed gull was recorded at Lund (on Unst) approximately 3.9 km east of the Proposed Development site (34 birds flushed in June 2001). Seven records of this species were within 2 km of the site along the coast to the south-west, west and north of the site. These records included counts of up to 20 adults and up to three breeding pairs, between 1999 and 2011.

6.5.154 Great black-backed gull and herring gull were also recorded during winter walkover survey work. A flock of 10 great black-backed gull and 10 herring gull were noted on Gossa Water in the south-western corner of the site between 31 October and 08 November 2017, and 12 great black-backed gull present on the same lochan on 26 and 27 February 2018.

6.5.155 Herring gull is Red listed and black-headed gull, common gull, great black-backed gull, and lesser black-backed gull are Amber listed in the UK (Hayhow *et al*, 2017). Common gull, great black-backed gull, and herring gull are common breeders on Shetland; whilst black-headed gull and lesser black-backed gull are “fairly common” breeders (SBC, 2018).

6.5.156 Black-headed gulls and lesser black-backed gulls have showed an increase in their breeding abundance within the UK, with black-headed gull increasing by 38 % between 2000 and 2015 (Hayhow *et al*, 2017), and lesser black-backed gull by 52 % between 1968/72 and 2008/11 (Balmer *et a*l, 2013). Black-headed gulls and lesser black-backed gulls on Shetland are likely to be in favourable Conservation Status.

6.5.157 Common gull, great black-backed gull, and herring gull have all shown declines in the UK. Losses of 6 % of the UK population of breeding common gull have been reported between the 1968-72 and 2008-11 Bird Atlases, with losses in Scotland being attributed to increased predation (Balmer *et al,* 2013). Great black-backed gull have shown reported declines of 11 % throughout the UK between 2000 and 2015 (Hayhow *et al*, 2017), and 26 % within the Shetland NHZ between 2000 and 2015

[27] Gull territories were not recorded during the 2016 work.

(Wilson *et al*, 2015). Robust national trends for herring gull are not available (Hayhow *et al*, 2017), but declines of 37 % have been observed within the Shetland NHZ between 2000 and 2015 (Wilson *et al*, 2015). However, urban populations have been shown to be generally increasing (Balmer *et al,* 2015) and increases have been reported within the Orkney and North Caithness NHZ (3455 pairs, 24 % increase between 2000 and 2015; Wilson *et al*, 2015). The Conservation Status of common gull, great black-backed gull, and herring gull on Shetland is likely to be unfavourable.

6.5.158 The Proposed Development site is unlikely to be of high value for cliff-breeding species such as greater black-backed gull, lesser black-backed gull and herring gull. But these species are likely to overfly the site regularly due to the close proximity of the site to suitable breeding cliffs, and presence of opportunistic foraging resources, such as lochans and burns, within it. Common gull and black-headed gull may breed within the site. However, the site is unlikely to support a significant proportion of the Regional population of either species given the availability of suitable breeding opportunities present throughout Shetland, and this is evidenced by the low number of territories recorded during breeding bird survey work in 2016 and 2018. It is concluded that the site is important for breeding gulls at the **Local (mid and north Yell)** level.

**Raptors and Owls**

Hen harrier

6.5.159 Two flights of hen harrier were recorded from VP surveys with both flights comprising single birds quartering over moorland in April 2018. The first bird was recorded on 03 April 2018 and involved a male bird flying south towards the Burn of Gossawater in the south-eastern part of the Proposed Development site, and the second bird was of a ringtail noted at the Hill of Vigon in the north-western part of the site on 09 April 2019. Both flights were entirely below collision risk height. Hen harrier flightlines are presented in Figure 6.29.

6.5.160 Hen harrier is a Schedule 1 and Annex I species (respectively under the 1981 Act and the Birds Directive), and is Red listed in the UK (Hayhow *et al*, 2017). The UK breeding population estimate is around 545 (Hayhow *et al*, 2017) and 630 (Musgrove *et al,* 2013) pairs, with 30,000 to 54,000 females making up the European population (BirdlLife International, 2004). Declines of hen harrier in the UK are reported to be around 27 % between 2004 and 2016 (Hayhow *et al*, 2017). However, Scotland remains a breeding stronghold for the species, supporting 80 % of the UK population.

6.5.161 Hen harrier are a very scarce migrant and rare winter visitor on Shetland, with occasional records of birds on Yell, including birds sighted during February 2016 (SBC, 2018) and January 2015 (SBC, 2017). The Shetland Bird Reports indicate that breeding is very rare, although Pennington *et al* (2004) suggest that there have been no successful attempts, presumably due to the absence of small mammal prey on Shetland.

6.5.162 The timing of the observations suggest that the birds were on passage and did not breed or overwinter on the Proposed Development site. The level of activity within the airspace over the site is insufficient to allow a valid assessment of collision risk to be made for hen harrier. Therefore, despite the national vulnerability of hen harrier, the importance of the site for this species is likely to be **negligible**. Hen harrier is **not considered further** in this assessment

Merlin

6.5.163 A total of ten flights of merlin were recorded from VP surveys. The majority of flights involved single birds with the exception of a flight of two birds noted on 05 July 2018. Merlin was recorded in flight for a total duration of 3 minutes and 16 seconds, and spent 25 seconds (2 flights) within the collision risk volume. Merlin flightlines are presented in Figure 6.30.

6.5.164 Flights by merlin were also recorded incidentally during breeding bird walkover survey work in April, May, June and July 2016, and in June 2018; and during a winter walkover visit in early November 2017.

6.5.165 Three nest locations were recorded during breeding raptor and breeding bird walkover surveys 2016. Two nests were within the Proposed Development site boundary (both near the Burn of Firth in the northern part of the site) and one nest approximately 3 km south the site near the Burn of

Lumbister. One of the nests within the site successfully fledged five birds in 2016. No evidence was found to indicate that this territory was occupied in 2018. A pair of merlin was noted defending a territory at a second location within the site during a raptor survey in June 2016. However, no sightings of birds were made at this location during subsequent visits indicating that the nest had failed. Three chicks were found to be present at the second location (although the fledging success was unknown) during surveys in 2018. The nest located to the south of the site fledged two birds in 2016 and three chicks were present in the nest in 2018 (although fledging success was not recorded). The locations of merlin nest sites recorded during the work are presented in Confidential Figure 6.34.

6.5.166 SBRC provided 14 records of merlin form within 10 km of the Proposed Development site centre since 2010. All records are for a single pairs, with breeding confirmed in all but one record. Seven of the records fall within the boundary of the site. These include: one breeding pair recorded in each year of 2012, 2014, 2016, 2017 and 2018, and two pairs recorded in 2015. The precise location of these records have not been provided.

6.5.167 Merlin is a Schedule 1 and Annex I species (respectively under the 1981 Act and the Birds Directive), and is Red listed in the UK (Hayhow *et al*, 2017). They are the only regularly breeding raptor on Shetland, but occur in low densities; forming approximately 1 % of the UK breeding population. There were 30 occupied territories on Shetland during the 2016 breeding season and 25 during 2015; of which 23 (in 2016) and 21 (in 2015) were successful (SBC, 2016; 2015). The Conservation Status of merlin on Shetland is likely to be stable.

6.5.168 Merlin are included in the Shetland LBAP. The species Action Plan for merlin includes the objective to "*maintain and enhance the population and distribution of merlin in Shetland*" through habitat awareness campaigns, monitoring of populations, encouraging sensitive agricultural practices, minimising disturbance and investigating the extent of heather damage by winter moth (*Operophtera brumata*).

6.5.169 The Shetland NHZ population estimate is 30 breeding pairs (reflecting the number of occupied territories in 2016), of a total 433 breeding pairs in Scotland (Wilson *et al*, 2015), 900 to 1,500 pairs in the UK (Musgrove *et al,* 2013), and 32,000 to 51,600 pairs in Europe (BirdlLife International, 2004). Two territories were recorded within the site during the 2016 and 2018 survey work, and this accounts for approximately 6.7 % of the Shetland NHZ population. The site provides suitable breeding opportunities to the regional population, and is considered to be of **Regional (Shetland)** importance for merlin.

Peregrine falcon

6.5.170 An individual peregrine falcon *Falco peregrinus* was recorded in flight approximately 160 m west of the site (900 m from the nearest turbine location) on 27th September 2017. The flightline is presented in Figure 6.29. No further observations of this species were made during the VP survey work. Dedicated breeding diurnal raptor walkover surveys and breeding bird walkover surveys found no evidence of breeding activity by this species

6.5.171 Peregrine is a Schedule 1 and Annex I species (respectively under the 1981 Act and the Birds Directive). It is a rare breeder on Shetland (SBC, 2018), and presumed extinct as a breeding species on Shetland in 1999 (Pennington *et al*, 2004). More recently, pairs have been recorded on north Mainland and Foula, with the north Mainland pair rearing four chicks in 2015 (SBC, 2017).

6.5.172 The Shetland NHZ population is estimated to be four breeding pairs, of 485 pairs in Scotland (Wilson *et al*, 2015). The UK breeding population estimate is 1,500 pairs (Musgrove *et al,* 2013) and the European population estimated to be between 14,900 and 28,800 pairs (BirdlLife International, 2004).

6.5.173 The timing of the observed flight suggests that the bird was on passage and did not breed or overwinter on or adjacent to the site. The level of activity within the airspace over the site is insufficient to allow a valid assessment of collision risk to be made for peregrine. Therefore, despite the national status of peregrine, the importance of the site for this species is likely to be **negligible**. Peregrine is **not considered further** in this assessment.

Short-eared owl

6.5.174 Short-eared owl *Asio flammeus* was recorded on one occasion during the May 2018 breeding bird walkover survey. No flights or evidence of breeding was recorded during the survey work.

6.5.175 Short-eared owl is a scarce migrant on Shetland with the majority of records occurring between March and June (SBC, 2018). Spring passage in prolonged with a peak of records in mid-May (Pennington *et al*, 2004, it is therefore likely that the bird recorded in May 2018 was a migratory bird. Pennington *et al* (2004) suggest that do not breed on Shetland due to the absence of small mammal prey.

6.5.176 Short-eared owl are an Annex I species under the Birds Directive, and are Amber listed in the UK (Hayhow *et al*, 2017).

6.5.177 Despite their conservation status, the importance of the Proposed Development site for short-eared owl is likely to be **negligible** due to the low-level activity recorded by survey work during 2016 and 2018, and the infrequency of records across Shetland. Short-eared owl is therefore **not considered further** in this assessment.

Kestrel

6.5.178 Kestrel *Falco tinnuculus* was recorded on one occasion during a breeding walkover survey undertaken in June 2016.

6.5.179 Kestrel are a very rare breeder on Shetland, typically a scarce migrant with most records of the species occurring in May and August to October (SBC, 2018). Recent records of kestrel on Yell include one bird at Gloup in July 2016 (SBC, 2018). Breeding on Shetland is likely to be restricted by the absence of small mammal prey; however, breeding has been confirmed historically at a location south of Voe in 1992 (Pennington *et al*, 2004).

6.5.180 Due to their locally scarce status, and low number of sightings during the survey work in 2016 and 2018, it is considered likely that the Proposed Development site is of **negligible** importance for kestrel. Kestrel is therefore **not considered further** in this assessment.

Black kite

6.5.181 A black kite *Milvus migrans* was recorded near Vigon near the north-west corner of the Proposed Development site during a breeding walkover survey undertaken in May 2018. This species is a rare vagrant on Shetland, with 10 previous records reported (SBC, 2017).

6.5.182 Black kite is an Annex I species under the Birds Directive. However, given the infrequency of records on Shetland, it is unlikely that black kite will occur over the site regularly, and the importance of the Proposed Development site is likely to be **negligible**. Black kite is therefore **not considered further** in this assessment.

**Secondary species**

6.5.183 Sparrowhawk *Accipter nisus* was recorded within the Proposed Development site on three occasions (all single birds): one during breeding bird walkover surveys in each of April and May 2016 and once during a winter walkover survey in November 2018.

6.5.184 The species is categorised as being of 'least concern' in conservation terms, and has increased considerably in number over the past twenty years at both the UK and European levels. Atlas work has demonstrated an expansion of range in the UK of 29 % between 1968/72 and 2007/11 (Balmer *et al*, 2013), and the UK population is estimated at 35,000 pairs (Musgrove et al, 2013). Given the size of the population, and low quality of the habitats on site for foraging, the Proposed Development site is unlikely to be of value to sparrowhawk populations at any geographic level. Sparrowhawk is therefore **not considered further** in this assessment.

6.5.185 Raven *Corvus corax* are a common breeding species in Shetland (SBC, 2018) and two pairs were recorded breeding on coastal cliffs within the 500 m of the Proposed Development site during breeding bird walkover surveys in 2018. Raven was also frequently recorded (as a secondary species) during VP surveys throughout the survey period.

6.5.186 Raven are common and widespread throughout Shetland, Scotland, and the west and north UK, and have shown an expansion in their range by around 70 % since the late 1970's (Balmer et al, 2013). The current UK population is estimated at 7,000 pairs. The use of the airspace over the site is unexceptional for Shetland, and the habitats within it are unlikely to provide a rich foraging resource for raven. Therefore, the importance of the Proposed Development site for the local population is likely to be **negligible**. Raven is therefore **not considered further** in this assessment.

