

7 Ornithology

Contents

7.1	Executive Summary	7-1
7.1	Introduction	7-1
7.2	Legislation, Policy and Guidelines	7-2
7.3	Consultation	7-3
7.4	Assessment Methodology and Significance Criteria	7-6
7.5	Baseline Conditions	7-12
7.6	Receptors Brought Forward for Assessment	7-22
7.7	Identification and Evaluation of Key Impacts	7-24
7.8	Likely Effects	7-25
7.9	Additional Mitigation and Enhancement	7-34
7.10	Residual Effects	7-35
7.11	Cumulative Assessment	7-36
7.12	Summary	7-42
7.13	References	7-48

This page is intentionally blank.

7 Ornithology

7.1 Executive Summary

- 7.1.1 Following consultation with Scottish Natural Heritage, a suite of ornithological surveys was adopted for the purposes of assessing the avian baseline conditions for the Proposed Development. The surveys included: vantage point surveys, breeding bird surveys, breeding raptor surveys and high tide roost counts surveys, all undertaken between April 2018 and March 2019.
- 7.1.2 Three species of high conservation value; raptor and owl, and one species of common raptor were registered during the breeding season. None were assessed as breeding within the site, one species was recorded as breeding within the 2 km survey area. Twelve species of wildfowl and divers were recorded during the non-breeding season, while none were recorded as breeding. Five species of gull were recorded during both the breeding and non-breeding seasons. Eight species of waders were recorded, seven were recorded as breeding. Although the levels of recorded flight activity are considered to be low or moderate, for the purposes of completeness, collision risk modelling was undertaken for greylag goose, lapwing, oystercatcher, redshank, golden plover and curlew.
- 7.1.3 The results of surveys previously undertaken for a proposed development at the same location were compared with the results from the Proposed Development and presented little change to the significance of effects.
- 7.1.4 An assessment of ornithology effects arising from the construction and operation of the Proposed Development was undertaken, based on the current proposed layout and turbine dimensions. Through a standardised evaluation method, Important Ornithological Features were identified and brought forward for assessment. Important Ornithological Features taken forward for further consideration include four designated sites (North Orkney proposed Special Protected Area (SPA); Orkney Mainland SPA, Keelylang Hill and Swartaback Burn Moors Site of Special Scientific Interest (SSSI) and West Mainland Moors SSSI) and ten species and species groups (greylag goose, lapwing, oystercatcher, redshank, golden plover, curlew, other waders, pSPA qualifying species and other wildfowl and gull species).
- 7.1.5 In line with guidelines, the impact assessment process assumes the application of standard mitigation measures. With these in place, predicted effects were considered to be barely perceptible and therefore not significant for all Important Ornithological Features. With further specific mitigation detailed, residual impacts for construction and operation phases are considered to have barely perceptible adverse significance, i.e. not significant.
- 7.1.6 Likely cumulative effects of nearby operational developments, as well as those currently consented or at application stage of planning, were also considered and no significant cumulative effects are anticipated as a result of the Proposed Development.
- 7.1.7 The assessment concludes that there would be no significant adverse effect on any of the ornithological interests of the site, as a result of the Proposed Development.

7.1 Introduction

Scope of Study

- 7.1.8 This chapter considers and provides an assessment of the likely effects of the Proposed Development on the ornithological interests both within the development boundary (i.e. 'the site') and the surrounding area.
- 7.1.9 This chapter presents the baseline ornithological interests and considers the likely impacts of the Proposed Development on notable species, while focusing on Important Ornithological Features (IOFs).

- 7.1.10 Likely ornithological effects of the Proposed Development are outlined and an assessment is provided based on the value of the receptor and the magnitude of the impact giving the significance of the effect. Where appropriate, mitigation measures to enhance, prevent, minimise or control identified ornithological effects are presented and residual ornithological effects following the adoption of those measures are assessed.
- 7.1.11 This chapter (and its associated figures and appendices) is not intended to be read as a standalone assessment. As such, reference should be made to Technical Appendices 7.1, 7.2 and 7.3, as well as other chapters of this EIA Report as referenced appropriately.
- 7.1.12 Likely ornithological effects associated with the development of a wind farm can occur throughout the three main phases of a wind farm's lifespan (construction, operation and decommissioning) and may include: direct habitat loss and indirect effects on habitat quality, mortality from collision with turbines and disturbance and displacement impacts.

Description of the Site

- 7.1.13 The site lies approximately 2.7 km north-west of Kirkwall town centre boundary on The Mainland of Orkney within the Orkney Islands. The site comprises pasture farmland, at times used for crops. It is divided into large regular fields, with a network of tracks.
- 7.1.14 The site is generally flat, with Wideford Hill rising steeply to the south of the site area. The site elevation is approximately 20 m above Ordnance Datum (AOD) at the southern edge of the site, falling very gently to approximately 10 m AOD in the central site area, and sea level at the northern site boundary. The site is centred on grid reference (BNG) 341560, 1013640 and occupies an approximate area of 172.27 hectares.
- 7.1.15 There are no substantial watercourses onsite, although several field drains are marked on 1:10,000 scale Ordnance Survey (OS) mapping and were observed during site reconnaissance. There are several small ponds/lochans in the north-west corner of the site, although these are confirmed to be rainwater fed and ephemeral in nature.
- 7.1.16 There are no residential properties within the site boundary. Quanterness farmhouse and cottages are located south of the site boundary, over 600 m from the nearest turbine location, and there are additional properties at Saverock to the south-east. All properties have been appropriately buffered in terms of proposed turbine siting, to minimise residential amenity impacts.

Statement of Competence

- 7.1.17 The assessment has been carried out in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management (CIEEM) by Allan Taylor (BA (Hons), MSc. ACIEEM) and Richard King (BSc (Hons), MSc., MCIEEM), ecologists and ornithologists with over 18 combined years' experience.

7.2 Legislation, Policy and Guidelines

- 7.2.1 Relevant legislation documents have been taken into account as part of this ornithological assessment. Of particular relevance are:
- Council Directive 2009/147/EC on the conservation of wild birds (i.e. the "Birds Directive");
 - The Ramsar Convention on Wetlands (1975);
 - The Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
 - The Wildlife and Countryside Act (WCA) 1981 (as amended);
 - The Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
 - The Nature Conservation (Scotland) Act 2004 (as amended);
 - The Scottish Biodiversity Strategy, with Scottish priority species and habitats listed on the Scottish Biodiversity List (SBL), is also pertinent and is based on the former UK Biodiversity

Action Plan (UK BAP), and regional biodiversity targets defined through the Orkney Local Biodiversity Action Plan (LBAP) (Orkney Islands Council, 2013); and

- Eaton et al (2015), Birds of Conservation Concern (BoCC) 4: the Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man.

Planning Policy

7.2.2 Chapter 5 of this EIA Report sets out the planning policy framework that is relevant to the EIA process. The policies set out include those from the Orkney Local Development Plan (LDP) (2017), those relevant aspects of Scottish Planning Policy (SPP), Planning Advice Notes and other relevant guidance. In addition to policies within SPP and the LDP relevant to ornithology and nature conservation, regard has been had to the Planning Advice Note (PAN) 60: Planning for Natural Heritage (amended in 2008).

Best Practice Ornithological Guidance

7.2.3 As well as detailed consultation with Scottish Natural Heritage (SNH), current best practice guidance on assessing ornithological interests in relation to onshore wind farm developments was followed. A full description of relevant guidance is presented in Technical Appendix 7.1; however, of particular relevance to ornithology are the following:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018);
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2005);
- Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities (SNH, 2017); and
- 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, 2018a);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al.* 2007); and
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012).

7.3 Consultation

7.3.1 Table 7.1 provides details of consultations undertaken with relevant regulatory bodies, together with action undertaken by the Applicant in response to consultation feedback.

Table 7.1 – Consultation Responses

Consultee	Consultation Response	Applicant Action
Orkney Islands Council (Policy Officer - Environment)	The proposed development area is close to the Keelylang and Swartaback Burn Site of Special Scientific Interest (SSSI) which forms part of the Orkney Mainland Moors Special Protection Area (SPA). Breeding and non-breeding hen harrier, breeding short-eared owl and breeding red-throated diver are qualifying species of the SPA. Wide Firth, which borders the proposed development area, forms part of the North Orkney proposed SPA (pSPA),	All points noted and all designated sites are taken into account in the assessment. Collision risk analysis has been undertaken on six key target species.

Consultee	Consultation Response	Applicant Action
	<p>where the qualifying features are breeding red-throated diver and wintering wildfowl.</p> <p>Hen harrier and short-eared owl may forage within and around the site and red-throated diver may cross the area as they fly between their nesting sites in the moorland hills to feed at sea. In line with the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), an assessment should be undertaken of the likely direct and indirect effects of the proposal on the qualifying interests of these sites, and any other SPA with qualifying species whose foraging range includes the proposed development area.</p> <p>The assessment should address the effects of all stages of the proposal on the bird species of the sites, including collision risk, displacement due to disturbance, and loss of foraging habitat. It should also consider the cumulative impact of the proposal with other wind turbine developments, including any wind energy proposals which are currently in the planning system. Vantage Point surveys should be undertaken in line with current guidance which may be accessed from the SNH website at www.nature.scot, and advice should be sought from SNH on the scope and frequency of these surveys, as well as potential vantage point locations.</p> <p>The Keelylang Hill and Swartaback Burn SSSI is designated because of both its habitats and its bird species. Whilst the Proposed Development appears unlikely to impact the habitats of the SSSI, effects on its breeding bird assemblage should be considered in the EIA. Please note that breeding hen harrier and short-eared owl are features of both the SSSI and the Orkney Mainland Moors SPA; therefore, impact on these species will be covered by the assessment of effects on the SPA.</p>	<p>All other wind farms in Orkney have been taken into consideration as part of the cumulative assessment.</p>
	<p>The proposed development area is also close to a number of Local Nature Conservation Sites (LNCS), which support a range of breeding and foraging birds, including birds of prey such as short-eared owl, hen harrier and merlin. Many of these birds are identified in the Scottish Biodiversity List as priority species for conservation. LNCS closest to the proposed development site are Wideford Hill, Rennibister and North Mainland Coast: Evie to Finstown. Bridgend LNCS is approximately 3km to the south-west. The EIA should assess and address the likely effects of the development on the interests of these sites.</p>	<p>LNCS are taken into account in the assessment.</p>