6.5.187 A number of species of conservation concern not discussed above were recorded during the breeding bird walkover survey and included three red-listed species: skylark, twite *Carduelis flavirostris*, and starling *Sturnus vulgaris*. A further three red-listed species: fieldfare *Turdus pilaris*, snow bunting *Plectrophenax nivalis* and redwing *Turdus iliacus* were recorded during the winter walkover surveys.

6.5.188 The Shetland LBAP includes specific action plans for skylark and arable birds. The objectives of these plans are to prevent further declines in the breeding populations of breeding arable birds, and to improve the extent and condition of farmland habitats.

6.5.189 The breeding passerine community is considered to be typical of the habitats present within the Proposed Development site, which are unremarkable in the context of the wider landscape. The breeding passerine community is therefore considered to be important at the level of the **Site**.

6.5.190 The site is unlikely to be important (providing unremarkable habitats relative to the surrounding landscape) for winter visiting passerines. Wintering passerines are therefore **not considered further** in this assessment

### *Summary of Evaluation of Resources*

**Table 6.3 - Summary of Evaluation of Resources**

| Receptor | | Evaluation | Further consideration required |
|---|---|---|---|
| Statutory Sites (SPA/pSPA) | Bluemull and Colgrave Sounds | International | Yes |
| | Otterswickand Graveland | International | Yes |
| | Fetlar | International | Yes |
| | Herma ness, Saxa Vord and Valla Field | International | Yes |
| Statutory Sites (MPA) | Fetlar to Haroldswick | International | No |
| Statutory Sites (SSSI) | East Mires | National | Yes |
| | Graveland | National | Yes |
| | Valla Field | National | Yes |
| | Hascosay | National | Yes |
| | North Fetlar | National | Yes |
| | Hill of Colvadale and Sobul | National | Yes |

| Receptor | | Evaluation | Further consideration required |
|---|---|---|---|
| | Easter Loch | National | No |
| | Lamb Hoga | National | Yes |
| Birds | Greylag Goose | Local | Yes |
| | Barnacle Goose | Negligible | No |
| | Whooper Swan | Negligible | No |
| | Goldeneye | Negligible | No |
| | Red-breasted merganser | Negligible | No |
| | Eider | Negligible | No |
| | Mallard | Site | Yes |
| | Red-throated diver | International | Yes |
| | Curlew | National | Yes |
| | Dotterel | Negligible | No |
| | Dunlin | National | Yes |
| | Golden plover | National | Yes |
| | Lapwing | Site | Yes |
| | Oystercatcher | Local | Yes |
| | Redshank | Local | Yes |
| | Ringed Plover | Local | Yes |
| | Ruff | Negligible | No |
| | Turnstone | Negligible | No |
| | Whimbrel | National | Yes |
| | Woodcock | Negligible | No |
| | Snipe | Regional | Yes |
| | Great skua | International | Yes |

| Receptor | | Evaluation | Further consideration required |
|---|---|---|---|
| | Arctic skua | National | Yes |
| | Arctic tern | County | Yes |
| | Fulmar | County | Yes |
| | Great black-backed gull | Local | Yes |
| | Lesser black-backed gull | Local | Yes |
| | Herring gull | Local | Yes |
| | Black-headed gull | Local | Yes |
| | Common gull | Local | Yes |
| | Hen harrier | Negligible | No |
| | Merlin | Regional | Yes |
| | Peregrine falcon | Negligible | No |
| | Short-eared owl | Negligible | No |
| | Kestrel | Negligible | No |
| | Black kite | Negligible | No |
| | Other Species | Site (for breeding passerines only) | Yes (construction phase only: standard practice avoidance of impacts breeding passerines) |

## 6.6 Standard Mitigation

6.6.1 The assessment process assumes the application of standard mitigation measures in accordance with CIEEM (2018) guidance. A range of measures have already been applied as part of the iterative design process (see below and Chapter 2: Design Iteration), to avoid the higher quality habitats (see Chapter 7: *Ecology and Nature Conservation*). Standard mitigation will include general measures to comply with the provisions of the Wildlife and Countryside Act 1981 (as amended) (see section 6.8

for further details) as well as adherence to current environmental protection policies and guidance, including but not limited to:

- Good Practice During Wind Farm Construction (SNH, 2015a)
- Constructed tracks in the Scottish uplands (SNH, 2015b);
- WAT-SG-75 (SEPA, 2018);
- A Practical Guide to the CAR Regulations (SEPA, 2019); and
- LUPS-GU31 (SEPA, 2014).

6.6.2 The development of a Site Construction Environmental Management Plan (CEMP), in consultation with stakeholders (i.e. SEPA, SNH and Shetland Islands Council) will also be implemented, and will include:

- Appointment of a suitably qualified and experienced Ecological Clerk of Works (ECoW) to oversee application of the CEMP;
- HMP; see Appendix 7.7 for the Outline HMP (OHMP).
- Preconstruction ornithological survey programme to provide updated baseline information to feed into the CEMP and other operational plan documents;
- Use of Method Statements during construction, to include current good practice and prescribed use of low noise and vibration plant to limit disturbance and displacement effects;
- Development of an Operational Site Management Plan, (OSMP) to include an HMP and maintenance task Method Statements.

### *Mitigation through Design Iteration*

6.6.3 As described in Chapter 2: *Design Iteration*, the Proposed Development has gone through ten major iterative design changes (A to J), from November 2017 to the design being taken forward for this 2019 application. Commencing from an initial design aimed at maximising capacity, design development has included:

- reduction of the site application area to avoid conflicts with the RSPB Lumbister nature reserve and the majority of the north-eastern and south-western lochs and lochans, including avoidance of the Gossa Water catchment watershed;
- reduction of the number of turbines from an initial 68 (Layout A) to 50 (Layout B), then to 31 (Layout C) and then finally to 29 (Layout D onwards), in order to reduce the loss of peatland and avoid bog pool complexes;
- creation of turbine-free “passages” for commuting;
- routing of the site tracks and turbine locations to minimise impacts to the deeper peat deposits and limit the number of watercourse crossings;
- rotation of crane pad locations to avoid deeper peat deposits;
- relocation of the substation to reduce the access track connection; and
- re-defining of the borrow pit search areas to reduce size, avoid deeper peat deposits, reduce transport requirements (by locating close to the access tracks) and/or to follow hill contours.

6.6.4 Other considerations have included avoidance, through micro-siting, of watercourses and gullies, wet peat and deep peat (deposits of over 2m depth), the settlements at Gloup and Cullivoe; avoidance of Gossa Water Catchment area and key sensitive areas, including some of the more visually important landscape character areas (e.g. the south-west coastline at Gerherda and the open headland at North Neaps and the coastal edge at Vignon and Burgi Geos).

## 6.7 Potential Effects

6.7.1 This section of the chapter includes a detailed assessment of potential effects on designated sites and each ornithological receptor identified in the evaluation of resources section as requiring further assessment. Conclusions with regard to the significance of impacts that could arise in the absence of mitigation are also provided for each receptor.

### *Designated Sites*

6.7.2 The Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Herma ness, Saxa Vord and Valla Field SPA are important at the International Level.

6.7.3 The East Mires SSSI, Graveland SSSI, Valla Field SSSI, Hascosay SSSI, North Fetlar SSSI, Hill of Colvadale and Sobul SSSI, and Lamb Hoga SSSI are important at the National Level.

6.7.4 Impacts on habitats within designated sites have been considered unlikely given their distances from the site (see Chapter 7: *Ecology and Nature Conservation).* In addition, significant residual hydrological effects are unlikely to occur (see Chapter 10: *Geology, Peat, Hydrology & Hydrogeology*). Impacts are, therefore limited to those affecting populations of species qualifying as features of each designated site. Impacts on each qualifying species during construction, operation and decommissioning phases of the Proposed Development are provided in the species accounts below. Conclusions with regards the outcome of the testing for likely significant effect on the interest feature of each European Site and, if required, the assessment for adverse effects on integrity of any screened-in European Site are presented in a Shadow Habitats Regulations Assessment (HRA).

### *Species*

#### Construction

6.7.5 Construction of the Proposed Development is likely to extend over 24 months. Construction activities will include ground clearance, excavation and construction of the turbine bases and access tracks, the erection of the turbines and the movements of machinery and construction personnel.

6.7.6 Temporary land take will be needed for four construction compounds and nine borrow pit search areas which total approximately 1.8 ha (for construction compounds) and 19.2 ha (for borrow pits) respectively. There would be temporary disturbance on land surrounding the turbine bases and some of the access road that would be subject to restoration once construction is complete. The main construction phase consideration for birds is disturbance leading to displacement.

6.7.7 The extent of the effects of construction on birds would depend upon the timing of disturbing activities, the degree of displacement (spatially and temporally) that occurs, the size, suitability and proximity of habitats available to displaced birds, and their capacity to accommodate them.

6.7.8 There have been only a small number of wind farm construction phase specific studies published in the peer reviewed literature. This is likely to be because disturbance during construction is short term and can often be mitigated by avoiding sensitive areas and certain times of year. Most studies of bird wind farm interactions have concentrated on operational phase disturbance and collision.

6.7.9 Notwithstanding the above, there is a risk that construction work undertaken in the breeding season (the species recorded during baseline breeding bird survey work will predominantly breed between March and August inclusive) could result in the damage or destruction of active nests, or killing and injury of young birds. Without mitigation this would contravene the provisions of the Wildlife and Countryside Act 1981 (as amended). The effect of this has not been assessed as measures would inevitably need to be taken to ensure legislative compliance. There is specific guidance, last updated in March 2016, on the SNH website with regard to this[28]. The measures to manage the

[28] https://www.nature.scot/sites/default/files/2017-09/Guidance%20note%20-%20Dealing%20with%20construction%20and%20birds.pdf

implementation of appropriate protection measures would be included in the Construction Environmental Management Plan (CEMP).

6.7.10 Construction phase displacement impacts will be greatest on species that are intolerant of noise and the visible presence of people. Many common species of passerines and some waders breed in or alongside industrial sites, close to major roads and in heavily disturbed areas of farmland if the habitat is otherwise appropriate. However, individuals and populations not exposed to disturbance are unlikely to habituate to it in the short term. It follows that a worst case assessment is that there may be some disturbance of breeding birds resulting from construction, and this could result in declines in productivity in some species during the construction period.

6.7.11 The species that could be significantly affected by disturbance associated with construction are those that use the Proposed Development site with regularity as opposed to commuting across it. These are considered to be: greylag goose, red-throated diver, curlew, dunlin, golden plover, lapwing, oystercatcher, redshank, ringed plover, whimbrel, snipe, great skua, Arctic skua, Arctic tern, and merlin.

Greylag goose

6.7.12 The Proposed Development site is considered to be of **local** importance for greylag goose.

6.7.13 Breeding was confirmed during survey work in 2016 and 2018, with a maximum of 22 territories recorded within the Proposed Development site (in 2018). Disturbance effects have been recorded near to high levels of human activity (e.g. Steiner & Parz-Gollner, 2002) and evidence suggests that geese in north-east Scotland are unlikely to approach within 100 m of roads (Keller, 1991). However, greylags show more tolerance to sources of disturbance than seen in other species of goose, and have been shown to return to disturbed areas once the source of disturbance has passed (Månsson, 2017). Therefore, any disturbance effects are likely to minor, given the extent of the available foraging and breeding habitat available locally.

6.7.14 Given the low proportion of the Proposed Development site made unavailable for foraging and breeding geese as a result of the Proposed Development, disturbance, displacement and land take impacts are likely to be minor in magnitude, and effects are considered to be **significant** at the level of the **Site**.

Mallard

6.7.15 The Proposed Development site is considered to be of importance to mallard at the level of the **Site**.

6.7.16 Three pairs of mallard were recorded within the site during the breeding bird walkover survey work. Mallard are typically highly tolerant to disturbance, and readily habituate to the presence of humans (as evidenced by the species' success in urban environments). However, disturbance effects may still occur for individuals with limited experience of human presence. Effects may be significant, as disturbance could result in nest failures or decrease in condition (due to repetitive forced flight, as indicated by Borgmann (2012). The distance over which disturbance impacts are likely to occur is uncertain (as it will depend on factors such as individual thresholds, breeding status, and availability of cover). However, effects are likely to be **negligible** and **not significant** at any geographic level, given the low number of breeding pairs present within the Proposed Development site, and limited value of the site for mallard.

Red-Throated Diver

6.7.17 The Proposed Development site is considered to be of importance to red-throated diver at the **International Level.**

6.7.18 Red-throated divers are susceptible to disturbance, primarily during breeding, season, but disturbance and displacement of passage birds may also occur (Cramp, 1977). Studies by Bundy (1978) indicate that breeding success is significantly affected in areas where both human disturbance and avian predators (such as gulls and skuas) are present. However, reactions to human disturbance are likely to be influenced by the area of water and availability of cover (Bundy, 1978). Ruddock & Whitfield (2007) suggest that divers are more likely to take flight and show signs of active

disturbance on smaller breeding lochans in response to human disturbance, than they are on lochs with a maximum dimension of about 400 m or greater.

6.7.19 Currie & Elliott (1997) recommend safe working distances for forestry operations of 300 m from established nests with chicks and up to 900 m from nest-building. However, Ruddock & Whitfield, (2007) note that most red-throated divers showed signs of disturbance at about 300 – 500 m distance, and suggest that they are insensitive to the presence of observers on the ground when making foraging flights to and from the nest, as long as the observer is not within around 300 m of the nest site. Individuals also vary greatly in their tolerance to human presence (Bundy, 1978) with some birds having been observed not to leave the nest until approached to within a few metres (Ruddock & Whitfield, 2007). Therefore the upper limits of disturbance to nest-building birds suggested by Currie & Elliott (1997) are likely to refer to line of sight distances, and subject to tolerance of individual birds.

6.7.20 The majority of lochans within the Proposed Development site have sheltered margins, either due to the presence of longer vegetation, or the surrounding landscape[29] (Simon Pinder pers. comm.). Gossa Water is the exception, and can be viewed from as far east as the ridge west of Dalsetter, and as far west as the coast. However, breeding was only observed on the southern margin of Gossa Water during 2018 and appeared to typically support non-breeding birds (un-mated, failed or juvenile birds).

6.7.21 The footprint of the Proposed Development infrastructure approaches to within 298 m of confirmed breeding locations, and to within 230 m of unconfirmed breeding locations.

6.7.22 In the absence of mitigation, the construction phase work is likely to result in disturbance effects on breeding red-throated diver, particularly during the nest building period when tolerance to disturbance is lowest. Despite the temporary nature of disturbance during construction, the magnitude of the impact may still be high. Monitoring by Upton (2012a; 2014a, b) at Burgar Hill wind farm, Orkney suggests that numbers of red-throated diver breeding within the wind farm site showed a marked decrease during construction, and did not recover during eight subsequent breeding seasons.

6.7.23 In the absences of mitigation, disturbance and displacement impacts are therefore likely to be major in magnitude and effects significant at the **International (European)** level. This is a worst-case scenario. The level of significance may be lower if displaced or disturbed divers are able to establish a new territory locally, and will also depend on the visibility of construction activity by red-throated diver, individual tolerance of affected birds to disturbance, and whether or not construction works in proximity to breeding lochs coincides with the breeding season.

Waders

6.7.24 Curlew, dunlin, golden plover, lapwing, oystercatcher, redshank, ringed plover, and snipe have been recorded breeding within the site. Whimbrel has been recorded breeding near to the Proposed Development site, and the site is likely to provide suitable breeding habitat for the species. The site is considered to be important for curlew, whimbrel, dunlin, and golden plover at the **National** level; for snipe at the **Regional** level, for redshank, oystercatcher and ringed plover at the **Local** level and for lapwing at the **Site** level.

6.7.25 Very few studies focussed on wind farm impacts have considered construction phase disturbance effects on breeding waders. Studies by Finney *et al*. (2005); Pearce-Higgins *et al*. (2007) have recorded avoidance of highly disturbed tracks and footpaths. Disturbance effects of golden plover adjacent to Pennine Way, Snake Summit was found to be greatest near to ill-defined footpaths (wherein movement of people over moorland was widespread and unpredictable), but reduced significantly on resurfacing of the footpath, at which point golden plovers only avoided areas within 50 m of the footpath. Similar effects on breeding dunlin were not recorded, and habitat occupancy was found to be greatest close to the footpath. Pearce-Higgins *et al*. (2007) indicates that dunlin nest locations were related to the distribution of suitable habitat locally, rather than an affinity for

[29] The nature of the landscape made survey for red-throated diver difficult from a low number of VP locations. Thirteen local VPs were required to view all lochans effectively.

disturbance. However, the study may demonstrate a high threshold for disturbance in dunlin breeding in optimal habitat of limited availability.

6.7.26 Yalden & Yalden (1989, 1990) found that golden plover typically alarm when humans approached to within 200 m of the nest, and this may reduce nesting or chick provisioning behaviour if persistent. This distance is broadly consistent with Hötker *et al*. (2005) and Pearce-Higgins *et al* (2009) for golden plover disturbance distances from turbines. However, a more recent study by Pearce-Higgins *et al* (2012) reports there is little evidence of population declines in golden plover at wind farm sites, and that golden plover may habituate to wind farms. Pearce-Higgins *et al* (2012) found that there was no significant difference between golden plover, lapwing or dunlin densities at wind farm sites between pre-construction, construction and post-construction phases. In contrast, significant adverse effects were found for curlew and snipe, with densities reducing by up to 40 % within 620 m (for curlew) and 500 m (for snipe) during construction and post-construction phases.

6.7.27 Pearce-Higgins *et al* (2012) indicate that disturbance effects are less likely in species of wader most associated with short-sward vegetation, such as golden plover, dunlin, and lapwing. This is also likely to apply to oystercatcher and redshank; both of which also nest within short swards (Cramp, 1983; surveyor observation). However, disturbance effects are still likely to occur within 200 m of nesting sites (as demonstrated for golden plover).Based on the baseline survey work for the site, between eight and 11 golden plover territories (of a total 13 recorded in 2016 and 15 recorded in 2018) were located within 200 m of the Proposed Development footprint. This number is between 20 and 25 for dunlin (of a total 32 recorded in 2016 and 41 recorded in 2018). Disturbance may therefore affect approximately 60 % of the breeding golden plover and dunlin within the site. In the absence of mitigation, impacts are considered likely to be major for golden plover and dunlin and effects on the population of each significant at the **National (UK)** level.

6.7.28 For redshank, two of the eight territories recorded during the 2018 breeding bird work were within 200 m of the Proposed Development. Given the low breeding density of this species within the site, significance of displacement effects are unlikely to be greater than the **Local** level.

6.7.29 Lapwing were not recorded within the Proposed Development site, and no breeding territories noted within 200 m of the Proposed Development. Oystercatcher were recorded in low numbers (1 in 2016 and 2 in 2018) close to the perimeter of the site. No territories were recorded within 200 m of the Proposed Development. Construction phase disturbance impacts on lapwing and oystercatcher are therefore likely to be **negligible** and **not significant** at any geographic level.

6.7.30 For curlew and snipe, the proportion of breeding pairs within the Proposed Development site likely to be disturbed during construction will be greater given their reported lower tolerance to disturbance. In the absence of mitigation the magnitude of impacts may be major, and effects significant at the **National (UK)** level for curlew and the **Regional (Shetland)** level snipe. The uncertainty will depend on the location of nest sites both in relation to the local landform, and occurrence of construction in close proximity to territory locations during the breeding season.

6.7.31 It is likely, in the absence of species-specific study, that the 620 m disturbance distance applied to curlew will also apply to whimbrel. However, baseline survey work at the site has not recorded whimbrel breeding within this distance of the Proposed Development (the nearest breeding pair were noted approximately 2.4 km from the nearest infrastructure). Construction phase disturbance impacts on whimbrel are therefore likely to **negligible** and **not significant** at any geographic level.

6.7.32 Ringed plover are known to be susceptible to recreational disturbance (Liley, 1999; Liley & Sutherland, 2007). However, the species frequently associates with man-made structures, such as gravel pits and compounds, benefiting from protection from predators (Cramp, 1983). An adult with newly fledged young were recorded at the Dalsetter Water Treatment Works near to the site entrance during breeding bird survey work in 2016. Breeding was not recorded at this location in 2018.

6.7.33 If the Water Treatment Works are used as a regular breeding site for ringed plover, then disturbance and/or displacement is likely to occur during the construction phase. No loss of breeding habitat will occur as a result of the Proposed Development. New breeding opportunities may be provided following construction of the substation compound, and this would result is a beneficial effect.

However, this is also uncertain. Overall, impacts on ringed plover during the construction phase are likely to be adverse, but minor, and temporary in duration. The significance of effects is likely to be at no more than a **Local** level.

Skuas

6.7.34 The Proposed Development site is considered to be important at the **International** level for great skua, and the **National** level for Arctic skua. Great skua and Arctic skua breed within the site. A total of 48 great skua and three Arctic skua apparent occupied territories were recorded during the breeding season of 2018.

6.7.35 Skuas are not considered to be particularly sensitive to disturbance in the non-breeding season when using marine waters (Furness & Wade, 2012; Garthe & Hüppop 2004). Furness & Wade (2012) suggest that both great and Arctic skua fall into the category of birds with "*hardly any escape behaviour and a very short flight distance when approached*[30]". The authors also suggest a low index value of concern for these species in the context of disturbance and/or displacement from offshore wind farms. Great skua and Arctic skua were ranked at 30 and 32 respectively of 38 study species in order of vulnerability to disturbance. A studies by Dawson *et al* (2011) also noted that great skua will nest close to roads (used as a proxy for determining effects of human disturbance), with the greatest factor in nest site selection being proximity to other skua nests.

6.7.36 Notwithstanding this, skuas are renowned for clearly reacting aggressively to human intrusion, and (unpublished) studies[31] have recorded reactions to light aircraft on Foula. Furness (1977) noted that great skua on Foula appeared to select territories in areas free from human intrusion. Similarly, Arctic skua were noted to nest in close proximity to roads and the airstrip on Foula, presumably as these were areas of lowest great skua density. However, this does demonstrate that skuas are adaptable in their tolerance to disturbance.

6.7.37 Given the above, it is reasonable to assume that disturbance distances for both skua species are low, and unlikely to be greater than 100 m (in line with those published for other species with a high tolerance of disturbance in Mallory, 2016; Ruddock & Whitfield, 2007; Currie & Elliott, 1997).

6.7.38 Based on the number and location of apparent occupied skua territories recorded during the 2018 survey work, the Proposed Development may disturb and displace one (of three) Arctic skua territories and 12 (of forty-eight) great skua territories. The impact is considered to be adverse, moderate in magnitude, and effects significant at the **County (Yell)** Level. The impact magnitude is uncertain and will depend on the timing of work and whether or not that occurs in the breeding season. Impact magnitude will be high if active nests are abandoned resulting in nest failure. However, impacts will be far lower (given the adaptability and broad habitat use of skuas) for displaced birds that have not yet laid and can establish a territory away from the source of disturbance.

Terns, fulmar and gulls

6.7.39 The Proposed Development site is considered to be important at the **County** Level for Arctic tern, at the **County** level for fulmar and at the **Local** level for gulls.

6.7.40 Arctic tern were not recorded breeding within the site during breeding bird survey work in 2016 or 2018. The nearest colony was located 430 m west of the Proposed Development. Fulmar were not recorded breeding within the site, and territories noted during the 2018 breeding season work were confined to the cliffs on the west coast of Yell (more than 500 m distant from the Proposed Development infrastructure). Three common gull territories were recorded with in the site. These were located near Grud Waters in the south-western part of the site, approximately 700 m from the nearest part of the Proposed Development. Herring gull, greater black-backed gull, lesser black backed gull and black-headed gull breed within the Survey Area (but not within the site).

6.7.41 Mallory (2016) observed that relatively few gulls and terns appear to initiate flight when humans are greater than 100 m from nests, and a review of disturbance studies by Carney & Sydeman (1999)

[30] This refers to the response of birds sitting on marine waters when approached by boat.

[31] See https://scotlandsnature.blog/2018/05/22/great-skua-behaviour-and-fair-isles-lifeline/

referenced observations of common terns flushing at an average of 80 m, and least terns at an average of 64 m when approached by observers. Hillman *et al*. (2015) found no evidence that military or civilian aircraft adversely affected incubation behaviour for tern species in North Carolina.

6.7.42 Given the distance of Arctic tern colonies, breeding fulmar and gulls recorded during the 2016 and 2018 survey work from the footprint of the Proposed Development, disturbance and displacement impacts during the construction phase are considered unlikely. Effects on terns, fulmar and gulls are considered to be **negligible** and **not significant** at any geographic level.

Merlin

6.7.43 The Proposed Development site is considered to be of importance at the **Regional** level for merlin. Breeding was recorded at two locations within the site during the 2016 and 2018 survey work: one alongside the Burn of Tongafield and another alongside the Burn of Rulesgill. Therefore, direct impacts to breeding birds (through potential disturbance or destruction of nests) are possible in the absence of mitigation.

6.7.44 Ruddock & Whitfield (2007) suggest that the range of disturbance during incubation is between 300 and 500 m. Currie & Elliott (1997) propose a 200 to 400 m buffer for forestry operations. The nest located at the Burn of Tongafield is approximately 500 m from the nearest part of the Proposed Development, which is on the limit of the range suggested by Ruddock & Whitfield (2007) and further than that proposed by Currie & Elliott (1997). The nearest proposed construction works to the Burn of Rulesgill nest is in excess of 600 m.

6.7.45 However, breeding merlin may re-locate nest sites within territories between years, and may nest within disturbance distance of the Proposed Development during the construction phase. If this occurs, then disturbance impacts are likely to adverse and moderate to major in magnitude, and effects significant at the **Regional (Shetland)** level.

6.7.46 Foraging birds may be temporarily displaced as a result of construction phase disturbance; however, effects are likely to be very localised (around active machinery), and **not significant** at any geographical level when taken with the area of foraging habitat available locally.

Other species

6.7.47 The breeding passerine community is considered likely to be of interest at a **Site** level. Indirect effects arising from direct disturbance of nesting birds adjacent to the Proposed Development would be limited in extent and be temporary, especially given the low density of common ground nesting birds present on the site. The overall direct and indirect disturbance effects are assessed as adverse, but **not significant** at any geographical level.

**Operation**

6.7.48 Effects of land take (i.e. decreased resource availability) on birds are likely to be low given the small percentage (<1 %) of the site that will be occupied by the footprint of the Proposed Development (30.6 ha). There is the potential for a particular component of the Proposed Development infrastructure to be sited on, or close to, a specific type and area of habitat used by one or more bird species of high conservation value. That potential effect is assessed, where relevant, in the species text that follows.

6.7.49 The two main ways in which birds can be affected by operational wind farms are: through displacement due to ongoing disturbance caused by the wind turbines and associated equipment (and by periodic servicing of them), and through collision with moving blades or associated infrastructure.