Consultee	Consultation Response	Applicant Action
SNH Scoping Response	<p>The content of the scoping report appears appropriate and we concur that the following key areas will require assessment as part of the EIA process:</p> <p>Potential impacts to Protected Areas, including the Orkney Mainland Moors Special Protection Area (SPA) and North Orkney pSPA (proposed SPA) alone and in combination with other proposals or plans in the area.</p>	<p>All points noted and all designated sites are taken into account in the assessment.</p> <p>Collision risk analysis has been undertaken on six key target species.</p> <p>All other wind farms in Orkney have been taken into consideration as part of the cumulative assessment.</p>
	<p>Orkney Mainland Moors SPA</p> <p>The Environmental report should include bird survey data and analysis for both Hen harriers and the breeding Short-eared owl. The report should consider the potential for disturbance, displacement and/or collision risk.</p> <p>North Orkney pSPA</p> <p>The features of the proposed SPA are wintering waterfowl and breeding red-throated diver.</p> <p>The proposed wind farm is located close to the pSPA and potential impacts to the qualifying interests (through disturbance, displacement and/or collision risk) should be considered through survey and assessment in accordance with our bird survey guidance.</p>	<p>All points noted and all designated sites are taken into account in the assessment.</p>
	<p>Keelylang Hill and Swartaback Burn SSSI</p> <p>The site is designated for both habitat and bird species. From the information provided in the application it is unlikely that there is connectivity with the upland assemblage habitat feature of the SSSI. Survey and assessment for the breeding bird assemblage may need to be considered, and we can provide a list of species to the applicant on request. Both the breeding hen harrier and short-eared owl features would be covered by the assessment of the Orkney Mainland Moors SPA.</p> <p>West Mainland Moorland SSSI</p> <p>The site is designated for both habitat and bird species. From the information provided in the application, it is unlikely that the blanket bog and upland assemblage habitat will be affected by the proposal. The bird species of the SSSI will be covered by the assessment of the Orkney Mainland Moors SPA.</p>	<p>All points noted and all designated sites are taken into account in the assessment.</p>

Consultee	Consultation Response	Applicant Action
SNH phone conservation / email confirmation. Senior Casework Manager 27 th February 2019	Following the provision of a summary report from ITPE of the survey results from Quanterness Ornithology surveys and Comparison with 2006/7 results. "I agree there would be little added value in undertaking another year of bird surveys for the Quanterness site."	No action required.
RSPB Scoping Response 24 th May 2019	On the survey effort point, we do not support the proposal to undertake only one years' worth of data collection. A lack of two years' worth of data will serve to increase any uncertainties in the assessment and devalue the robustness of its conclusions. Further, we have not been party to the justification provided to take only 1 year of survey.	See SNH response (dated 27 th February 2019) in row above.
	As stated in the report, there are a number of designated sites, including SPAs and pSPAs, within 20 km of Quanterness. Due consideration should be given to potential connectivity to these sites, particularly with regard to the collision risk impacts on their qualifying features and any in-combination impacts from other relevant developments	All points noted and all designated sites are taken into account in the assessment. Collision risk analysis has been undertaken on six key target species. All other wind farms in Orkney have been taken into consideration as part of the cumulative assessment.

7.4 Assessment Methodology and Significance Criteria

7.4.1 This section identifies the 'key ornithology and nature conservation issues' which have been considered as part of the Ornithological Impact Assessment, describes the methods used to establish baseline conditions and assess the magnitude and significance of the likely ornithological effects of the Proposed Development.

Desk Study

7.4.2 A desk study was undertaken of web-based resources to identify baseline data for the Proposed Development site and wider area. Where relevant, the desk study was supplemented by consultation with relevant non-statutory organisations for a 5 km radius of the Proposed Development.

7.4.3 In order to further identify baseline data for the Proposed Development, the results of ornithology surveys undertaken in 2006 and 2007 were researched. The surveys were undertaken for a previous proposal of broadly a similar size and location to the current application.

Site Scoping Visit

- 7.4.4 The scope of the ornithology surveys, including field survey methods and vantage point (VP) locations, were developed and agreed with SNH, taking cognisance of current best practice guidance (SNH, 2017).

Field Studies

- 7.4.5 Ornithology field surveys for the Proposed Development were carried between April 2018 and March 2019.

- 7.4.6 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.

- 7.4.7 SNH (2017) guidance indicates that wind farm assessments should focus on ‘target species’. SNH defines ornithological 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, vulnerable or warrant species consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the proposed wind farm; and
- Species occurring at the site in nationally or regionally important numbers.

- 7.4.8 SNH guidance goes on to note that consideration should be given to species of local conservation concern (i.e. those listed in LBAPs), but that target species should be restricted to those likely to be affected by wind farms. 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, geese and wading bird species within and adjacent to the site.

- 7.4.9 A summary of the ornithological methods adopted is provided in this chapter, however please refer to Appendix 7.1 for the full details.

Study Area

- 7.4.10 Appropriate study areas for each survey were derived from best practice guidance (SNH, 2017) and are provided below:

- Flight activity VP surveys: the Proposed Development site boundary plus 500 m;
- Breeding birds walkover survey: the Proposed Development site boundary plus 500 m;
- High Tide Roost Count survey: the Proposed Development site boundary plus 500 m; and
- Breeding raptor survey: the Proposed Development site boundary plus 2 km.

Vantage Point surveys

- 7.4.11 SNH guidance advises that 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, vegetative screening and any other constraints to effective survey). A minimum of 36 hours of survey effort should be completed at each VP during both the breeding season and winter periods, and the timing of VP watches should be varied to ensure that all times of day are appropriately covered.

- 7.4.12 One VP was initially selected following review of aerial imagery and Ordnance Survey maps, and then ground-truthed during an avian site scoping visit completed in April 2018. The selected VP location was approved through consultation with SNH prior to the commencement of surveys in April 2018. The locations of the VP and the respective viewshed is presented in Figure 7.1.

7.4.13 VP surveys were completed between April 2018 and March 2019. A total of 36 hours was undertaken at each VP during the breeding season and 42 hours at the VP during the non-breeding season. VP watches were conducted for periods of no longer than 3 hours in a single watch. A minimum 30 minute break was observed between watches to allow the observer an adequate rest time between VP watches.

Breeding Raptor surveys

7.4.14 Surveys were conducted for moorland nesting raptors and owls, including hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*) and short-eared owl (*Asio flammeus*), between April and July 2018 inclusive. The survey methods followed Hardey *et al.* (2013) and involved four survey visits (minimum of two weeks apart) walking transect routes focusing on suitable habitat and any prominent features such as rock outcrops or fence lines within the site and a 2 km survey buffer. The breeding raptor walkover Survey Area is shown in Figure 7.1.

Breeding Bird surveys

7.4.15 A walkover technique based on the Brown & Shepherd (1993) method was employed and covered the site and a further 500 m survey buffer. The method involved approaching within 50 m of all parts of the Survey Area to record the presence of waders. Four survey visits were conducted during the period mid-April to early July in 2018, with a minimum of two week's gap between each of the surveys. SNH (2014, and subsequent 2017) guidance recommends that four survey visits should be completed over the breeding season, based on recommendations set out in Calladine *et al.* (2009). The breeding bird Survey Area is shown in Figure 7.1.

High Tide Roost Count Surveys

7.4.16 Given the direct proximity to the sea and open nature of the site, a Core Count at high tide was undertaken in order to identify potential areas where birds would use the site to roost, as their feeding grounds are covered by the sea at high tide (as per methodology outlined in Bibby *et al* (2000)). Three survey visits were undertaken one hour either side of high tide and covered the site and a 500 m survey buffer with the aim to count:

- all waders in the fields or on the shore;
- all geese in the fields;
- all ducks and seabirds along the shore, and offshore out to 500 m; and
- all waders, raptors and other species of interest seen in flight above the fields.

Other surveys

7.4.17 It should be noted that dedicated black grouse (*Tetrao tetrix*) surveys were not undertaken due to a lack of recorded observations and a lack of suitable habitat for this species which supported the conclusion that these surveys were not required, as discussed and agreed with SNH.

7.4.18 Dedicated red-throated diver (*Gavia stellata*) surveys were not undertaken due to a lack of suitable breeding lochans noted for this species within the site and immediate surrounds. However, any potential commuting flights to/from breeding lochans in the wider area are considered to have been registered within the VP survey.

7.4.19 All surveys were undertaken by suitably qualified and experienced ornithologists.

Survey Limitations

7.4.20 Due to the slight delay in the commencement of surveys the first and second breeding bird and breeding raptor walkover surveys were undertaken only one week apart which is slightly less than the two weeks recommended in the SNH guidance. This is deemed unlikely to have any significant limitations on the results of the surveys.

7.4.21 All other surveys were carried out according to current recommended guidelines and took place during appropriate times of year and under appropriate weather conditions. As such, there are considered to be no limitations to the results.