6.7.50 A range of studies have concluded that most bird species are not significantly affected by operational wind farms (e.g. Vauk, 1990; Phillips, 1994; Percival, 2005, 2000 Devereux *et al* 2008; Winkelmann, 1994; Langston & Pullan, 2003; Hotker *et al,* 2006). This is reflected by SNH Guidance (2017) on birds and wind farms which does not, for example, normally recommend surveys for breeding passerines. SNH Guidance, which is the UK standard, indicates that effort should focus on species / species groups that are thought to be susceptible to the effects of wind farms or highly

protected species on which effects remain unclear. In the context of the Proposed Development site, those species that are most susceptible are likely to be those that have a low tolerance to disturbance (such as red-throated diver), that breed on open moorland (such as merlin), and are susceptible to collision (inferred from collision data presented by the Brandenburg Institute: Dürr, 2019).

Displacement

*Greylag Goose*

6.7.51 The Site is considered to be of **local** importance for greylag goose.

6.7.52 Greylag geese may be displaced from suitable breeding habitat within at least 100 m of turbine locations (following observations of disturbance distances by Keller, 1991). Therefore, in addition to direct, permanent land-take by the Proposed Development (32.2 ha), an additional 77.6 ha of effective habitat loss through displacement around turbines may also occur. However, this habitat loss occupies a small proportion (4.6%) of the total site area.

6.7.53 Given the low proportion of the Proposed Development site made unavailable for foraging and breeding geese as a result of the Proposed Development, disturbance, displacement and land take impacts during the operational phase are considered to be **negligible** and **not significant** at any geographic level.

*Mallard*

6.7.54 The Proposed Development site is considered to be of importance to mallard at the level of the **Site**.

6.7.55 Operational phase disturbance and displacement effects are considered to be **negligible** and **not significant** at any geographic level, on account of the species' adaptable disposition, low number of breeding pairs present within the site, and limited value of the site for mallard.

6.7.56 No lochans will be lost as a result of the Proposed Development and, therefore, no land-take impacts will occur.

*Red-throated Diver*

6.7.57 The Proposed Development site is considered to be of importance to red-throated diver at the **International** Level**.**

6.7.58 A monitoring study by Halley & Hopshaug (2007) at Smøla wind farm, Norway found that red-throated divers avoided the wind farm area post-construction, indicating a strong displacement effect. However, the authors do caution that the variation between pre- and post-construction use of the wind farm may be attributable to normal variation between years given the low sample size.

6.7.59 Red-throated diver flight lines reported in Upton (2012a) indicate that birds frequently fly between the individual turbines on Burgar Hill. However, Furness (2015) suggests that this may be true only for turbines arranged in lines (as in the five-turbine Burgar Hill site) and not in array formation.

6.7.60 It is possible, based on empirical evidence that the Proposed Development may result in displacement of breeding birds from within the Proposed Development site. However, displacement is unlikely to occur at all lochans within the site. Flight lines recorded during Red-Throated Diver VP Surveys indicate that birds breeding at six of eight confirmed and possible breeding lochans within the site typically use routes that pass greater than 500 m distant from the proposed turbine locations during foraging trips. Birds flying from lochans on Flonga Field head north onto Gloup Voe; those flying from Fulga Water and Grud Water head west over Markamouth.

6.7.61 For birds breeding at the two lochans at the Hill of Vigeon and Hill of Houllanginga, foraging flights were typically recorded over the proposed locations of turbines 1, 2 and 7. However, a gap of 1.1 km will be present between turbines 2 and 7, and of 770 m between turbines 1 and 2. The turbines at Burgar Hill are located between approximately 360 m and 420 m apart, and divers have been recorded regularly passing between them (as presented above). It is therefore unclear whether or not displacement of birds breeding at Hill of Vigeon and Hill of Houllanginga will occur, as divers have been shown to pass between turbines with smaller separation distances. A precautionary assessment is that displacement effects will be significant at the **National (UK)** level.

6.7.62 It is considered unlikely that the Proposed Development would result in a barrier effect to birds breeding outwith the Proposed Development site. Flight lines recorded during Breeding Diver Survey work indicate that birds breeding to the east of the site fly north from nest sites through Gloup Voe to forage, and those breeding to the south of the site fly west, directly onto the North Sea (see Figures 6.5-6.6). Neither route takes birds through the Proposed Development. It is considered unlikely that birds nesting further afield on Yell would need to pass over the site during flight between nesting sites and foraging grounds, on the basis of the logic that birds will minimise their energy their energy expenditure by taking the shortest flight route. Birds breeding on lochans east of the Survey Area are unlikely to fly over land further west than Gloup Voe, and birds breeding further south than the Survey Area would likely either fly west or east into the Bluemull and Colgrave Sounds pSPA. This is evidenced by the results of the Red-Throated Diver VP Survey work which demonstrates that divers breeding at the Otterswick and Graveland Peninsula SPA (south of the site) do not fly north over the site during foraging trips. Therefore, it is considered that barrier effects are **negligible** and **not significant** at any geographic level.

6.7.63 Effects of habitat loss are likely to be **not significant.** No direct or indirect impacts on breeding lochans will occur. The Proposed Development will not change the physical characteristics of lochans available to red-throated diver, and measures implemented within the CEMP will ensure no impacts resulting from pollution or sedimentation of waterbodies.

*Waders*

6.7.64 Curlew, dunlin, golden plover, lapwing, oystercatcher, redshank, ringed plover, and snipe have been recorded breeding within the site. Whimbrel has been recorded breeding near to the Proposed Development site, and the site is likely to provide suitable breeding habitat for the species. The site is considered to be important for curlew, whimbrel, dunlin, and golden plover at the **National** level; for snipe at the **Regional** level, for redshank, oystercatcher and ringed plover at the **Local** level and for lapwing at the **Site** level.

6.7.65 Hotker *et al* (2006) reported that of 22 operational wind farm sites for which monitoring of wintering golden plover was conducted, six sites showed a minimum disturbance (displacement) distance of 50m, nine of 150m, four of 250m, two of 350m and one 850m. The latter result appears likely to reflect localised circumstances (such as a lack of alternative habitat closer to the site), as it is exceptional. McLoughlin et al (2012) conducted post construction monitoring at Out Newton Wind Farm, in the East Riding of Yorkshire. This study, which recorded considerable baseline use of the area by wintering plovers pre-construction, did not suggest that birds were displaced, as slightly elevated use of the airspace close to the turbines was recorded after construction. Studies by Pearce-Higgins *et al* (2012) also suggest that changes to the population of waders, such as golden plover, dunlin, and lapwing, associated with wind farm operation has little effect on local populations. The authors go on to state that birds may become habituated to operational wind farms following any detrimental effects of disturbance during construction.

6.7.66 Recent studies by BSG Ecology[32] at a wind farm in East Yorkshire have recorded golden plover in winter flocks foraging close to the base of an operational wind turbine, suggesting that golden plovers are tolerant of turbines, albeit the observations were conducted outside of the breeding season. BSG Ecology have also observed flocks of lapwing in fields around the edge of an operational wind farm in Fenland (Cambridgeshire). In this situation considerable alternative farmland was available to the lapwing, and despite also using this area, birds were seen roosting within 100 m of turbines (albeit not between turbines).

6.7.67 If operational phase displacement effects on golden plover, dunlin and lapwing do occur, the extent of effects are likely to be limited to 200 m around the proposed turbine locations. This distance is based on published disturbance distances for these species (Yalden & Yalden, 1989, 1990; Hötker et al. 2005; Pearce-Higgins et al, 2009), and likely to also apply to oystercatcher and redshank (as these are species also most associated with short-sward vegetation; Pearce-Higgins et al, 2012; Pearce-Higgins & Grant 2006; Hancock, Grant & Wilson 2009).

[32] http://www.bsg-ecology.com/golden-plover-operational-wind-farm/

6.7.68 On a precautionary basis, displacement effects on golden plover, dunlin, lapwing, oystercatcher and redshank will be significant at no more than the **local** level given the availability of suitable habitat (beyond the likely extent of displacement) within the Proposed Development site and locally, and likelihood (based on research referenced above) that population-level effects will not occur.

6.7.69 Curlew (and inferred for whimbrel) are likely to be most affected by post-construction displacement based on the study by Pearce-Higgins *et al* (2012). Populations of curlew appear to decline by up to 40% during the construction phase within a 620 metre area around the outermost turbines of a wind farm. The study also showed a 53% decline of snipe within wind farm sites, which is reasonably consistent with an earlier study by Pearce-Higgins that identified a 48% decline in abundance in the species within 500 metres of turbines. The authors state that (non-significant) increases in numbers have been noted at reference sites which may indicate these birds also move into the wider areas to breed as opposed to being lost to the population. However, there is no clear evidence to support this assertion at present.

6.7.70 For curlew and snipe, the proportion of breeding pairs within the Proposed Development site likely to be displaced during operation will therefore comprise a significant proportion of total site population; albeit displaced birds are likely to continue to breed locally. The magnitude of impacts is therefore likely to be moderate, and effects significant at the **County (Yell)** level for curlew and snipe.

6.7.71 Baseline survey work at the Proposed Development site has not recorded whimbrel breeding within this distance of the Proposed Development (the nearest breeding pair were noted approximately 2.4 km from the nearest infrastructure). Operational phase displacement impacts on whimbrel are therefore likely to **negligible** and **not significant** at any geographic level.

6.7.72 For redshank, two of the eight territories recorded during the 2018 breeding bird work were within 200 m of the Proposed Development. Given the low breeding density of this species within the site, impacts are likely to be minor and displacement effects are unlikely to be of greater significance than at the **Local** level.

6.7.73 Despite the documented sensitivity of ringed plover to disturbance (Liley, 1999; Liley & Sutherland, 2007), the Proposed Development may offer additional breeding opportunities (for example, within the substation compound). Displacement and land-take impacts are unlikely to occur give the species' affinity for man-made structures when breeding in-land. Impacts may therefore be beneficial, but given the likely low population locally, will be no more than minor in magnitude and significant at the **Site** level. This assessment is made with a low level of certainty.

*Skuas*

6.7.74 The Proposed Development site is considered to be important at the **International** level for great skua, and the **National** level for Arctic skua.

6.7.75 As outlined in the construction phase impact assessment for these species, skuas are unlikely to demonstrate wide-ranging disturbance or displacement responses during operation of wind farms (Furness & Wade, 2012; Garthe & Hüppop 2004). Displacement effects are likely to be representative of disturbance distances during operation, and unlikely to extend beyond 100 m of the turbine rotor swept area. As a precautionary assessment, it is unlikely that adverse impacts on great skua will be more than minor in magnitude and effects significant at the **Local** level.

6.7.76 A study by Furness (1977) noted that Arctic skua nested in close proximity to roads and the airstrip on Foula. The authors conclude that this association was driven by densities of great skua in less disturbed areas. If great skua are displaced by the Proposed Development, this may open up opportunities for Arctic skua to nest close to turbines. If this effect did occur, then impacts on Arctic skua would be beneficial, minor in magnitude and effects significant at the **Local** level. However, this assessment is made with a low level of certainty as it is reliant on Arctic skua not being displaced.

*Terns, fulmar and gulls*

6.7.77 The site is considered to be of importance at the **County** level for Arctic tern, at the **County** level for fulmar, and the **Local** level for great black-backed gull, lesser black-backed gull, herring gull, black-headed gull and common gull.

6.7.78 Displacement of terns and fulmar is unlikely to occur given that these species were not recorded breeding within the site. The nearest Arctic tern colonies recorded during the survey work were approximately 430 m from nearest proposed turbines. Fulmar nest sites were confined to the coastal cliffs which are in excess of 500 m from the nearest proposed turbine. Three common gull territories were recorded with in the site. These were located near Grud Waters in the south-western part of the site, approximately 700 m from the nearest proposed turbine herring gull, greater black-backed gull, lesser black backed gull and black-headed gull breed within the Survey Area (but not within the site).

6.7.79 Displacement and land-take impacts on terns, fulmar and gulls are therefore considered to be **negligible** and **not significant** at any geographic level.

*Merlin*

6.7.80 The Proposed Development site is considered to be of importance at the **Regional** level for merlin. Breeding was recorded at two locations within the site during the 2016 and 2018 survey work: one alongside the Burn of Tongafield and another alongside the Burn of Rulesgill. The nest sites are located in excess of 500 m from the nearest proposed turbine location. This is beyond the 200 to 400 m buffer proposed by Currie & Elliott (1997), and at the upper limit of the range of 300 – 500 m suggested by Ruddock & Whitfield (2007).

6.7.81 Given that the historical nest sites are beyond the limits of disturbance and, therefore, likely displacement of merlin during the operational phase, it is considered likely that impacts are **negligible** and **not significant** at any geographic level.

6.7.82 The habitats within the Proposed Development site are of value to foraging merlin as they support breeding passerines. Loss of a small proportion of these habitats by the Proposed Development is likely to result in an adverse effect. However, the limited extent of permanent habitat lost (30.6 ha) is a small proportion of the total available locally and is not likely to result in a significant effect on the local population of merlin. Habitat loss during construction is considered to be adverse but **not significant**.

*Other species*

6.7.83 The breeding passerine community is considered likely to be of interest at a **Site** level. The effect on breeding passerines will be the permanent loss of 30.6 ha of suitable breeding habitat from within the site. The direct impact of the loss of a small amount of ground-nesting habitat is assessed as being permanent and adverse, but of **negligible** significance when taken with the total area of available habitat locally.