Assessment of Likely Effect Significance

Evaluation Methods for Ornithological Features

7.4.22 Table 7.2 lists the criteria used to determine the value of ornithological features in a geographical context.

Table 7.2 – Geographical Evaluation Criteria

Scale of Ornithological Value	Criteria	Examples
International	<p>Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of international importance.</p> <p>N.B. For designations, such as a Special Protection Area (SPA), this may also include off-site features on which the qualifying population(s) are considered, from the best available evidence, to depend.</p>	<p>International nature conservation areas:</p> <ul style="list-style-type: none"> – Any Special Protected Area (SPA); – Any potential SPA (pSPA); and – Any Ramsar wetland. <p>Significant numbers of a designated population outside the designated area.</p> <p>Any species listed on Annex 1 of the Birds Directive.</p> <p>A site supporting more than 1% of the EU population of a species</p>
National (Scotland)	<p>Nature conservation resource, i.e. site or population of species, of national importance.</p> <p>NB. Includes designated sites, but may also include off-site ornithological receptors on which the qualifying population(s) of designated sites are considered, from the best available evidence, to depend.</p>	<p>National nature conservation areas:</p> <ul style="list-style-type: none"> – Any Site of Special Scientific Interest (SSSI) or National Nature Reserve (NNR) designated for ornithological feature(s). – A site supporting more than 1% of the UK population of a species. – Nationally important population / assemblage of a species listed on Schedule 1 of the WCA.
Council area (Orkney)	<p>Nature conservation resource, i.e. nature conservation designation, habitat or species, of importance on a county scale</p>	<p>Statutory and non-statutory nature conservation designations:</p> <ul style="list-style-type: none"> – Any Local Nature Reserve (LNR); – Any Local Nature Conservation Site (LNC); – Any Scottish Wildlife Trust (SWT) reserve;

Scale of Ornithological Value	Criteria	Examples
		<ul style="list-style-type: none"> – A council-scale important population / area of a species listed on the Scottish Biodiversity List (SBL) (Scottish Government, 2013) as requiring conservation action. <p>A county-scale important population/area of a species listed on the LBAP.</p> <p>A county-scale important population / assemblage of species listed on Schedule 1 of the WCA</p>
Local (i.e. within 2km of the site)	Nature conservation resource, e.g. a habitat or species of importance in the context of the local district	<p>A breeding population of a species or a viable area of a habitat that is listed in a Local BAP because of its rarity in the locality.</p> <p>An area supporting 0.05-0.5% of the UK population of a species.</p> <p>Any species included on the Birds of Conservation Concern (BoCC) Red List (Eaton <i>et al.</i>, 2015). A council-scale important population of an amber-listed species on the BoCC.</p> <p>A breeding population of a species on the SBL.</p> <p>All breeding populations of Schedule 1 species not captured in higher scale categories.</p>
Less than local	Unremarkable, common and widespread habitats and species of little/no intrinsic nature conservation value.	Common, widespread, agricultural and/or exotic species (such as escapees).

7.4.23 Where a feature qualifies under two or more criteria, the higher value is applied to the feature.

7.4.24 In the context of this chapter, any ornithological feature of local or higher value is considered an Important Ornithological Feature (IOF).

Impact Assessment Methods

7.4.25 The approach to the EclA follows the CIEEM guidelines (CIEEM 2018) and considers the factors described below.

Ornithological Zone of Influence

7.4.26 The Ornithological Zone of Influence (OZOI) is defined as the area within which there may be ornithological features subject to effects from the Proposed Development. Such effects could be direct, e.g. habitat loss resulting from land-take or removal of a building occupied by breeding birds, or indirect, e.g. noise or visual disturbance causing a species to move out of the OZOI. The OZOI is determined through:

- review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- identification of sensitivities of ornithological 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.

Temporal Scope

7.4.27 Likely impacts on ornithological features have been assessed in the context of how the predicted baseline conditions within the OZol might change between the surveys and the start of construction.

Characterising Ornithological Impacts and Effects

7.4.28 In accordance with the CIEEM guidelines, the following definitions are used for the terms ‘impact’ and ‘effect’:

- Impact – Actions resulting in changes to an ornithological feature. For example, the construction activities of a development removing of woodland; and
- Effect – Outcome to an ornithological feature from an impact. For example, the effects on a species population from loss of woodland.

7.4.29 In accordance with the CIEEM guidelines, when determining impacts on IOFs, reference is made to the following:

- Beneficial or adverse – i.e. whether the impact has a beneficial or adverse effect in terms of nature conservation objectives and policy;
- Magnitude – i.e. the size of an impact, in quantitative terms where possible;
- Extent – i.e. the area over which an impact occurs;
- Duration – i.e. the time for which an impact is expected to last;
- Timing and frequency – i.e. whether impacts occur during critical life stages or seasons; and
- Reversibility – i.e. a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible.

7.4.30 Unless stated otherwise impacts assessed below are assumed to be adverse, reversible and last of the period of the phase of the development.

7.4.31 For the purposes of this assessment, the predicted impacts on an ornithological feature are categorised as ‘no impact’, ‘barely perceptible’, ‘low’, ‘medium’ or ‘high’, based on the definitions in Table 7.3, below.

Table 7.3 – Levels of impact

Level of impact	Definition
No impact	No detectable impacts on the ornithological resource, even in the immediate term
Barely perceptible	Detectable impact but reversible within 12 months. Not expected to affect the conservation status of the nature conservation designation, habitat or species under consideration

Level of impact	Definition
Low	Detectable impacts, and may be irreversible, but either of sufficiently small scale or of short-term duration to have no material impact on the conservation status of the nature conservation designation, habitat or species population
Medium	Detectable impact on the status of the nature conservation designation, habitat or species population in the medium term but is reversible / replaceable given time, and not a threat to the long-term integrity of the feature
High	Irreversible impact on the status of the nature conservation designation, habitat or species and likely to threaten the long-term integrity of the feature. Not reversible or replaceable. Will remain detectable in the medium and long term
<p>The following definitions have been applied in respect to timescales:</p> <p>Immediate: Within approximately 12 months;</p> <p>Short term: Within approximately 1-5 years;</p> <p>Medium term: Within approximately 6-15 years; and</p> <p>Long term: More than 15 years.</p>	

7.4.32 The magnitude of any impact on IOFs was categorised according to the criteria outlined in Table 7.3, which is based on a table presented in the CIEEM (2018) guidelines. The concept of integrity refers to coherence of ecological structure and function and includes both temporal and spatial considerations.

7.4.33 Both direct and indirect impacts are considered: Direct ornithological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ornithological impacts are attributable to an action but affect ornithological resources through effects on an intermediary ecosystem, process or feature, e.g. fencing of a development site and subsequent lack of grazing may create suitable grassland for ground nesting birds.

7.4.34 The assessment is undertaken in relation to the baseline conditions that would be expected to occur if the Proposed Development were not to take place, and therefore may include possible predictions of future changes to baseline conditions, such as environmental trends and other completed or planned development. Both adverse and beneficial impacts are possible. It is important to appreciate that this approach is not a rigid framework for assessment and the assessment of impact categories is a matter of professional judgement.

Limitations to Assessment

7.4.35 The surveys were undertaken at appropriate times of year, under favourable survey conditions and generally with full access to the Study Area, though one transect required modification, due to agricultural management of part of the area. As such, no significant limitations were identified.

7.5 Baseline Conditions

Desk Study Results

Statutory Designated Sites

7.5.1 As described in Technical Appendix 7.1 and shown on Figure 7.2, one international, two proposed international and five national nature conservation designations occur within 10 km of the site.

7.5.2 The North Orkney Proposed SPA lies directly adjacent north of the site with the primary reason for the proposed designation including breeding red-throated diver, non-breeding great northern diver (*Gavia immer*) and non-breeding slavonian grebe (*Podiceps auritus*). The numbers of migratory/non-breeding species are another primary reason for the proposed designation which include common eider (*Somateria mollissima*), shag (*Phalacrocorax aristotelis*), long-tailed duck (*Clangula hyemalis*),

red-breasted merganser (*Mergus serrator*); and velvet scoter (*Melanitta fusca*). Following the precautionary principle, as a proposed designation (i.e. pSPA) this site is considered to be of International ornithological importance.

- 7.5.3 The Orkney Mainland moors SPA lies 1.8 km south-west of the site and is designated for breeding and wintering hen harrier, breeding red-throated diver and short-eared owl. This site is considered to be of International ornithological importance.
- 7.5.4 Scapa Flow Proposed SPA lies approximately 5 km south-east of the site and is proposed for designation for similar species to the North Orkney proposed SPA with the addition of over wintering black-throated diver (*Gavia arctica*). Following the precautionary principle, as a proposed designation (i.e. pSPA) this site is considered to be of International ornithological importance.
- 7.5.5 Keelylang Hill and Swartaback Burn SSSI located 1.8 km south-west and Orphir and Stenness Hills SSSI located 7 km south-west of the site are both cited for their breeding bird assemblages and breeding hen harrier. West Mainland Moors SSSI located 4.6 km south-west of the site is designated for breeding hen harrier, red-throated diver and short-eared owl. Waukmill SSSI and Lochs of Harray and Stenness SSSI, 6.5 km south-west and 9 km west respectively, are cited for their wildfowl and wader species. As SSSIs, these sites are considered to be of National ornithological importance.

Non-Statutory Designated Sites

- 7.5.6 Two Local Nature Conservation Sites (LNCS) designated for ornithology are located within 2 km of the site. Wideford Hill, an area of habitat suitable for foraging and breeding raptors such as hen harrier, lies directly south at its closest point, Rennibister and North Mainland Coast: Evie to Finstown (which is also an RSPB Important bird Area (IBA)) lies directly west and north of the site and is an important wintering ground for curlew (*Numenius arquata*), purple sandpiper (*Calidris maritima*) and turnstone (*Arenaria interpres*). A third LNCS, Bridgend, lies 3 km south-west which is an important site for breeding waders most notably curlew. While there are similar species associated with these three LNCS sites, they are considered to have only limited connectivity with the site and Proposed Development and so are assessed to be of Less than Local ornithological value in the context of the site.

Species Records

- 7.5.7 As described in Technical Appendix 7.1, a search for bird species recorded within 2 km of the Proposed Development between 2009 and 2019 was undertaken. The search highlighted historical records of 13 species listed on Annex 1 of the Birds Directive and 12 species listed on Schedule 1 of the WCA; of these species six are listed on both. An additional 52 bird species are listed on the Red and Amber BoCC List (Eaton et al., 2015).

Orkney RSG Data

- 7.5.8 Records of breeding attempts of Schedule 1 raptors within 2km of the site boundary were provided by the Orkney RSG for the years 2013-2017. The results of the data are displayed in Confidential Figures 7.11-7.12 and discussed in more detail below.

Hen Harrier

- 7.5.9 Data indicating single proven hen harrier breeding attempts were identified in each breeding season between 2013 and 2017. The nearest record was located approx. 0.5 km from the site boundary, while the remaining records were >1 km away and are not discussed in further detail in this chapter but are displayed in Confidential Figure 7.11.

Short-Eared Owl

- 7.5.10 Either a single or two short-eared owl breeding records (a maximum of one proven attempt in each year) were identified in four of the five years between 2013 and 2017. The nearest breeding location being approximately 500 m from the site boundary in 2014 and the other records all being between 1.5 km and 2 km from the site and are not discussed in further detail here but are displayed in Confidential Figure 7.12.

Field Survey Results and Receptor Evaluation

- 7.5.11 Full details of the field survey results are provided in Technical Appendix 7.1 with a summary of relevant results used to inform the assessment of likely ornithological impacts provided below. Details of flight lines of target species are presented in Technical Appendix 7.1 and are shown on Figures 7.3 to 7.9.

Wildfowl

Greylag Goose

- 7.5.12 Greylag goose (*Anser anser*) were registered frequently during VP surveys between September and March. A total of 42 flightlines were recorded during the VP surveys with a maximum count of 2000 birds recorded on 30th March 2019. The total flight time recorded was 2,071 seconds ranging in height between 0 and 130m presenting a total at risk flight time of 273,195 flight seconds (see Figure 7.8). The presence of wintering greylag geese on Orkney is complicated by an increasing feral population which remain on Orkney throughout the year which are considered in some areas to be a pest species and as such are controlled under licence.
- 7.5.13 Greylag goose was recorded utilising the Proposed Development as a feeding and roosting site and also utilising the airspace above the Proposed Development for commuting, with a total of 42 flights recorded. The presence of greylag goose and the relatively high usage of the site as a stopover/staging roost to access areas of higher value within the wider region increase the biodiversity value of the site. Consequently, wintering greylag goose is considered to be of **Local** Ornithological Value

Pink-Footed Goose

- 7.5.14 Pink-footed goose (*Anser brachyrhynchus*) were not recorded in flight during the non-breeding season from VP surveys. However two groups of 50 and 55 pink-footed geese were recorded in fields during the VP surveys on 30th March 2019 and a group of 140 were recorded in fields in the centre of the site during the high tide roost count on 24th February.
- 7.5.15 The Proposed Development lies in the Natural Heritage Zone 2 (NHZ2), Orkney and North Caithness (ONC). The current ONC wintering pink-footed goose population estimates are 20,746 individuals (Wilson *et al*, 2015) of a total of approximately 360,000 wintering birds in the UK (Musgrove *et al*. 2013). Pink-footed goose is BoCC amber-listed as a result of its status as a European species of conservation concern.
- 7.5.16 Pink-footed goose was occasionally recorded utilising the Proposed Development as a feeding and roosting site. The infrequent presence of pink-footed goose and the relatively low usage of the Proposed Development as a roost area does increase the biodiversity value of the site slightly. Consequently, pink-footed goose is considered to be of Less than local Ornithological Value.

pSPA Qualifying Wildfowl and Divers

- 7.5.17 Eider, red-breasted merganser (*Mergus serrator*), long-tailed duck, red-throated diver (*Gavia stellata*) and great-northern diver (*Gavia immer*) are all cited as potential features of the the adjacent North Orkney pSPA. Eider numbers peaked at 1,600 on February 25th, recorded approximately 400 m outside the site. Numbers of red-breasted merganser (42), great-northern diver (12), red-throated diver (2) and long-tailed duck (8) all peaked during the second high-tide roost count survey on 23rd January with all records of birds recorded on the sea within 500 m of the site.
- 7.5.18 As these SPA qualifying species are sea ducks, it is to be expected that they weren't recorded within the site boundary, however their presence in the sea directly adjacent to the site (during the winter months) does increase the biodiversity value of the local area. Consequently, given their status as SPA qualifying species, pSPA wildfowl and divers are considered to be of international ornithological value.

Other wildfowl

- 7.5.19 Goldeneye (*Bucephala clangula*), mallard (*Anas platyrhynchos*), shelduck (*Tadorna tadorna*), teal (*Anas crecca*), tufted duck (*Aythya fuligula*) and wigeon (*Anas Penelope*) were all recorded occasionally from VP surveys. These species were generally recorded using the man-made 'duck-pond' 50 m west of the site boundary. The presence of these duck species and the relatively low usage of the Proposed Development does increase the biodiversity value of the site, however these are all common and widespread species in Orkney. Consequently, other wildfowl is considered to be of Less than local Ornithological Value

Raptors and Owls

- 7.5.20 Three species of scarce raptors and owls were recorded during surveys: Hen harrier, short-eared owl and honey buzzard (*Pernis apivorus*). Kestrel (*Falco tinnunculus*) was also recorded.

Hen Harrier

- 7.5.21 Five flights consisting of a total of six hen harrier were registered from VP surveys. Of the five flights, two were recorded within the site boundary with the other three being recorded within the wider survey buffer. All five flights were recorded between 20th August 2018 and 30th March 2019, outwith the breeding season for this species (see Figure 7.5). The dedicated breeding diurnal raptor walkover surveys and breeding bird walkover surveys found evidence of breeding activity within the Survey Area by this species (Confidential Figure 7.10) and the desk study identified historic breeding evidence for this species (Confidential Figure 7.11). Ruddock and Whitfield (2007) outlined a precautionary no disturbance distance of 500-750 m from any hen harrier breeding attempt and none of the records, current or historic, fall within this distance of the Proposed Development infrastructure.
- 7.5.22 The Orkney Mainland moors SPA lies 1.8 km south-west of the site and qualifies partly for supporting a breeding population of hen harrier (28 pairs), which represents 5.6 % of the Great Britain breeding population and 27% of the ONC population (105 pairs), as well as a wintering population (13.individuals) (Wilson *et al*, 2015). In addition to being Annex 1 and Schedule 1 listed species, hen harrier are also listed on the SBL and are BoCC Red list as well as considered to be a species at risk from wind farm developments (SNH, 2018b). As such, hen harrier receive protection at both an international and national level, accordingly.
- 7.5.23 The low level of flight activity and the lack of breeding records within the site boundary indicate that the birds were passing over the site to adjacent feeding grounds. The site comprises intensively farmed grassland fields which do not provide suitable foraging or breeding habitat for hen harrier and the level of activity within the airspace over the site is insufficient to allow a valid assessment of collision risk to be made. Given the suite of surveys completed throughout the year and the limited activity recorded by hen harrier, the Proposed Development site is not considered to support breeding hen harrier and the site is considered to be only occasionally used by this species.
- 7.5.24 Therefore, despite the international status of hen harrier, the importance of the site for this species is considered to be barely perceptible. As such, hen harrier is not considered further in this assessment.

Short-eared owl

- 7.5.25 Two flights of individual short-eared owl were recorded in July and August during the VP surveys with the flights recorded towards the south-west of the site with all the flight time (totalling 635 seconds) recorded below collision risk height (see Figure 7.5).
- 7.5.26 Dedicated breeding raptor surveys found no sign indicative of breeding short-eared owl within the site and wider 2 km survey buffer. The desk study identified one or two short-eared owl breeding records in four of the five years between 2013 and 2017 (Confidential Figure 7.12).
- 7.5.27 The Orkney Mainland moors SPA lies 1.8 km south-west of the site qualifies partly for supporting a breeding population of short-eared owl (19 pairs), which represents 3.3 % of the Great Britain breeding population (taking an average of the estimated 125-1,250) and 6.7% of the ONC population

(estimated 283 pairs) (Wilson *et al*, 2015). Short-eared owl is also an Annex 1, BoCC Amber List, SBL and Orkney LBAP species as well as considered to be a species at risk from wind farm developments (SNH, 2018b) and is legally protected accordingly.

7.5.28 The low level of flight activity and the lack of breeding records within the site indicate that the birds were passing over the site to adjacent feeding grounds. The habitats within the site do not provide suitable foraging or breeding habitat for short-eared owl and the level of activity within the airspace over the site is insufficient to allow a valid assessment of collision risk to be made. Given the suite of surveys completed throughout the year and the limited activity recorded by short-eared owl, the Proposed Development site is not considered to support breeding short-eared owl and that the site is only occasionally used by this species.

7.5.29 Therefore, despite the national status of short-eared owl, the importance of the site for this species is considered to be barely perceptible. As such, short-eared owl is not considered further in this assessment.

Honey buzzard

7.5.30 A single record of a vagrant honey buzzard was recorded during VP surveys and it is deemed unlikely that development of the site will have any major adverse impacts on this species. The fact that the observation was a single record indicates that the importance of the site for this species is likely to be barely perceptible. As such, honey buzzard is not considered any further in this assessment.

2006/2007 Raptor and Owl Survey Results - Comparison

7.5.31 VP watches undertaken in 2006/2007 which covered the current site boundary recorded low levels of raptor activity at the site, with no records of either hen harrier or short-eared owl, and only two records of merlin (Upton, 2014). The results from the current surveys also display low levels of raptor activity and outline that the site is not optimal habitat for hunting or breeding for these species.

Non-schedule 1 Raptors and Raven

Raven

7.5.32 Raven was commonly recorded within the site during both the VP surveys and the breeding bird survey. No evidence of breeding raven was found during any of the surveys completed.

Kestrel

7.5.33 A single record of an individual kestrel was recorded on 17th April during the VP surveys. No evidence of breeding kestrel was found during any of the other surveys completed. The fact that the observation was a single record means that the importance of the site for this species is likely to be barely perceptible.

7.5.34 As such, both raven and kestrel are not considered any further in this assessment.

Waders

Curlew

7.5.35 Curlew were regularly recorded within the site between April 2018 and March 2019. A total of 65 flights were recorded during VP surveys, with a maximum number of 500 individuals recorded on 25th February. A total of 18 breeding territories (13 possible and 5 probable) were defined within the Survey Area, following the breeding bird survey, of which six were within the site boundary (Figure 7.3). Of the six territories within the site, none are within 100 m of any of the proposed turbines and access tracks. Eighteen breeding territories represents 0.55 % of the estimated ONC population (estimated total of 3,223 pairs, as per Wilson *et al*, 2015). In addition, several groups of curlew were recorded off site during VP surveys, with a group of 700 recorded in a field south of the site in July 2018. Curlew were also recorded during high tide roost counts peaking at 330 located in fields west of the site boundary during the third visit on 24th February 2019.