Collision

6.7.84 The level of collision will depend on the extent to which birds are displaced, and their ability to detect and manoeuvre around rotating turbine blades. Collision risk may also be greater under certain environmental conditions causing reduced visibility, such as haar[33]. Birds that collide with blades are likely to be killed or fatally injured.

6.7.85 SNH and other nature conservation consultees recommend that collision risk of birds at wind farms is calculated using the model developed by Bill Band of SNH (in de Lucas et al, 2007). The extent to which outcomes of modelling reflect observed mortality rates has always been questionable, and the subject of academic debate (Chamberlain et al., 2005; Chamberlain et al, 2006; Madders & Whitfield, 2006; Drewitt & Langston, 2006; Fernley, Lowther & Whitfield (2006)). The main limitations of the model are that pre-construction use of the airspace above a site by birds is assumed to be representative of the use of the airspace following wind farm construction, and that the rate of avoidance applied to the output of the model is often arbitrary. Where empirical estimates of avoidance can be applied, the model becomes a far more useful tool.

6.7.86 Greylag goose, red-throated diver, great skua, Arctic skua, Arctic tern, fulmar, curlew, golden plover, and whimbrel were recorded flying at collision risk height within 280 m of the proposed turbine

[33] A sea mist which occurs at coastal locations between April and September.

locations[34]. SNH (2017) accepts that a "default value" avoidance rate of 98 % can be applied when modelling collision risk for all species of waders and Arctic tern. For greylag goose the accepted avoidance rate is 99.8 % to reflect the uniform and consistent flight lines taken by geese over land (SNH, 2013). Red-throated diver and great skuas can be corrected by 99.5 % as recommended by Funess (2015). This avoidance rate may also be inferred for Arctic skua (owing to their similar flight characteristics to great skua (SNH, 2017)). For fulmar, the recommended avoidance rate is 99.9 % (Maclean *et al* 2009). However, this figure is derived from observations of the species' low flight behaviour below the rotors of offshore wind farms, and may not be applicable to birds in flight over land. Therefore, the default avoidance rate of 98 % will be applied for the assessment of fulmar collision risk on a precautionary basis.

6.7.87 The approach that has therefore been taken has been to look at empirical data for avoidance or typical flight characteristics that may have a bearing on likelihood of collision in each species seen, while also considering modelled collision risk where data have been collected that allow calculations to be made.

6.7.88 Various published studies have concluded that collisions are rare events, often occurring in situations where there are large numbers of birds (such as on narrow-front migratory flyways), or where the behaviour of birds leads to high risk situations (such as where wind turbines are located on the shortest route between a breeding colony and a foraging area) (e.g. Langston & Pullan, 2003; Drewitt & Langston, 2006 ; Hotker et al., 2006). Any source of additional mortality may be significant for long-lived species with low productivity and slow maturation rates, especially if these species are relatively rare or in decline. Assessment of collision risk therefore concentrates on these species, as relevant to the Proposed Development site.

6.7.89 Knowledge of the susceptibility of bird species to collision with wind turbines has taken many years to emerge. Before empirical data were available, it was assumed that species with a high wing loading and low manoeuvrability in flight were likely to be most susceptible to collision with turbine blades. However, as data have emerged it has become clear that this initial assessment was too simplistic.

6.7.90 Table 6.4 below provides a summary of current knowledge of the UK and European population sizes and the known collisions of red kite, kestrel, peregrine and golden plover. It is based on mortality data collated by Dürr (2018), with context provided by European bird population estimates from Birdlife International (2004) and Mebs & Schmidt (2006) and UK population estimates by Musgrove et al (2013).

**Table 6.4 - Known collisions of the birds species that have been evaluated for further consideration in this assessment with wind turbines in Europe (in the context of populations).**

| **Species** | **Known collisions in Europe to date[1]** | **UK population estimate** | | **European population estimate** | |
|---|---|---|---|---|---|
| | | Breeding (pairs) | Winter (Indvs.) | Breeding (pairs) | Winter (Indvs.) |
| Greylag goose | 31 | 46,000 | 230,000 | 259,000-427,000 | 825,000-1,180,000 |

[34] Dunlin, oystercatcher, redshank and merlin were also recorded in the Collision Risk Volume. However, insufficient 'at risk' flight data was generated for these species to complete a meaningful analysis with regard to the site.

| Species | Known collisions in Europe to date[1] | UK population estimate | | European population estimate | |
|---|---|---|---|---|---|
| Red-throated diver | 1 | 1,300 | N/D[2] | 42,100-93,000 | 42,100-44,000 |
| Curlew | 12 | 68,000 | 150,000 | 212,000-292,000 | 480,000-625,000 |
| Whimbrel | 2 | 400-500 | 30 | 343,000-402,000 | N/D |
| Golden plover | 39 | 38,000–59,000 | 420,000 | 630,000-860,000 | 1,350,000-2,440,000 |
| Great skua | 0 | 9,600 | N/D | 16,300-17,200 | N/D |
| Arctic skua | 0 | 2,100 | N/D | 39,900-56,200 | N/D |
| Arctic tern | 0 | 53,000 | N/D | 564,000-906,000 | N/D |
| Fulmar | 3 (1) | 500,000 | N/D | 3,380,000-3,500,000 | N/D |

*[1]UK component in brackets where relevant*

*[2]N/D = Data not available*

6.7.91 Robust monitoring of bird mortality at wind farms is uncommon, and collisions may be under recorded. There will also be biases in the data, as wind farms in some parts of Europe are more frequently and effectively monitored than others, and bird species show differences in abundance across their range which may influence their likelihood of encountering wind farms.

6.7.92 Despite these shortcomings and biases, however, the data collated by Dürr on behalf of the Brandenburg Institute indicate that some species and species groups appear more susceptible to collision than others. In the context of populations, the number of collisions of all species presented here is very small.

*Greylag goose*

6.7.93 Data collated by Dürr (2019) indicate there have been 31 collisions of greylag goose with wind turbines recorded in Europe to date (latest update 09 January 2019). Of these, 16 have been in Germany, six in the Netherlands, four in Norway, three in Spain, one in Austria and one in Belgium. None have been reported in the UK.

6.7.94 Greylag geese were recorded within the Collision Risk Volume for a total of 24 minutes and 14 seconds during the 2016 VP work, and 16 minutes and 17 seconds during the 2017-2018 VP work. Modelling has resulted in a predicted rate of collision of between 0.15 (2016) and 0.12 (2017/18) birds per annum (based on 99.8 % avoidance). This equates to one bird killed every 6.7 to 8.3 years, or between three and four birds killed during the operational lifespan of the Proposed Development. Details are presented in Appendix 6.1.

6.7.95 SNH (2013) presents a review of evidence to derive avoidance rates for grey geese, drawing on US wind farm data, collision data from the German collision database, and observational and radar data from offshore. The conclusion of the review is that "*all the lines of evidence examined point to a single, consistent conclusion which is that geese do not collide with wind farms in numbers that are of conservation concern*". This statement is likely to hold true at the Proposed Development site.

Breeding bird survey work completed in 2016 and 2018 identified 22 (in 2016) and 21 (in 2018) apparent occupied territories within the site. Taking the mean fledging success reported by Cramp (1977) as 4.1, the productivity of the site could be as high as 90 birds per annum. This is unlikely to be the case as not all territories will result in successful breeding attempts, and it is likely that pressure from the large local skua population will reduce the success rate from the reported mean. Notwithstanding this, Harvey *et al*, (2012) report a population increase on Shetland of approximately 17 % to 20 %.per annum, thus evidencing a high regional productivity. In addition, the predicted collision mortality rate is lower than the typical life expectancy of the species (3.8 years, Cramp 1977), and measures to control the expanding population are being implemented in parts of their breeding and wintering range (Mitchell & Brides., 2017). Given these factors, it is unlikely that the predicted collision mortality will have a discernible effect on the local or wider population. Adverse effects on greylag geese arising as a result of collision are considered to be **not significant** at any geographical level.

*Red-throated diver*

6.7.96 Dürr (2019) reports one documented collision for red-throated diver in Europe, occurring at Bremen, Germany. It is possible that the species' tendency to avoid wind farms (e.g. Halley & Hopshaug, 2007; Percival, 2014; Petersen, 2007; Topping and Petersen, 2011) precludes collision risk to some degree. Okill (1994) reports a recovery of a red-throated diver killed by flying into overhead wires, and Funess (2015) provides two further examples of birds reportedly flying into fences on Foula. Furness (2015) further suggests that red-throated diver may actively avoid turbines due to their vulnerability of colliding with objects that they cannot detect over distance.

6.7.97 Post construction monitoring work by Upton (2012a; 2014a, b) at Burgar Hill Wind Farm, Orkney did not find any evidence of red-throated diver collision over eight breeding seasons. However, the Burgar Hill site supports fewer breeding pairs (both pre- and post-construction) than recorded at the Proposed Development site.

6.7.98 Red-throated diver were recorded in flight within the Collision Risk Volume on 34 occasions during VP survey work in 2016, and on 56 occasions during 2018. The total flight time within the Collision Risk Volume for each year respectively was 2 hours, 26 minutes and 5 seconds (in 2016) and 3 hours, 45 minutes and 15 seconds (in 2018). Using a 99.5 % avoidance rate, the rate of collision predicted by the model is between 0.12 (based on 2016 data) and 0.18 (based on 2018 data) collisions per annum. This equates to 1 bird killed every 5.6 to 8.6 years, or between 3 and 5 collisions over the operational lifespan of the Proposed Development. Details are presented in Appendix 6.1.

6.7.99 Red-throated divers are reasonably predictable in their flight behaviour when brooding and provisioning young. Furness (2015; referencing Furness, 1983 and Eriksson, *et al*. 1990) indicate that flights by breeding birds are direct between the nest site and foraging areas at sea, and occur at a consistent frequency. The breeding population within the Survey Area (11 confirmed and 13 unconfirmed breeding pairs recorded in 2018[35]) is likely to represent a small proportion of the total number of individuals present. The surveyors reported up to 103 birds present during breeding bird survey visits in July 2016, the majority of which are likely to have been non-breeding birds. Analysis of the flight lines that pass within the Collision Risk Volume suggest that they are predominantly made up of wheeling and looping flights between lochans, not representative of direct flights expected by breeding birds. In addition approximately 47% of the total number of flights within the Collision Risk Volume (19 of 34 flights in 2016 and 24 of 56 flights in 2018) occurred in August when birds are likely to have been dispersing.

6.7.100 Given this, it is reasonable to assume that collisions are most likely to affect young (first winter / sub adult) or non-breeding birds. It is considered that the effect on the population is, therefore, likely to be imperceptible, as rates of fledgling (due to predation) and overwintering survival for first year birds are likely to be low (as suggested by O'Brien *et al*, 2018). If adult / breeding birds were killed, this would potentially open up an opportunity for the recruitment of sub adults into the breeding population to replace them (which is likely given the number of non-breeding birds present).

[35] Four confirmed and two unconfirmed. Three unconfirmed breeding pairs were recorded in 2016, but breeding was not confirmed within the Site.

6.7.101 The 2018 Shetland Bird Report (SBC, 2018) indicates a mean success rate of 0.58 for nests within monitored areas on Shetland between 2007 and 2016. Applying this rate to the number of confirmed breeding pairs within the Survey Area in 2018 (11 pairs), it would be expected that productivity within the site should reach an average of 6.38 birds per year. A reduction of this productivity rate by 0.14 as a result of collision (based on 2018 data) is unlikely to have significant adverse effect on population of red-throated diver. Adverse effects on red-throated diver arising as a result of collision are considered to be **not significant** at any geographical level.

*Curlew*

6.7.102 There is very little publically available literature on collision of curlew with turbines. SNH have therefore accepted a default avoidance rate of 98 % for this species. However, documented collisions in Europe (Dürr, 2019) are low in the context of populations.

6.7.103 Flights in the Collision Risk Volume were infrequent, with 6 flights recorded in 2016 (with a total flight duration of 7 minutes and 30 seconds) and 5 flights recorded in 2018 (with a total duration of 5 minutes). Modelling based on this data indicates that between 0.02 and 0.03 curlew will collide with turbines per annum, or 1 bird killed every 30 to 40 years. Details are presented in Appendix 6.1.

6.7.104 Taking this predicted rate of collision, it is unlikely that the Proposed Development will kill any curlew during its 30-year operation. Collision impacts on curlew are therefore likely to be **negligible** and **not significant** at any geographical level.

*Whimbrel*

6.7.105 Dürr (2019) reports two collisions of whimbrel with turbines from within Europe, both at Bouin wind farm, France.

6.7.106 Ringing data provided by Clark *et al* (2004) indicate two British ringed birds re-trapped in Bouin: one of which was a bird ringed at Fetlar (likely to be a breeding bird) in June 1987 (re-trapped Bouin April 1993).

6.7.107 A total of 6 flights of whimbrel were recorded during the VP survey work: 5 were recorded during August 2018 and 1 recorded in July 2016. Collision modelling has been undertaken for the 2018 data; however, given the low number of flights recorded, the output is unlikely to be statistically robust. Insufficient flight activity was recorded for whimbrel in 2016 to complete a meaningful analysis, and therefore, collision risk based on 2016 data has not been modelled.

6.7.108 Based on the default avoidance rate of 98 % (as recommended in SNH, 2017), the model predicts a collision mortality rate of 0.2 birds per year, or 1 bird killed every 5 years. Details are presented in Appendix 6.1.