- 7.5.36 Curlew is BoCC red-listed, as well as an SBL and Orkney LBAP species and considered to be a species at risk from wind farm developments (SNH, 2018b), as a result of its declining population. The presence of breeding curlew and the fact that the Proposed Development site is being regularly used by this species means that it is considered to be of Council area Ornithological Value.

Golden Plover

- 7.5.37 Golden plover were recorded within the site on seven occasions during VP surveys, all registrations were made during April with a maximum of 310 individuals recorded in any one flock of birds. A total of two possible golden plover breeding territories were recorded within the site boundary (Figure 7.4), which represents 0.14 % of the estimated ONC population (1,474 pairs) (Wilson *et al*, 2015). Although, as there is no suitable breeding habitat (heather moorland) for this species within the site, it is considered that the birds recorded as singing during the April breeding bird survey were birds preparing for the coming breeding season within moorland breeding grounds in close proximity of the site.
- 7.5.38 Golden plover is an Annex 1 species and is legally protected accordingly. Golden plover is also an SBL and Orkney LBAP species as well as being considered to be a species at risk from wind farm developments (SNH, 2018b). The presence of breeding golden plover and the fact that the Proposed Development site is being used by golden plover as a winter roost location is considered to be of Local Ornithological Value.

Lapwing

- 7.5.39 A total of 53 flights of lapwing were recorded during the VP surveys with a maximum number of 600 birds recorded on 30th March 2019. Twenty-four potential lapwing territories (8 possible and 16 probable) were recorded within the Survey Area following the breeding bird walkover survey (Figure 7.6), which represents 0.48 % of the estimated ONC population (estimated 5,000 pairs, Tait (2012)). In addition, several groups of lapwing were recorded during high tide roost counts peaking at 730 located in fields west of the site boundary during the second visit on 23rd January 2019.
- 7.5.40 Lapwing are a BoCC Red List, SBL and Orkney LBAP species and numbers of this species are rapidly declining across Scotland and the UK as a whole and as such are considered to be a species of concern. The presence of breeding lapwing and the fact that the Proposed Development site is being regularly used by lapwing is considered to be of Local Ornithological Value.

Oystercatcher

- 7.5.41 Oystercatcher were regularly recorded within the site between April 2018 and March 2019. A total of 20 flights were recorded during VP surveys, with a maximum number of 21 individuals recorded on 18th April. A total of 45 potential breeding territories (21 possible and 24 probable) were defined within the Survey Area, of which 30 were located within the site boundary, following the breeding bird survey (See Figure 7.7). Forty-five breeding territories represents 0.45 % of the estimated ONC population (estimated 10,000 pairs, Tait (2012)).
- 7.5.42 Oystercatcher are a BoCC Amber List and Orkney LBAP species. Due to the presence of multiple breeding territories, and the fact that the Proposed Development site is being regularly used by oystercatcher, this species is considered to be of Local Ornithological Value.

Redshank

- 7.5.43 Redshank (*Tringa totanus*) was recorded utilising the site for breeding and foraging and also utilising the airspace above the Proposed Development for commuting, with nine flights totalling 136 individuals recorded throughout the VP survey period (see Figure 7.9). In addition, five probable redshank breeding territories were recorded within the Survey Area. Redshank is BoCC amber-listed as a result of its declining population. The presence of breeding redshank and the fact that redshank use the site and the airspace over the site is considered to increase the biodiversity at a local level and therefore are considered to be of Local Ornithological Value.

Ringed Plover

- 7.5.44 Ringed plover (*Charadrius hiaticula*) was recorded utilising the Survey Area as a breeding species with three possible ringed plover breeding territories recorded within the Survey Area, (see Figure 7.9). Ringed plover is BoCC red-listed as a result of its declining population. The presence of breeding ringed plover is considered to increase the biodiversity at a local level and therefore they are considered to be of Local Ornithological Value.

Snipe

- 7.5.45 Snipe (*Gallinago gallinago*) was recorded utilising the site for breeding and foraging as well as passing across the Proposed Development, with a single flight of an individual recorded throughout the VP survey period (see Figure 7.9). In addition, four probable snipe breeding territories were recorded within the Survey Area, (see Figure 7.9). Snipe is an Orkney LBAP and BoCC amber-listed species as a result of its declining population. The presence of breeding snipe is considered to increase the biodiversity at a local level and therefore they are considered to be of Local Ornithological Value.

Dunlin

- 7.5.46 Four dunlin (*Calidris alpina*) were recorded perched in fields during VP surveys on 31st October 2018. No breeding territories for dunlin were identified following the breeding bird survey.
- 7.5.47 The fact that the observations made were infrequent means that, the importance of the site for this species is likely to be barely perceptible. As such, dunlin is not considered any further in this assessment.

2006/2007 Wader Survey Results - Comparison

- 7.5.48 Surveys undertaken in 2006/2007 were not considered sufficient by SNH with regards to wading birds in order to fully inform an EclA at the site, and further data was collected in the winter 2012/2013 in the form of high tide roost counts undertaken on eight occasions. A number of wading birds were recorded roosting within the site and immediate surrounds, including curlew (maximum count 610), lapwing (50), golden plover (7), redshank (14), snipe (12) and dunlin (6) (Upton, 2014). The results from the 2012/2013 surveys are broadly similar to the results recorded during the high tide roost surveys undertaken in 2018/2019 with the site being used frequently by wading birds as a roost site during the winter months, and occasionally by large groups of species such as curlew and lapwing.
- 7.5.49 The surveys undertaken in 2006/2007 recorded four wading bird species breeding within the site: curlew, lapwing, redshank and oystercatcher. This is broadly similar to the 2018 breeding season where, in addition, small numbers of ringed plover and golden plover territories were also identified.

Seabirds, Skuas and Gulls

Arctic tern

- 7.5.50 Arctic tern was not recorded during VP surveys, however a single confirmed territory was noted in the north-west of the site during the breeding bird walkover surveys (see Figure 7.9).
- 7.5.51 Arctic tern is an Annex 1 species and is legally protected accordingly. Arctic tern is also an SBL and Orkney LBAP species. The presence of breeding Arctic tern is considered to increase the biodiversity at a local level and therefore are considered to be of Local Ornithological Value.

Fulmar

- 7.5.52 Two flight records of individual fulmar were recorded by the VP surveys on 18th April. The fact that the observations made were infrequent means that, the importance of the site for this species is likely to be barely perceptible. As such, fulmar is not considered any further in this assessment.

Great skua

- 7.5.53 Two records totalling three individuals great skua were recorded by the VP surveys in April and June (Technical Appendix 7.1, Annex A: Table 10 and Figure 7.9). The fact that the observations made were infrequent means that, the importance of the site for this species is likely to be barely perceptible. As such, great skua is not considered any further in this assessment.

Gulls

- 7.5.54 Black-headed gull (*Larus ridibundus*), common gull (*Larus canus*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*) and lesser black-backed gull (*Larus fuscus*) were all recorded during VP surveys. Breeding colonies of common (20 nests recorded in June visit) and black-headed gull (36 nests recorded in June visit) were recorded on the west centre of the site during breeding bird walkover surveys. An estimated 11,208 pair of common gulls and 2,853 pairs of black-headed gulls breed on Orkney (Tait, 2012) meaning the colonies at the site consist of 0.18% and 1.26% of the Orkney population respectively and therefore not significant.
- 7.5.55 All five gull species are of conservation concern as a result of their inclusion in the BoCC red and amber lists. Flights of gulls and gulls roosting in fields through the Survey Area were commonly recorded from VP surveys and the site was observed to be used for both breeding black-headed and common gulls. The highest recordings of gull species were following farm machinery during field ploughing in June and perched in fields during winter months. Due to the presence of breeding gulls within the Survey Area, which is utilised by all five gull species, it is considered that their presence increases the biodiversity resource of the site and wider environs and therefore these species are considered to be of Local Ornithological Value.

Other passerine species

- 7.5.56 A small number of species of conservation concern were recorded during the breeding bird walkover survey and included two BoCC red-listed species: house sparrow (*Passer domesticus*) and twite (*Linaria flavirostris*) and a single BoCC amber-listed species: meadow pipit (*Anthus petrosus*).
- 7.5.57 These species are typical of these habitats within Orkney. Although their presence does enrich the biodiversity of the local area they are considered to be of Less than local Ornithological Value.

Summary of Evaluation of Recorded Features

Table 7.4 - Summary of Evaluation of Ornithological Features

Feature	Summary	Level of Importance
North Orkney pSPA	Located directly north of the site. Annex I species are a primary reason for the proposed designation including: breeding red-throated diver; non-breeding great northern diver, non-breeding slavonian grebe. The numbers of migratory/non-breeding species are another primary reason for the proposed designation including: non-breeding common eider, shag, long-tailed duck, red-breasted merganser and velvet scoter.	International
Orkney Mainland Moors SPA	1.8 km south-west of the site. Designated for Breeding and wintering/non-breeding hen harrier and breeding red-throated diver and short-eared owl.	International
Keelylang Hill and Swartaback Burn SSSI	1.8 km south-west of the site. Designated for breeding bird assemblage and breeding hen harrier	National

Feature		Summary	Level of Importance
West Mainland Moors SSSI		4.6 km west north-west of the site. Designated for breeding bird assemblage; breeding hen harrier, short eared owl and red-throated diver.	National
Scapa Flow pSPA		5km south-east of the site. Annex I species are a primary reason for the proposed designation including breeding red-throated diver, non-breeding great northern diver; black-throated diver and slavonian grebe. Migratory/non-breeding species are another primary reason for the proposed designation including non-breeding common eider; shag; long-tailed duck, red-breasted merganser and goldeneye.	International
Waulkmill SSSI		6.5km south-west of the site, cited for supporting several wildfowl and wader species as well as a variety of birds including stonechat (<i>Saxicola rubicola</i>).	National
Orphir and Stenness Hills SSSI (part of Orkney Mainland Moors SPA)		7 km south-west of the site, cited primarily for the breeding bird assemblage as well as supporting breeding hen harrier.	National
Local Nature Conservation Sites / RSPB IBA		Three sites within 3 km of the site (two of which are within 2 km).	Council
Lochs of Harray and Stenness SSSI		9 km west of the site, cited for non-breeding goldeneye, pochard, scaup and tufted duck.	National
Greylag Goose		Frequently recorded in winter months, likely some naturalised birds. BoCC Amber listed species.	Local
Pink-footed Goose		Infrequently recorded in winter months in Proposed Development. BoCC amber listed.	Less than local
pSPA qualifying species	Eider	Recorded in sea directly adjacent to the site in winter months	International
	Red-throated diver	Recorded in sea directly adjacent to the site in winter months	
	Great-northern diver	Recorded in sea directly adjacent to the site in winter months	
	Red-breasted merganser	Recorded in sea directly adjacent to the site in winter months	

Feature		Summary	Level of Importance
	Long-tailed duck	Recorded in sea directly adjacent to the site in winter months	
Common waterfowl	Teal	Frequently recorded, BoCC Amber listed species.	Less than Local
	Goldeneye	Frequently recorded species.	Less than Local
	Tufted Duck	Frequently recorded species.	Less than Local
	Shelduck	Infrequently recorded, BoCC Amber listed species.	Less than Local
	Mallard	Frequently recorded, BoCC Amber listed species.	Less than Local
	Wigeon	Frequently recorded, BoCC Amber listed species.	Less than Local
Curlew		Frequently recorded and breeding in Proposed Development. SBL / BoCC Red Orkney LBAP listed. Designated species for SSSI and LNCS sites within 10km of the site.	Council area
Lapwing		Frequently recorded and breeding in Proposed Development. SBL / BoCC Red Orkney LBAP listed.	Local
Oystercatcher		Frequently recorded and breeding in Proposed Development. BoCC Amber, Orkney LBAP listed.	Local
Golden plover		Infrequently recorded, breeding in Proposed Development., Annex 1 species, BoCC Amber, Orkney LBAP listed.	Local
Redshank		Infrequently recorded and breeding in Proposed Development. BoCC Amber.	Local
Other waders	Ringed plover	Breeding records in Proposed Development. BoCC Red listed.	Local
	Snipe	Infrequently recorded breeding records in Proposed Development., BoCC Amber listed species.	Local
Gulls	Great black-backed gull	Commonly recorded BoCC Amber listed species.	Local
	Lesser black-backed gull	Commonly recorded BoCC Amber listed species.	
	Herring gull	Commonly recorded, BoCC Red and SPL listed species.	

Feature		Summary	Level of Importance
	Black-headed gull	Commonly recorded, Breeding records in Proposed Development BoCC Amber and SPL listed species.	
	Common gull	Commonly recorded, Breeding records in Proposed Development BoCC Amber listed species.	
Arctic tern		Recorded breeding in Proposed Development; Annex 1, BoCC Red, Orkney LBAP listed and SBL species.	Local
Great skua		Infrequently recorded, BoCC Amber list species.	Barely perceptible
Fulmar		Infrequently recorded, BoCC Amber list species.	Barely perceptible
Hen harrier		Recorded five times in non-breeding season; Recorded breeding within 2km of Proposed development, Orkney Mainland moors SPA qualifying species Annex 1, Schedule 1, BoCC Amber and Orkney LBAP listed and SBL species.	Barely perceptible
Short-eared owl		Recorded twice; Historic breeding within 2km of Proposed development Orkney Mainland moors SPA qualifying species Annex 1, BoCC Amber, Orkney LBAP listed and SBL species.	Barely perceptible
Honey buzzard		Single record. Schedule 1, Annex 1 and an SPL species.	Barely perceptible
Common raptors and raven	Raven	Commonly recorded, locally breeding.	Less than local
	Kestrel	Single record, BoCC Amber listed species.	Less than local
Other Passerine Species		Commonly recorded species typical of the habitat, BoCC red listed, BoCC amber listed, SBL species	Less than local

7.6 Receptors Brought Forward for Assessment

7.6.1 As noted in Section 7.4, under Evaluation Methods for Ornithological Features, ornithological features of local and higher value are considered IOFs. Due to a range of factors, some of these IOFs can be scoped-out of further consideration:

- Designated sites:
 - Waulkmill, Orphir and Stenness Hills, Lochs of Harray and Stenness SSSI's are over 6.5 km from the Proposed Development. These distances are considered beyond potential connectivity given the qualifying features supported therein and not to be subject to impacts resulting from the Proposed Development and, therefore, not considered any further in this assessment.
 - Scapa flow pSPA is located 6.5 km away and its proposed designated features are sea ducks and divers. Given the Proposed Development lies on the opposite coast of Orkney

mainland it is deemed unlikely to have any connectivity to the qualifying features and, therefore, not considered any further in this assessment.

- Two LNC's (Wideford Hill and Rennibister) were recorded within 2 km of the site which are designated for their habitats for birds and it is deemed unlikely that the Proposed Development will have any significant impacts on the habitats within these sites and qualifying species are assessed individually within this section, therefore, they are not considered any further in this assessment.

- Species (scoped out of further assessment due to level of importance as described above and summarised in Table 7.4):

- common raptors and raven;
- hen harrier;
- short-eared owl;
- honey buzzard;
- fulmar;
- great skua;
- common waterfowl; and
- other passerine species.

7.6.2 The remaining IOFs of Local value or higher, and therefore taken forward for further assessment, are:

- designated sites:

- North Orkney pSPA;
- Orkney Mainland Moors SPA;
- Keelylang Hill and Swartaback Burn Moors SSSI; and
- West Mainland Moors SSSI.

- Species/Species Groups:

- greylag goose;
- pink-footed goose;
- pSPA qualifying species;
- curlew;
- lapwing;
- golden plover;
- oystercatcher;
- redshank;
- other waders;
- arctic tern; and
- gull species.

7.7 Identification and Evaluation of Key Impacts

Standard Mitigation

- 7.7.1 As previously noted, following CIEEM guidance (CIEEM, 2018), the assessment process assumes the application of standard mitigation measures. This section of the assessment details the mitigation measures that are recommended to ameliorate identified effects associated with the construction and operational phase of the Proposed Development. These measures are aimed to prevent, reduce or offset any likely significant effects of the Proposed Development on identified ornithological receptors. This approach is in accordance with best practice guidance and UK, Scottish and Local Government environmental, planning and sustainability policies.
- 7.7.2 The principles and objectives for mitigation associated with the Proposed Development have been developed through an iterative process with the Applicant's design team and through discussion with SNH and other stakeholders.
- 7.7.3 Mitigation includes best practice methods and principles applied to the Proposed Development as a whole (generic measures) as well as site specific mitigation measures applied to individual locations (specific measures).
- 7.7.4 All ornithological mitigation will be incorporated into a Construction Environmental Management Plan (CEMP). This CEMP, to be confirmed, will outline all required mitigation and provide details on timelines for undertaking mitigation for each identified ornithological receptor. This CEMP will also outline timetable of actions and form part of the contract documents to ensure delivery of mitigation specified in this chapter. In addition, the CEMP should incorporate the provision of an Ecological Clerk of Works (ECoW) to oversee the implementation of recommended mitigation.

Generic/Embedded Mitigation

- 7.7.5 In the event of consent the generic mitigation measures that apply to all ornithological receptors across the Proposed Development, and which are considered as embedded in the site development proposals and therefore assumed to be the case for the purposes of assessing potential impacts, are outlined below:
- Not more than 12 months prior to construction of the Proposed Development, the Applicant will engage a Suitably Qualified Ecologist (SQE) to undertake a series of pre-construction ornithological surveys to update the baseline information reported in this chapter. The aim of these surveys would be to provide up to date information in order to finalise the mitigation proposals. This would be in addition to completing a final check prior to construction for protected species (see Chapter 8 of this EIA Report) and would be discussed and agreed with SNH.
 - Further to or incorporated into the update surveys above, protection of breeding bird nests from damage and/or destruction during the breeding season will need to be ensured. Wherever possible, all vegetation clearance will occur outside the breeding season (i.e. between September – March, inclusive), to ensure that no active nests are damaged or destroyed by the proposed works. This would include any areas of shrub clearance and vegetation removal for access tracks, compounds or turbine bases due to the populations of ground nesting birds on and around the site.
 - Removing vegetation from working areas outside the breeding season, wherever possible between October and February inclusive but preferably between November and January, would also reduce the attractiveness of those areas to breeding birds the following season, which means that birds are less likely to breed in those areas.
 - Avoidance of unnecessary disturbance to habitats by minimising the extent of ground clearance and other construction practices as far as practicable.

- The permanent met mast will have line markers on guide wires to mitigate for bird collisions.
 - An ecological toolbox talk will be given to all construction personnel as part of site induction on the potential presence of ornithological species and any measures that need to be undertaken should such species be discovered during construction activities. The toolbox talk will also include the requirement to report and log any bird casualties (including due to the temporary met-mast) at the Proposed Development during construction and operation of the site.
- 7.7.6 As part of the Proposed Development proposals it will be necessary to develop and implement a Site Restoration Plan (SRP) as part of the CEMP to ensure the regeneration of those areas of habitat that have been temporarily lost through development.
- 7.7.7 In order to facilitate restoration, disturbed ground will be restored as soon as practicably possible using materials removed during the construction of access tracks, excavation of cable trenches and turbine foundations. To achieve this, any excavated soil will need to be stored in such a manner that is suitable to facilitate retention of the seed bank. This will aid site restoration and help conserve the pre-construction floristic interests at the site.
- 7.7.8 Additional, specific mitigation measures are discussed in Section 7.9.