6.7.109 No whimbrel were recorded breeding within the Proposed Development site (three breeding territories (one in 2016 and two in 2018) were recorded at the Lochs of Lumbister approximately 2 km south of the site). In addition, flights by this species within the Collision Risk Volume occurred late in the breeding season of both survey years (July 2016 and August 2018). This would suggest that the airspace over the Site is unlikely to be used regularly by breeding adults, but traversed occasionally by passage birds (including a proportion of fledglings) moving between foraging grounds.

6.7.110 The impacts of mortality on whimbrel may be amplified due to the low regional (290 pairs) and national (400-500 pairs) population. However, the loss of 0.16 birds per annum as a result of collision is unlikely to be discernible, particularly as the risk of collision is likely to be biased towards non-breeding birds. It follows that collision effects on whimbrel will be **adverse** but **not significant** at any geographical level.

*Golden plover*

6.7.111 A total of 39 golden plover fatalities in Europe have been reported by Dürr (2019), with none occurring in the UK. In the context of European breeding and wintering populations, this level of mortality is very low.

6.7.112 Four flights by golden plover were made through the Collision Risk Volume during the 2016 breeding season VP work, and seven flights recorded during 2018. Modelling has predicted a collision rate of between 0.004 (based on 2016 data) and 0.2 (based on 2018 data) birds per annum, or 1 bird killed every to 3.7 to 231 years (assuming a default 98 % avoidance rate). Details are presented in Appendix 6.1. An additional observation of a flock of five birds was made on 05 November 2017. This was the only flight recorded during the winter period, and no further use of the Site by golden plover (feeding or loafing flocks) was noted. No collision risk analysis has been completed for wintering golden plover, as the model is unlikely to provide a statistically viable result.

6.7.113 A maximum flock size of 41 birds was recorded within the Collision Risk Volume on 03 August 2018. All flight recorded in 2016 were made by single birds, and this is likely to account for the large variation in predicted collision risk between years. In addition, the statistical validity of the model when applied to flocking species that undertake non-directional, wheeling flights, such as golden plover is questionable. The model assumes that input data relates to a random flight path taken by (typically) a single bird (such as an eagle or a kite) or a predictable flight path taken by flocks of birds (such as geese or swans) to reach a prediction. SNH reportedly accept the limitations of their model in this regard..

6.7.114 Studies by Whitfield (2007) concluded that the American golden plover (*Pluvialis dominicai)* was able to take avoidance action in more than 99 % of potential collision events. Given the close relationship (in both phylogeny and behaviour) between the two species, it is reasonable to assume that a 99 % avoidance rate can also be applied to European golden plover, resulting in a calculated collision rate at the Proposed Development (based on a worst-case scenario using 2018 data) of one bird every 8.9 years. It is likely, given the exceptionally low mortality rate recorded by Dürr (2019), that the predicted number of collisions is an overestimate.

6.7.115 Notwithstanding this, the risk of collision is considered unlikely to result in a significant impact on the local population, and effects will be indiscernible over the life of the Proposed Development. This view is supported by the findings of Pearce-Higgins *et al.* (2012) which indicate that any increase in mortality through collision with operating turbines, or other changes associated with wind farm operation, has little effect on local (wader) populations. It is considered that collision effects on golden plover will be **adverse** but **not significant** at any geographical level.

*Great skua*

6.7.116 A total of 169 flights by great skua were recorded passing within the Collision Risk Volume during the 2016 breeding season VP work. This resulted in 7 hours, 27 minutes and 1 second of flight time.

6.7.117 A further 15 flights were recorded within the Collision Risk Volume between 20 September and 02 November 2017 during the winter period VP work. However, this activity has not been included in the model. It was considered appropriate in this instance to discount flights by great skua that occurred outside of the breeding season, as flights are infrequent, likely to be made by dispersing or wandering individuals and not representative of the breeding season activity. In addition, the model accounts for the period of the year over which the species are likely to be present within the airspace over the Proposed Development site. It is more robust to indicate that this period is restricted to the breeding season (taken as April to August inclusive) when activity over the site is greatest and most consistent. If this period is extended into the autumn when the majority of individuals have moved off-land and activity over the site is far lower, then this will dilute the output of the model.

6.7.118 Great skua was not recorded as a target species during the 2018 breeding season VP work (as agreed in consultation with SNH; see Section 6.3) due to the large numbers of birds present, and collection of sufficient information in 2016 to robustly inform collision risk.

6.7.119 Modelling based on the 2016 data has resulted in a predicted rate of collision of 0.35 great skuas per year, or 1 bird every 3 years (on the basis of 99.5 % avoidance). Details are presented in Appendix 6.1.

6.7.120 No collisions of great skua with wind turbines in Europe have been documented by Dürr (2019). Upton (2014c) suggest that the recommended collision avoidance rate of 99.5 % for great skua is a precautionary one, and post construction carcass searching at Burgar Hill wind farm, Hammars Hill

wind farm and Hoy community turbine (Upton, 2012b) has resulted in no evidence of collision being found. Funess (2015) further indicates anecdotal evidence that great skua carcasses typically remain in-situ for long-periods due to an apparent reluctance of great skua to scavenge their kin (despite frequently scavenging carcasses of other species). Carcass searches are therefore likely to be a reliable monitoring method for this species, and the conclusions drawn by Upton (2014c) are considered to be robust.

6.7.121 Breeding bird survey work in 2018 recorded 46 apparent occupied territories within the Proposed Development site, with a further 45 territories within 500 m of the site boundary. Productivity within the site is likely to be high and, based on the mean success of birds breeding in monitored areas in Shetland reported by SBC (2018), the site may fledge 21.4 birds per year[36]. This reflects the reported population expansion within the Shetland NHZ of 52 % by the Seabird 2000 and the 2006 - 2013 Seabird Monitoring Program surveys.

6.7.122 Given the current great skua population increases reported in Shetland, and likely high productivity of the Proposed Development site, it is considered unlikely that a loss of 0.27 great skua per year as a result of collision with turbines will have any discernible effect on the population at any geographic level. Adverse effects on great skua arising as a result of collision are considered to be **not significant.**

*Arctic skua*

6.7.123 Three flights by Arctic skua were recorded passing within the Collision Risk Volume during the 2016 breeding season VP work and ten flights were recorded in 2018. This resulted in 5 minutes and 9 seconds of flight time during 2016 and 11 minutes and 4 seconds during 2018. Although very low rates of flight activity within the Collision Risk Volume were recorded, modelling has been undertaken for Arctic skua for completeness. However, from a statistical perspective the validity of running the model based on the recorded activity of Arctic skua is questionable.

6.7.124 SNH (2017) accept an avoidance rate of 99.5 % for Arctic skua based on Furness (2015). This is supported by an absence of documented collisions in Europe (Dürr, 2019). Modelling based on the accepted avoidance parameters has resulted in a predicted rate of collision of between 0.003 (based on 2016 data) to 0.02 (based on 2018 data) Arctic skuas per year, or 1 bird every 66 to 358 years. Details are presented in Appendix 6.1.

6.7.125 Given the model prediction, the likelihood of collision of Arctic skua over the term of Proposed Development operation is **negligible** and **not significant** at any geographical level.

*Arctic tern*

6.7.126 Very low rates of flight activity within the Collision Risk Volume were recorded for Arctic tern. The 2016 VP survey work recorded 7 flights (7 minutes 57 seconds) and the 2018 VP work 3 flights (2 minutes 43 seconds). Collision modelling has been undertaken for Arctic tern for completeness; however, the output is unlikely to be statistically robust.

6.7.127 There have been no specific studies of collision risk in Arctic tern to inform avoidance rates. Therefore SNH (2017) accept the default 98 % avoidance rate for this species. However, the actual avoidance rate for Arctic tern may greater than this since no collisions have been documented in Europe by Dürr (2019) for this species, and the flight habits of terns are akin to gulls and skuas for which an accepted avoidance of 99.5 % is applied.

6.7.128 Nevertheless, modelling based on 98 % avoidance results in a collision rate of between 0.01 (based on 2018 data) and 0.02 (based on 2016 data) Arctic tern killed by collision per annum, or 1 bird killed every 45 to 83 years. Details are presented in Appendix 6.1.

6.7.129 Given the model prediction, the likelihood of collision of Arctic tern over the term of wind farm operation of the Proposed Development is **negligible** and **not significant** at any geographical level.

[36] SBC (2018) indicate an average productivity of 0.466 chicks fledged per apparent occupied nest based on monitoring surveys on six Shetland islands between 2007 and 2016.

*Fulmar*

6.7.130 Fulmar were recorded flying within the Collision Risk Volume on ten occasions (total 22 minutes and 6 seconds) during the 2016 VP work and on 6 occasions (total 14 minutes and six seconds) during the 2018 work. Modelling based on a 98 % avoidance rate suggests that between 0.18 (based on 2016 data) and 0.06 (based on 2018 data) birds will collide with turbines per annum. This equates to 1 bird killed every 5.7 to 17.3 years. Details are presented in Appendix 6.1.

6.7.131 The difference in the prediction of collision risk between years is large, and is likely due to the differences in duration of a low number of flights (and small number of individuals) through the Collision Risk Volume (as the number of recorded flights for both survey years are low). As a worst case, the model predicts that four fulmar will collide with turbines over the operational period of the Proposed Development. However, the number of fatalities is likely to be less than this due to variations in activity over the site (as borne out by the differences of model output between years) and likelihood that avoidance rates in fulmar exceed the default 98 % (as suggested by Maclean *et al*., 2009).

6.7.132 Dürr (2019) has documented three collisions by fulmar in Europe. Of these, one occurred at Blyth Harbour Wind Park in Northumberland, UK. Newton & Little (2009) report that the bird collided with a turbine tower rather than being struck by the blades. It is likely in this instance (given that the collision was with a large static object), that the bird was foraging and, therefore, looking down at the water. This blindness in the direction of flight whilst foraging has been documented in collision prone species (including species of crane, bustard, vulture and eagle) by Martin (2017). However, it is unlikely that fulmar would exhibit this behaviour when flying over land (and therefore, not foraging) and it would be expected that the susceptibility to collision would be greatly reduced in these instances. Indeed, the number of fulmar collisions in Europe documented by Dürr (2019) is very low in the context of populations, and Maclean *et al*. (2009) do not suggest that the species is vulnerable to collision.

6.7.133 There are no breeding fulmars within the Proposed Development site. Territories recorded within the Survey Area were restricted to coastal cliffs to the west of the site. Breeding adults are likely to fly from the nest sites to foraging grounds at sea and, therefore unlikely to pass over the site with any regularity. The majority of flights recorded within the collision risk volume occurred during August (four flights in 2016 and nine flights in 2018) when fulmars are likely to be dispersing, and include a large proportion of newly fledged birds. Collision risk is therefore more likely to impact on dispersing juvenile birds than breeding adults. Given that the Shetland fulmar population is subject to large annual fluctuations (primarily in response to sandeel productivity; Pennington et al, 2004, Balmer et al, 2013, Hayhow et al, 2017, SBC, 2018) it is considered unlikely that the loss of 0.18 birds to collision (as a worst case scenario) will have a measurable impact on the population.

6.7.134 Impacts on fulmar due to collision are likely to be **adverse**, but **not significant** at any geographic level.

### *Decommissioning*

6.7.135 The effects of decommissioning have the potential to be similar to those during construction phase but are likely to occur over a shorter time period.

6.7.136 In the absence of any significant residual hydrological effects (see Chapter 10: *Geology, Peat, Hydrology & Hydrogeology*) there are unlikely to be any effects on statutorily protected sites at the time of decommissioning. Breeding and foraging habitats that are lost during the construction phase will be allowed to regenerate to a condition representative of the baseline and turbine foundations may be left in situ but will be buried with top-soil to allow colonisation of vegetation present within the surrounding sward.

6.7.137 Species most likely to be disturbed and displaced from the Proposed Development site during decommissioning are those that breed, roost or forage within it at that time.

6.7.138 It is reasonable to expect that there will be changes in legislation concerning birds, as well as changes in local populations and distribution over the operational life of the Proposed Development. These may be driven by climatic change, landscape-scale land management, increased effectiveness /

policing of protection, changes in the attitude of land managers to birds, the spread of reintroduced populations, changes on the wintering and staging grounds of migrant species and other factors.

6.7.139 Predictions are not therefore possible, with any confidence, over a 35-year period[37] (particularly given the rate of change in number and distribution of many species over the past 35 years). It follows that effects on birds would be best addressed through a decommissioning phase Environmental Management Plan.

# 6.8 Mitigation

6.8.1 Broad habitat and species mitigation measures for the construction and operational phases of the Proposed Development will be defined within the CEMP. The OHMP (see Appendix 7.7) provides an overview of proposed mitigation, habitat enhancement and focussed monitoring as summarised below.

## *Construction Phase Mitigation*

**General Measures for Ground-Nesting Birds**

6.8.2 All birds are afforded general protection under the Wildlife and Countryside Act 1981 (as amended). This prevents intentional or reckless: killing, injury or taking of any wild bird; taking, damaging, destroying or otherwise interfering with the nest of that bird while it is in use or being built; obstruction of any wild bird from using its nest; and, taking or destroying an egg of any wild bird.

6.8.3 The breeding bird community of the Proposed Development site features species that are listed under Annex 1 of the Birds Directive and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Some of these species are likely to be ecologically linked to SPA populations and afforded protection from disturbance (as well as from nest destruction) during the breeding season.