7.8 Likely Effects

Description of the Proposed Development

- 7.8.1 As described in Chapter 3, the Proposed Development will consist of six wind turbines with a maximum blade tip height of up to 149.9 m. The specific turbine manufacturer and model has not yet been selected, as this will be subject to a pre-commencement tendering exercise and will be confirmed post-consent.
- 7.8.2 The proposed final locations of the turbines have been defined, in order to enable the EIA report to fully describe the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Chapter 3 and shown on Figure 1.2.
- 7.8.3 The main elements of the Proposed Development which have the potential to impact on IOFs, both during construction and operation are:
- Cut track construction, including bridging/culverting of two drainage ditches and mobile plant traffic movements.
 - Turbine foundation creation (including excavation, steel work and concrete pouring, pile-driving of anchors, piling if required etc.).
 - Crane pad construction.
 - Cable-laying and grid connection infrastructure (including substation).
 - Temporary lay-down and construction compound areas.
 - Temporary materials storage (soils).
 - Site water management.
 - Site restoration (track batters, compounds, etc.).

Construction Impacts

- 7.8.4 The above activities have the potential to cause the following construction impacts to the IOFs identified for the site:
- Direct loss of habitat.
 - Direct loss of foraging habitat and/or breeding habitat for protected species.

- Indirect loss of foraging habitats and/or breeding habitat for species, through displacement.
- Disturbance and displacement to habitats and species (including noise, vibration, pollution), due to track and turbine base construction, as well as turbine erection, heavy machinery, noise and human activity on the site. Disturbance of ground vegetation and ground-nesting birds may affect a 5 m zone around all infrastructure.

Operational Impacts

- 7.8.5 The potential operational impacts have been identified as:
- Habitat change (modification) over time (N.B. operation phase drying of peaty or marshy substrates may affect up to 5m around cut track).
 - Direct and indirect loss of foraging or breeding habitat due to displacement or avoidance.
 - Mortality resulting from collision with turbines.
 - Cumulative impacts of the Proposed Development in the context of other nearby wind farms (operational, consented and in planning).

Construction Effects

Designated Sites

- 7.8.6 The North Orkney pSPA and Orkney Mainland Moors are important at the International Level.
- 7.8.7 Keelylang Hill, Swartaback Burn Moors SSSI and West Mainland Moors SSSI are important at the National Level.
- 7.8.8 Impacts on habitats within designated sites have been considered unlikely given their distances from the site (see Chapter 8: Ecology and Nature Conservation). In addition, significant residual hydrological effects are unlikely to occur (see Chapter 11: Geology, Peat, Hydrology and 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 and operation phases of the Proposed Development are provided in the species accounts below.

pSPA qualifying species

- 7.8.9 The Proposed Development is considered to be of International importance for pSPA qualifying species, although the land contained within the site was not found to support any of the pSPA qualifying species, which utilise the marine and shoreline environments directly north of the Proposed Development. Construction activities would lead to temporary disturbance effect as a result of an increase in noise. Construction activities could potentially lead to the displacement of birds roosting and foraging on the seas and shoreline.
- 7.8.10 The qualifying species of the North Orkney pSPA, as outlined paragraph 7.5.2, include breeding red-throated diver and non-breeding sea ducks and divers. With the exception of breeding red-throated diver, the pSPA species remain in the marine environment during the winter (non-breeding) season. As there are no suitable nesting lochans for red-throated diver located within or near the site, this area is unsuitable in terms of this specie's preferred nesting habitat. Furthermore, red-throated diver were only recorded out at sea in the winter period throughout all of the baseline surveys completed (during VP surveys, see Appendix 7.1).
- 7.8.11 The VP and wintering bird surveys did not record any of the pSPA qualifying species active within the site or flying within the site boundary during the winter months, while the high tide roost surveys recorded a maximum count of 1,600 eider located 400 m out to sea from the shore as well as low numbers of the remaining pSPA qualifying species (see Section 7.5). As such, these wintering species are considered unlikely to come into close proximity to construction activities. Any construction-related disturbance of foraging or resting sea ducks or divers may potentially lead to the temporary and short-term displacement of these species away from the shore adjacent to the site, either

further along the coast or north into the pSPA. This temporary displacement is therefore considered unlikely to lead to any significant, longer term impact due to the temporary, short-term nature of the construction period (i.e. approx. 12 months).

- 7.8.12 There is a large amount of similar habitat for roosting and foraging birds in the coastal strip in the local area, in particular west and east of the Proposed Development. Although the baseline surveys did not register any pSPA species along the shoreline adjacent to the northern site boundary, any temporary, short-term displacement of birds from this small length of coast is not considered significant in the context of other similar and locally available habitat along the wider coastline.
- 7.8.13 The potential effects on pSPA qualifying species during construction are considered to be immediate, short-term in duration and of **barely perceptible** adverse impact and therefore **not significant**.

Greylag goose

- 7.8.14 The Proposed Development is considered to be of Local importance for greylag goose. Greylag goose utilise the site as a roosting location and utilise the airspace above the Proposed Development for commuting flights between September and April. Construction would lead to temporary disturbance effect as a result of an increase in noise and vibration. Construction activities would also lead to the displacement of roosting birds.
- 7.8.15 There is a large amount of similar habitat for roosting and foraging geese in the local area, in particular west and east of the Proposed Development, so the temporary displacement of geese is not considered significant.
- 7.8.16 The effects on greylag goose during construction are considered to be immediate and a **barely perceptible** adverse impact and therefore **not significant**.

Pink-footed goose

- 7.8.17 The Proposed Development is considered to be of Less than local importance for pink-footed goose. Pink-footed goose utilise the site as a roosting location. Construction would lead to temporary disturbance effect as a result of an increase in noise and vibration. Construction activities could also potentially lead to the displacement of roosting birds.
- 7.8.18 There is a large amount of similar habitat for roosting and foraging geese in the local area, in particular west and east of the Proposed Development, so the temporary displacement of geese from this roost site is not considered significant.
- 7.8.19 The effects on pink-footed goose during construction are considered to be immediate and a **barely perceptible** adverse impact and therefore **not significant**.

Curlew

- 7.8.20 The Proposed Development site is considered to be of Council area importance for curlew. Curlew were recorded using the Survey Area for breeding, foraging and roosting with a total of eighteen territories recorded within the Study Area, six of which were located within the Proposed Development boundary.
- 7.8.21 Potential impacts on curlew during construction include mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result from construction activities undertaken during the bird breeding season where unidentified nests and chicks may be destroyed or abandoned. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of construction-related disturbance, the mitigation outlined in paragraphs in 7.7.1-7.7.8, including the pre-construction checks and the appointed ECoW, will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.
- 7.8.22 The overall effects on curlew during construction are considered to be temporary and of **low** adverse impact and therefore **not significant** at the council area scale.

Lapwing

- 7.8.23 The Proposed Development site is considered to be of Local importance for lapwing. Lapwing were recorded using the Survey Area for breeding, foraging and roosting with a total of 24 territories recorded, twenty within the Proposed Development boundary. Of the twenty territories recorded within the site, two were recorded upon the Proposed Development infrastructure and a further three within 50 m.
- 7.8.24 Potential impacts on lapwing during construction include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed or abandoned. Paragraph 7.7.5 outlines the proposed construction mitigation measures in order to ensure nest sites would be protected from construction-related disturbance.
- 7.8.25 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories, as a result of disturbance the standard mitigation outlined in paragraphs in 7.7.1-7.7.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.
- 7.8.26 The overall effects on lapwing during construction are considered to be temporary and of **low** adverse impact and therefore **not significant** effects at the local area scale.

Golden plover

- 7.8.27 Golden plover were recorded as possibly breeding within the Survey Area in low numbers (assessed as having two possible territories). Golden plover were only recorded during April. The site does not contain any suitable breeding habitat for this species and they were likely using the site as a stopover point before heading to suitable breeding grounds. Given the presence of only two possible breeding territories for this species, as well as more favourable breeding habitat being located outwith the site boundary, displacement effects are unlikely to be greater than the Local level importance.
- 7.8.28 Likely impacts on golden plover during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.
- 7.8.29 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories, as a result of disturbance the standard mitigation outlined in paragraphs in 7.7.1-7.7.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.
- 7.8.30 The overall effects on golden plover during construction are considered to be temporary and of **barely perceptible** adverse impact and therefore **not significant** at the local area scale.

Oystercatcher

- 7.8.31 The Proposed Development site is considered to be of Local importance for oystercatcher. Oystercatcher were recorded using the Survey Area for breeding, foraging and roosting with a total of 45 territories recorded, 30 within the Proposed Development boundary.
- 7.8.32 Likely impacts on oystercatcher during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.8.33 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories, as a result of disturbance the standard mitigation outlined in paragraphs in 7.7.1-7.7.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.8.34 Although there is some potential for the displacement of oystercatcher territories during construction within the breeding season, the overall effects on oystercatcher during the construction phase are considered to be temporary and of **low** adverse impact and therefore **not significant** at the local area scale.

Redshank

7.8.35 The Proposed Development site is considered to be of Local importance for redshank. Redshank were recorded using the Survey Area for breeding, foraging and roosting with a total of five territories recorded within the Proposed Development boundary.

7.8.36 Likely impacts on redshank during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.8.37 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories, as a result of disturbance the standard mitigation outlined in paragraphs in 7.7.1-7.7.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.8.38 The overall effects on redshank during construction are considered to be temporary and of **low** adverse impact and therefore **not significant** at the local area scale.

Other waders

7.8.39 The Proposed Development site is considered to be of Local importance for ringed plover and snipe. Ringed plover and snipe were recorded as breeding within the Survey Area in low numbers (both assessed as having two territories).

7.8.40 Likely impacts on the waders during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of woodland felling / soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.8.41 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories, as a result of disturbance the standard mitigation outlined in paragraphs in 7.7.1-7.7.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.8.42 The overall effects on other waders during construction are considered to be temporary and of **low** adverse impact and therefore **not significant** at the local area scale.

Arctic tern

7.8.43 The Proposed Development site is considered to be of Local importance for Arctic tern. Arctic tern were recorded as breeding within the Survey Area with a single breeding territory recorded, located over 100 m from the nearest site infrastructure.