6.8.4 The below measures are standard mitigation measures (as outlined in Section 6.6), and are applicable to all breeding birds. Additional measures to avoid disturbance of specially protected species during breeding are provided in the following section.

6.8.5 To avoid destruction of the nests of birds (and the killing and injury of nestlings and destruction of eggs), vegetation will be removed in the winter (between October and February inclusive but preferably between November and January). If there is a need for destruction of habitats outside the period October to February inclusive, this will need to be overseen by an ECoW, whose role will be to establish whether breeding birds are present or not.

6.8.6 It is anticipated that the internal access tracks within the Proposed Development site will be laid down in the winter. If this is not possible, and construction has to take place between March and August inclusive, any areas for tracks, material laydown, turbine bases and other infrastructure will be kept short and largely devoid of vegetation during the breeding season until such time that they are developed. This will be achieved by regular ploughing, mechanical cutting or strimming during the breeding season. It is recommended that the areas are initially ploughed in early to mid-March, and again in May if they have not been developed by that point. Between these times, the cleared areas should be visited by an ECoW, to check whether they have been colonised by nesting birds, advise on any restrictions these pose and whether further measures are needed to keep the vegetation under control and deter birds from nesting. These measures will be required for each breeding season during the construction phase.

6.8.7 The ECoW will undertake construction phase surveys of birds within the Proposed Development site, and will record information of breeding success as far as is possible (avoiding disturbance, and following relevant survey guidance provided in SNH, 2017). The data will be used with pre-construction baseline survey data and future data obtained during monitoring work to provide population information across each phase of the development.

[37] Including the 3 year pre-construction period, 2-year construction period and 30 year operational period.

**Pre-Construction Surveys**

6.8.8 Pre-construction survey work will take place during the breeding season prior to the commencement of construction. The aim of which will be to update the baseline information regarding use of the site by breeding birds, and to further inform the CDEMP. The methods will follow those used during the 2016 and 2018 baseline survey work, and will be agreed with SNH prior to commencement.

**Additional Species-Specific Measures**

Red-Throated Diver

6.8.9 Red-throated diver is listed under Annex 1 of the Birds Directive and Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). It is, therefore, afforded protection from disturbance (as well as from nest destruction) during the breeding season. The red-throated diver population within the Site is likely to be linked to the Bluemull and Colgrave Sounds pSPA.

6.8.10 Construction of infrastructure and turbines within 500 m of historical breeding lochans will not be undertaken when red-throated diver arrive (from around mid-March). An Ecological Clerk of Works will monitor diver activity between mid-March and late-July to determine breeding status at each lochan. Once breeding is confirmed and chicks observed to be present, the construction buffer can be reduced based on the results of monitoring, the purpose of which is to identify the distance at which individual pairs start to show evidence of disturbance. The construction buffer will not be reduced below 300 m in line with the lower range of disturbance suggested by Ruddock & Whitfield (2007). Observation will continue at those lochans with confirmed breeding, and within 500 m of active disturbance to check for signs of disturbance behaviour (for example, alarm, frequent diving, or reluctance to return to the nest site). Details of the proposed exclusion measures are provided in Table 6.5.

6.8.11 If heavy construction traffic or active works are anticipated to occur closer than 250 m of an historical breeding lochan, then work will only proceed following the completion of a checking survey that confirms that breeding red-throated diver are not present. If breeding red-throated divers are present then work will only commence once the chicks have fledged and the nest vacated. No work or construction traffic will be allowed within 250 m of any breeding lochan.

6.8.12 These measures are likely to fully mitigate disturbance impacts on breeding red-throated diver during the construction phase of the Proposed Development.

**Table 6.5 - Exclusion zones and timing for avoidance of disturbance to red-throated diver during construction**

| Period | Breeding stage (as confirmed by ECoW) | Work exclusion distance |
|---|---|---|
| Mid-March to July inclusive | Arrival, nest building, incubating | 500 m |
| April to August inclusive | Chick brooding/provisioning | >300 m |

Waders, Skuas and Merlin

6.8.13 Curlew, whimbrel and merlin are listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Golden plover, dunlin, and merlin are listed under Annex 1 of the Birds Directive. The population of dunlin present within the Proposed Development site may be ecologically linked to the Fetlar SPA population. Curlew, whimbrel, golden plover, dunlin and merlin are afforded protection from disturbance (as well as from nest destruction) during the breeding season.

6.8.14 Great skua and Arctic skua are not afforded additional protection under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) or Annex 1 of the Birds Directive. However, the populations

of great skua within the Proposed Development site are likely to be ecologically linked to the Fetlar SPA and Hermaness, Saxa Vord and Valla Field SPA. Arctic skua are Red listed in the UK on account of their national population decline, and are likely to have an unfavourable Conservation Status on Shetland. Therefore, measures to protect these species from disturbance during breeding will also be implemented.

6.8.15 The species listed above will be deterred from breeding within the footprint of the Proposed Development through vegetation management prior to the breeding season commencing. If necessary other nesting deterrents may also be used, such as visual bird scarers (e.g. kites). An ECoW will scan for breeding birds within a perimeter of up to 620 m of the Proposed Development footprint ahead of the active works. The search perimeter for each species will be reflective of the published disturbance distances for each. These are presented in Table 6.7 (below). If breeding is confirmed within the disturbance distance for the species in relation to the Proposed Development footprint, then active works will be prohibited in that area (as marked out by the ECoW) with allowance for passage by low-level construction traffic only until the ECoW is satisfied that the nesting attempt has been concluded / the young are capable of dispersal. The outcome of all recorded nests will be recorded by the ECoW and included in an annual report.

**Table 6.6 - Breeding season search perimeters and exclusion zones around the Proposed Development footprint.**

| Species | Search/exclusion distance |
|---|---|
| Curlew | 620 m |
| Whimbrel | 620 m |
| Lapwing | 200 m |
| Golden Plover | 200 m |
| Dunlin | 200 m |
| Great Skua | 100 m |
| Arctic Skua | 100 m |
| Merlin | 500 m |

### *Operational Phase Mitigation*

6.8.16 Post-construction management of breeding bird habitats within the Proposed Development site will be undertaken for the operational life of the Proposed Development (30 years). The precise management regime will be detailed in a HMP, and will build on the outline objectives and measures provided in the OHMP. The below provides an overview of mitigation measures.

Red-throated diver

6.8.17 If the operation of the wind farm results in the displacement of red-throated diver then the possible worst-case scenario is that the displaced birds will move off site and, if they are dominant, they may displace other birds from existing territories (which may then lose their dominance and become unproductive). Alternatively the displaced birds may lose their dominance when they move into adjacent habitat areas, and ultimately they may also become unproductive. Either way birds will be lost from the breeding population so overall the effect will be a reduction in the number of breeding pairs.

6.8.18 Examination of Ordnance Survey mapping and aerial photography indicates that there are 78 lochans within the Site; however, not all of these may be suitable as nesting locations for red-throated divers. Survey data from 2016 and 2018 indicate that there were unoccupied lochans during the breeding season in both years, which may be due to various reasons including:

- The population of red-throated diver may be below the breeding capacity for the habitat, i.e. there are more lochans than breeding pairs.
- The lochans that are not being used may not be of suitable quality.
- The lochans may be rendered unusable by other factors such as territorial breeding birds.

6.8.19 The breeding bird survey data indicate that in 2016 and 2018 the closest that a nest site (confirmed and unconfirmed) was to a neighbouring nest site was c.400m. It is assumed from this that territorial behaviour by breeding red-throated diver means that nest sites are unlikely to be established within a 400m buffer around an occupied nest site. If this is applied to lochans within the Site, it would be expected that a cluster of lochans in close proximity to each other (i.e. within 400m) may only support a single breeding pair of red-throated diver (not necessarily a pair per lochan).

6.8.20 Within the Site there are 78 lochans arranged in 36 clusters, i.e. if territorial behaviour is taken into account, the 78 lochans may only support up to 36 breeding pairs of red-throated diver. In 2016 a total of 3 breeding pairs of red-throated diver were present (confirmed / unconfirmed) and in 2018 a total of 6 breeding pairs were present.

6.8.21 The high proportion of unoccupied lochans in 2016 and 2018 may be due to low numbers of red-throated diver, but it may also be due to habitat quality, in which case enhancement could increase their suitability. This is also likely to apply to lochans located outside the Site.

6.8.22 It is also possible that actual or perceived predation risk is deterring red-throated diver from nesting at some lochans. Hulka (2010) notes that predation risk is likely to be 'a key factor determining red-throated diver breeding performance, with breeding pairs more successful when predation risk is low, or if they are able to minimise the risk because they have the nutritional resources or nest site quality that enable them to do this'. Given the relative abundance of great skua within the Site and wider Survey Area, it is likely that predation risk is an important factor in determining nest site locations.

6.8.23 When the red-throated diver breeding sites (confirmed and unconfirmed) recorded in 2016 are compared with those recorded in 2018, only 2 locations were used in both years. It therefore seems unlikely that predation by great skua is an important factor given the abundance of this species in both years.

6.8.24 Enhancement of small, degraded lochans and/ or creation of new lochans locally (beyond 500 m of turbine locations) will be undertaken prior to the construction phase commencing (to allow time for enhancement measures to establish prior to operation of the Wind Farm).

6.8.25 Measures for enhancement of lochans for divers will include one or more of the following:

- profiling of degraded or poached margins;
- creating peat islands;
- providing nesting rafts (on sheltered lochans);
- damming lochan outflows to raise and stabilise water levels.

6.8.26 No work will be undertaken within the Gossa Water catchment without the prior approval and agreement of Scottish Water.

6.8.27 The enhancement of lochans will provide new nesting opportunities for those red-throated divers that are displaced by the presence of operating wind turbines and the occasional presence of maintenance personnel. These measures are likely to fully mitigate impacts on displaced red-throated diver during the operation phase of the Proposed Development (birds may be displaced from 2 lochans).

Waders and Merlin

6.8.28 Curlew and whimbrel typically favour serpentine heathlands and moorland on Shetland, but they will also breed on blanket bog and acid grassland (Pennington et al, 2004). Mitigation measures will, therefore, target management of a habitat mosaic locally, and will aim to support the objectives of the Shetland breeding waders action plan.

6.8.29 Grant *et al* (1992) suggest that a mosaic of unimproved heath, with areas seeded with grass after ploughing or harrowing, provide a good foraging and breeding habitat for whimbrel. Identified management areas should also be subject to managed grazing through the provision of stock fencing. Consultation will be undertaken with Shetland Islands Council, SEPA, SNH and Scottish Water to identify appropriate areas for this work.

6.8.30 Merlin may also benefit from areas of heath with reduced grazing pressure. The areas surrounding existing territories within the Proposed Development site will be protected from over-grazing through provision of stock fencing. The extent and location of stock fencing will be detailed in the HMP, but protected areas should be more than 500 m from the nearest turbines, and will aim to support the objectives of the Shetland Action Plan for this species.

6.8.31 Grazing management will also occur near to high densities of breeding dunlin, golden plover, lapwing and snipe. Where retained, these, and other identified areas of blanket bog, should be free from grazing between April and July inclusive to allow a cover sward to develop. A number of scrapes will be also created in areas of managed blanket bog to provide feeding opportunities for waders.

6.8.32 As noted in Chapter 7: *Ecology and Nature Conservation*, the permanent loss of 30.6 ha of blanket bog (and blanket bog containing mosaics) to the Proposed Development will be compensated through peatland restoration elsewhere on Yell. This is described in the OHMP presented in Appendix 7.7, to be agreed with the Shetland Islands Council, SEPA and SNH. Several areas of damaged/degraded peatland are currently being investigated as potential receptor sites for excess peat removed by the Proposed Development.

Monitoring

6.8.33 A comprehensive monitoring programme will be implemented to record the use of the Proposed Development site by birds following construction. Survey effort will be comparable to pre-construction baseline work, and follow industry standard best-practice guidance (SNH, 2009). The frequency of monitoring will be agreed with SNH and other interested parties prior to commencement of any works.

6.8.34 Monitoring surveys will be reported on, and will include a thorough desk-study (including, for example, data from National census surveys, Shetland Bird Club, and SOTEAG reports) to enable comparison of survey data with population trends throughout Shetland as a whole. If monitoring reveals that habitat enhancement measures have not been successful (taking into account population trends etc), a programme of further habitat enhancement will be agreed with SNH and Shetland Islands Council and implemented. This will include further habitat enhancement at locations that are more distant from the wind turbines.

### *Decommissioning Phase Mitigation*

6.8.35 Decommissioning mitigation will broadly follow measures proposed for construction of the Proposed Development. Mitigation will be tailored to avoidance of impacts (through disturbance and displacement) on those species that breed, roost or forage within the Proposed Development site at that time.

## 6.9 Residual Effects

6.9.1 Following the application of mitigation measures, which include land management, residual effects of the Proposed Development on ornithological interest are as follows:

6.9.2 During the construction phase the following impacts may occur:

- Disturbance and displacement of greylag goose (up to 16 territories[38]), red-throated diver (up to 6 territories), curlew (up to 8 territories), dunlin (up to 25 territories), golden plover (up to 11 territories), redshank (up to 3 territories), ringed plover (1 territory), snipe (up to 38 territories), great skua (up to 12 territories), Arctic skua (1 territory), and merlin (2 territories) may occur but this will be minimised through the timing of the work and the use of buffer zones.

6.9.3 Pre-development surveys and the adoption of habitat management measures will ensure that death or injury of any bird is not likely.

6.9.4 During the operation phase the following impacts may occur due to the proximity of turbines:

- Displacement of red-throated diver (up to 6 territories), curlew (up to 8 territories), dunlin (up to 25 territories), golden plover (up to 11 territories), redshank (up to 3 territories), snipe, great skua (up to 12 territories), and Arctic skua (1 territory).
- Collision with turbines of greylag goose (1 bird every 6.7 to 8.3 years), red-throated diver (1 bird every 5.6 to 8.6 years), whimbrel (1 bird every 5 years), curlew (1 bird every 30 to 40 years), golden plover (1 bird every to 3.7 to 231 years), great skua (1 bird every 3 years), Arctic skua (1 bird every 45 to 83 years), Arctic tern (1 bird every 45 to 83 years) and fulmar (1 bird every 5.7 to 17.3 years)

6.9.5 During the decommissioning phase impacts may occur that are similar to those predicted for the construction phase.

6.9.6 Any displaced territories will be accommodated through habitat enhancement to create more favourable nesting habitat. It is expected that displacement effects can be fully mitigated through habitat enhancement.

6.9.7 Collision-related mortality is predicted to be low for all species and of a magnitude where it is expected that there will be no discernible population-level effect above natural mortality levels.

6.9.8 Taking into account the proposed mitigation measures, it is concluded that the proposed development will not have an adverse effect at greater than the Local level for any species using the site and immediate surrounding area.

6.9.9 Taking into account the proposed mitigation measures, it is concluded that the proposed development will not have a significant adverse effect on the integrity of Bluemull and Colgrave Sounds pSPA, Otterswick and Graveland SPA, Fetlar SPA, Hermaness and Saxa Vord and Valla Field SPA. The land within the Site is functionally linked to the Bluemull and Colgrave Sounds pSPA for red-throated diver and to the Fetlar SPA for dunlin. Proposed measures will ensure that impacts on red-throated diver and dunlin (and other SPA qualifying features) are mitigated. Effects on all other designated sites are considered to be not significant.

6.9.10 There is an inherent level of uncertainty associated with ecological assessment (as is acknowledged in CIEEM Guidance). However, post-construction monitoring is proposed to address areas in which there is a lack of empirical data to support conclusions. This will inform future applications.

6.9.11 This assessment has fully considered the principles of and guidance provided by Scottish Planning Policy, the Nature Conservation (Scotland) Act 2004, the Shetland Local Development Plan 2014, and the Shetland Local Biodiversity Action Plan. In particular, consideration has been given to international responsibilities and the protection of designated sites. From an ornithological perspective, the Proposed Development is compatible with all relevant recommendations of these policy documents.

## 6.10 Cumulative Assessment

[38] Based on the maximum number of territories recorded /year within published disturbance distance of infrastructure.

6.10.1 SNH (2012) guidance states that a cumulative ornithological assessment should assess the effects of the proposal in combination with:

- existing development, either built or under construction;
- approved development, awaiting implementation; and,
- proposals awaiting determination within the planning process with design information in the public domain.

6.10.2 Cumulative effects are most likely to result with regard to those receptors for which a significant residual effect is predicted, particularly if the core range of these receptors includes other planned, consented or built development. SNH noted (in their scoping opinion, dated 08 February 2018) that the Shetland NHZ should be the appropriate scale for consideration of cumulative impacts. SNH further advised that the key species for cumulative assessment should be red-throated diver, merlin, curlew and dunlin.

### *Wind farm Developments Considered*

6.10.3 There are five consented or operational wind farms within the Shetland NHZ for which information has been sought. These are presented in Table 6.8.

**Table 6.8 - Wind farm Developments Considered as part of Cumulative Assessment.**

| Wind farm | Distance (km) | Number of turbines | Status |
|---|---|---|---|
| Garth | 1.5 | 5 | Consented |
| Beaw Field | 15.3 | 17 | Consented |
| Viking | 37.3 | 103 | Consented |
| Gremista | 53.2 | 3 | Consented |
| Mossy Hill | 55.6 | 12 | Application |

6.10.4 The ES for the five-turbine Garth Wind Farm, which is 1.5 km from the Site at its closest point, did not predict any significant effects on birds using the site. The predicted collision mortality rate for red-throated diver was 1 bird every 10-11 years (North Yell Development Council, 2009). This compares with a predicted collision mortality rate of 1 bird every 5.6 to 8.6 years for the Energy Isles Wind Farm. During the operational life of the Garth Wind Farm (30 years) it is estimated that 3 birds could be killed, compared with a worst-case estimate of 5 birds for the Energy Isles Wind Farm. The total impact would therefore be 8 birds in 30 years or 1 bird every 3.75 years.

6.10.5 The assessment for the Beaw Field Wind Farm predicted a negligible impact on all assessed species (Peel Energy, 2016), including impacts on whimbrel and red-throated diver. As a negligible impact is predicted for these species it is unlikely that an in-combination effect will occur given that Beaw Field Wind Farm is 15.3 km from the Site. The separation distance between the two wind farm sites leads to the conclusion that they are unlikely to the impacting on the same population of any particular species.

6.10.6 The assessment for the Gremista Wind Farm also predicted a negligible impact on all assessed species (Amec, 2011), including impacts on whimbrel and red-throated diver. As a negligible impact is predicted for these species it is unlikely that an in-combination effect will occur given that Gremista Wind Farm is 53.2 km from the Site.

6.10.7 The Mossy Hill Wind Farm ES predicted collision rates of less than one red-throated diver every ten years, and negligible impacts on all other species (Peel Energy, 2018). As this development is more

than 55 km away from the Proposed Development it is very unlikely that it will impact on the population of red-throated diver that is resident in north-west Yell.

6.10.8 The Viking Wind Farm ES (Natural Research Projects, 2009) predicted moderate significant adverse residual effects on merlin and whimbrel. These were: operational disturbance of merlin, and operational disturbance and collision mortality of whimbrel (at a rate of between 9.6 and 10.5 collisions per year). No further significant effects were predicted.

### *Assessment of Cumulative Effects*

6.10.9 Local significant effects have been predicted for red-throated diver, curlew, dunlin, golden plover, snipe, merlin and great skua as a result of construction and operation of the Proposed Development. Given that the schemes considered above have not predicted significant impacts on these species, it is considered unlikely that the residual impacts arising as a result of the Proposed Development would be significantly greater when taken in combination with other wind farm developments than in isolation.

6.10.10 No significant residual impacts on whimbrel are predicted during the construction or operational phases of the Proposed Development. No whimbrel territories were recorded within the Site during survey work in 2016 and 2018, and collision risk modelling has predicted a mortality rate of 1 bird every 5 years. Merlin nests recorded during survey work at the Site are located beyond 500 m of nearest proposed turbines, which is at the upper limit of published disturbance distances for merlin. Impacts may occur if merlins nest closer to the Proposed Development infrastructure during construction; but any effects will be fully mitigated through implemented mitigation measures. Operational phase disturbance will be negligible after mitigation, and collision mortalities are unlikely to occur.

6.10.11 Given the absence of likely significant residual effects on merlin and whimbrel as a result of construction and operation of the Proposed Development, it follows that in-combination effects in relation to the Viking Wind Farm are unlikely to occur.

## 6.11 Summary

6.11.1 The ornithological assessment considers potential effects on birds at each of the construction, operational and decommissioning phases of the Proposed Development.

6.11.2 Consultation with consultees, including Scottish Natural Heritage, has been extensive throughout the assessment process and baseline data was collected between April 2016 and August 2016 inclusive and between October 2017 and August 2018 inclusive.

6.11.3 Survey work at the site to inform the assessment has included:

- Vantage Point (VP) surveys;
- Red-throated diver VP surveys;
- Breeding diver surveys;
- Breeding raptor surveys;
- Moorland breeding bird surveys; and
- Wintering bird walkover surveys;

6.11.4 This assessment has fully considered the principles of and guidance provided by Scottish Planning Policy, the Nature Conservation (Scotland) Act 2004, the Shetland Local Development Plan 2014, and the Shetland Local Biodiversity Action Plan. In particular, consideration has been given to international responsibilities and the protection of designated sites. From an ornithological perspective, the Proposed Development is compatible with all relevant recommendations of these policy documents.

6.11.5 There are no sites designated for ornithological interest on the Proposed Development site and it is unlikely that any designated sites would be affected by the Proposed Development.

6.11.6 The assessment has accounted for measures designed into the Proposed Development and those that will be committed to in the project Construction Environment Management Plan. The assessment has also considered the Proposed Development in combination with other wind farm schemes in Shetland.

6.11.7 A range of bird species typical of moorland habitats on Shetland were recorded during the surveys. Those carried through to assessment include: greylag goose, mallard, red-throated diver, curlew, dunlin, golden plover, lapwing, oystercatcher, redshank, ringed plover, whimbrel, snipe, great skua, Arctic skua, Arctic tern, fulmar, great black-backed gull, lesser black-backed gull, herring gull, black-headed gull, common gull, and merlin. The assessment has concluded that residual effects of disturbance and displacement during the construction and operation phases are likely to be of no more than local significance. Collision-related mortality is predicted to be not significant for all species and of a magnitude where it is expected that there will be no discernible population-level effect above natural mortality levels.

6.11.8 Overall, construction and operational phase ornithological effects are likely to be localised.

**Table 6.2 – Summary of Effects[39]**

| Description of Effect | Significance of Potential Effect | | Mitigation Measure | Significance of Residual Effect | |
|---|---|---|---|---|---|
| | Significance | Beneficial/ Adverse | | Significance | Beneficial/ Adverse |
| Construction | | | | | |
| Bluemull and Colgrave Sounds SPA: disturbance and displacement of red-throated diver | International | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Fetlar SPA: disturbance and displacement of dunlin and great skua | International | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| East Mires SSSI: disturbance and displacement of moorland breeding birds | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Hascosay SSSI: disturbance and displacement of dunlin | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| North Fetlar SSSI: disturbance and displacement of great skua | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |

[39] Note, those effects considered to be not significant before mitigation have not been included in this table.

| Description of Effect | Significance of Potential Effect | | Mitigation Measure | Significance of Residual Effect | |
|---|---|---|---|---|---|
| | Significance | Beneficial/ Adverse | | Significance | Beneficial/ Adverse |
| Lamb Hoga SSSI: disturbance and displacement of dunlin and great skua | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Greylag Goose disturbance and displacement. | Site | Adverse | Timing of works or pre-construction check for nesting birds. | Negligible | Adverse |
| Red-throated diver disturbance and displacement. | International | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Curlew disturbance and displacement. | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Dunlin disturbance and displacement. | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Golden plover disturbance and displacement. | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Redshank disturbance and displacement. | Local | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |

| Description of Effect | Significance of Potential Effect | | Mitigation Measure | Significance of Residual Effect | |
|---|---|---|---|---|---|
| | Significance | Beneficial/ Adverse | | Significance | Beneficial/ Adverse |
| Ringed Plover disturbance and displacement. | Local | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Snipe disturbance and displacement. | Regional | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Great skua disturbance and displacement. | County | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Arctic skua disturbance and displacement. | County | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Local | Adverse |
| Merlin disturbance and displacement. | Regional | Adverse | | Local | Adverse |
| Operation | | | | | |
| Bluemull and Colgrave Sounds SPA: displacement of red-throated diver | International | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Fetlar SPA: displacement of dunlin and great skua | International | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |

| Description of Effect | Significance of Potential Effect | | Mitigation Measure | Significance of Residual Effect | |
|---|---|---|---|---|---|
| | Significance | Beneficial/ Adverse | | Significance | Beneficial/ Adverse |
| East Mires SSSI: displacement of moorland breeding birds | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Hascosay SSSI: displacement of dunlin | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| North Fetlar SSSI: displacement of great skua | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Lamb Hoga SSSI: displacement of dunlin and great skua | National | Adverse | Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season. | Negligible | Adverse |
| Red-throated diver displacement. | International | Adverse | Enhancement of lochans on- and off-site to provide breeding opportunities for potentially displaced birds. | Local | Adverse |
| Curlew displacement. | County | Adverse | Habitat management on- and off-site to retain local population density. | Local | Adverse |
| Dunlin displacement. | Local | Adverse | Habitat management on- and off-site to retain local population density | Site | Adverse |
| Golden displacement. | Local | Adverse | Habitat management on- and off-site to retain local population density | Site | Adverse |

| Description of Effect | Significance of Potential Effect | | Mitigation Measure | Significance of Residual Effect | |
|---|---|---|---|---|---|
| | Significance | Beneficial/ Adverse | | Significance | Beneficial/ Adverse |
| Redshank displacement. | Local | Adverse | Habitat management on- and off-site to retain local population density | Site | Adverse |
| Snipe displacement. | County | Adverse | Habitat management on- and off-site to retain local population density | Local | Adverse |
| Great skua displacement. | Local | Adverse | N/A | Local | Adverse |

**Table 6.0 – Summary of Cumulative Effects**

| Receptor | Effect | Cumulative Developments | Significance of Cumulative Effect | |
|---|---|---|---|---|
| | | | Significance | Beneficial/ Adverse |
| Red-throated diver | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |
| Curlew | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |
| Whimbrel | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Negligible | Adverse |
| Dunlin | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |
| Golden plover | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |
| Snipe | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |
| Great skua | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |
| Merlin | Disturbance, displacement and collision mortality | Garth, Beaw Field, Viking, Gremista and Mossy Hill | Local | Adverse |

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