7.8.44 Likely impacts on Arctic tern during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and

vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

- 7.8.45 Potential disturbance may result in displacement from the areas of land clearance and a wider area adjacent to it. Additionally, if the disturbance occurs during the breeding season this may result in the abandonment of nests or breeding territories. However, pre-construction checks and the ECoW will identify active nesting locations during any works taking place in the breeding season and implement appropriate mitigation measures to protect any nest sites.
- 7.8.46 The overall effects on Arctic tern during construction are considered to be temporary and of **low** adverse impact and therefore **not significant** at the local area scale.

Gull species

- 7.8.47 The Proposed Development site is considered to be of Local importance for gulls. Black-headed gull and common gull were recorded as breeding within the Survey Area with a small colony in the north-west of the site while herring gull, lesser black-backed gull and great black-backed gull were recorded flying over and roosting on the site.
- 7.8.48 Likely impacts on gulls during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.
- 7.8.49 Potential disturbance may result in displacement from the areas of land clearance and a wider area adjacent to it. Additionally, if the disturbance occurs during the breeding season this may result in the abandonment of nests or breeding territories. However, pre-construction checks and the ECoW will identify active nesting locations during any works taking place in the breeding season and implement appropriate mitigation measures to protect any nest sites. Roosting gulls may be displaced during the non-breeding season. There is a large amount of similar habitat for roosting gulls in the local area, in particular west and east of the Proposed Development, so the temporary displacement of gulls from this roost site is not considered significant.
- 7.8.50 The overall effects on gulls during construction are considered to be temporary and of **low** adverse impact and therefore **not significant** at the local area scale.

Operation Effects

- 7.8.51 Effects of land take (i.e. decreased resource availability) on birds are likely to be low given the small percentage (<3 %) of the site that will be occupied by the footprint of the Proposed Development (4.1 ha). There is the potential for a 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 carried through in this assessment. That potential effect is assessed, where relevant, in the species text that follows.
- 7.8.52 The two main ways in which birds can be affected by operational wind farms are: through displacement due to ongoing disturbance caused by wind turbine structures and associated equipment (and by periodic servicing of them), and potential mortality through collision with moving blades or associated infrastructure.

Displacement

- 7.8.53 A range of studies have concluded that most bird species are not significantly affected by operational wind farms (e.g. Vauk, 1990; Percival, 2005; Devereux *et al.*, 2008; Winkelmann, 1994; Langston & Pullan, 2003; Hotker *et al.*, 2006). This is reflected, in part, 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 and/or species groups that are thought to be susceptible to the effects of wind farms or highly protected species on which potential effects remain unclear.
- 7.8.54 Turbines may also present a barrier effect to the movement of birds across a site, restricting them from accessing wider areas. The effect this would have on a population is difficult to predict. If birds

have to regularly fly over or around an array this may result in greater energy expenditure, while birds displaced into other, suboptimal habitats may experience reduced foraging potential. Such impacts could effectively limit birds being able to build energy reserves, potentially affecting survival and/or breeding success.

pSPA Qualifying Features

- 7.8.55 As discussed in paragraphs 7.8.9 to 7.8.13, displacement effects during construction on pSPA qualifying species are anticipated to be barely perceptible and not significant. Given that the pSPA qualifying species have not been found to regularly use the site and, due to their nature as seabirds, are not expected to venture within the site boundary (including breeding red-throated diver due to lack of suitable breeding habitat within the site and wider area, demonstrated through the lack of any relevant registrations during the baseline survey work), displacement impacts during operation would be expected to be less significant than during the higher levels of disturbance experienced during the construction phase.
- 7.8.56 As discussed above in the construction phase, any disturbance of foraging or resting sea ducks or divers may potentially lead to the temporary and short-term displacement of these species away from the shore adjacent to the site, either further along the coast or north into the pSPA. In terms of barrier effects presented with respect to breeding red-throated diver, as these birds are known to not use the site or wider environs for breeding (due to lack of suitable breeding habitats and lochans) displacement through barrier effects are considered to be of **no impact and no effect**.

Waders

- 7.8.57 Of those species identified as IOFs that use the site and are carried forwards in this assessment, curlew, golden plover, lapwing, oystercatcher, redshank, ringed plover, and snipe have been recorded breeding within the Study Area. As outlined in Table 7.4, the site is considered to be important for curlew at the **Council** level and for snipe, lapwing, redshank, oystercatcher and ringed plover at the **Local** level.
- 7.8.58 In addition to disturbance to birds during the construction phase, the operation of turbines and associated human activities for maintenance purposes also has the potential to disturb birds and displace them from the site. Existing information (e.g. de Lucas *et al.*, 2007; Douglas *et al.*, 2011; Haworth & Fielding, 2012) and reviews of effects (e.g. Madders & Whitfield, 2006; Hötter *et al.*, 2006; Gove *et al.*, 2013; Harrison *et al.*, 2017) suggest that most birds are affected only slightly, if at all, although these effects require further study. Other studies involving long-term monitoring of golden plover (Fielding & Haworth 2010, 2012, 2013, Douglas *et al.* 2011) and curlew (Whitfield *et al.* 2010), found no evidence of displacement due to wind farm infrastructure for either species. In addition in their study of the effects of wind turbines on the distribution of wintering farmland birds Devereux *et al.* (2008) did not find any effect on four species groups (seed-eaters, corvids, gamebirds and Skylark), except for pheasant (*Phasianus colchicus*) an introduced species.
- 7.8.59 However contradictorily in other studies, breeding birds have been found to be displaced within 300 m from a turbine (e.g. Gill *et al.*, 1996; Percival, 1998; Hötter *et al.*, 2006), with some studies suggesting some potential for partial displacement effects at greater distances (Pearce-Higgins *et al.*, 2009). Wind turbines might also displace birds from much larger areas if they act as a barrier to bird movements, or if availability of suitable habitat is restricted.
- 7.8.60 The evidence suggests that impacts vary between species and sites (Madders & Whitfield, 2006). There is potential for some disruption of feeding and nesting due to increased human activity for maintenance purposes, although this infrequent maintenance is unlikely to create any increased disturbance as compared to current farming practices which sees daily activity of workers using quad bikes and other farm vehicles, as well as disturbance pressures resulting from grazing livestock, and would be restricted to areas of the site accessible by tracks. Therefore, the overriding source of disturbance and displacement of birds during the operational period is considered to be the turbines operating (Pearce-Higgins *et al.*, 2009).
- 7.8.61 On a precautionary basis, displacement effects on golden plover, lapwing, oystercatcher, ringed plover and redshank are likely to be limited to c.200 m around the proposed turbine locations. This

distance is based on published disturbance distances for golden plover and lapwing (Yalden & Yalden, 1989, 1990; Hötker *et al.* 2005; Pearce-Higgins *et al.*, 2009) and extend to similar short sward nesting species, such as oystercatcher and redshank.

- 7.8.62 The overall displacement effects on golden plover, lapwing, oystercatcher, ringed plover and redshank are therefore assessed to be significant at no more than the **local** level given the availability of suitable habitat (beyond the likely extent of displacement) within the site and wider area, and the likelihood (based on research referenced above) that population-level effects will not occur.
- 7.8.63 Curlew are considered to potentially be most affected by operational 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 m 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 (2009) that identified a 48% decline in abundance in 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.
- 7.8.64 Any initial displacement of snipe and curlew during the operational phase will likely lead to birds using other similar areas of breeding habitat within the site and wider areas in the immediate surrounds east, west and south of the site boundary. Some areas, such as the sloping land leading up to Wideford Hill, have a variety of grassland and wet heath habitat and is potentially more optimal breeding habitat for species such as curlew and snipe. Additionally it is likely over time that the birds will habituate to the presence of the turbines and return to breeding locations close to the site infrastructure and a grazing management plan outlined in the additional mitigation (see Section 7.9) will provide improved breeding habitat in the north-west corner of the site, with reduced disturbance from farming activities, cattle poaching the grassland and reduced egg and chick loss due to trampling by cattle.
- 7.8.65 Given the availability of alternative breeding habitat directly adjacent to the site and the proposed mitigation the effects on waders are of **low** adverse level of medium-term duration and the effects **not significant**.

Collision

Greylag goose

- 7.8.66 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.
- 7.8.67 An analysis of collision risk was undertaken following best practice guidance (SNH, 2013 and SNH, 2017). The collision risk analysis was informed by the recorded VP survey flight lines (Figure 7.8); full details of the calculations are provided in Technical Appendix 7.3.
- 7.8.68 It is predicted that 0.1 collisions will occur annually and that over a period of 25 years (which is the time period used for comparison within the cumulative section of the report) this will result in 2.07 collisions. Mitchell *et al.* (2012) estimate that the wintering population of greylag geese on Orkney numbers approximately 70,000 (estimated at 10,000 of the naturalised population and 60,000 migratory Icelandic birds). The mortality predicted represents 0.003 % of the winter greylag population and is therefore not considered to be significant.
- 7.8.69 Therefore, direct mortality impacts as a result of turbine collision are of **low** level and the effects **not significant**.

Curlew

- 7.8.70 There is very little publicly 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.
- 7.8.71 An analysis of collision risk was undertaken following best practice guidance (SNH, 2013 and SNH, 2017). The collision risk analysis was informed by the recorded VP survey flight lines (Figure 7.3); full details of the calculations are provided in Technical Appendix 7.3.
- 7.8.72 It is predicted that 0.05 collisions will occur annually and that over a period of 25 years (which is the time period used for comparison within the cumulative section of the report) this will result in 1.25 collisions. The breeding population on Orkney is an estimated 3223 pairs or 0.7 % of the UK total breeding population. The mortality predicted represents 0.019 % of the Orkney population and is therefore not considered to be significant.
- 7.8.73 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects **not significant**.

Lapwing

- 7.8.74 There is very little publically available literature on collision of lapwing with turbines. SNH have therefore accepted a default avoidance rate of 98 % for this species. An analysis of collision risk was undertaken following best practice guidance (SNH, 2013 and SNH, 2017). The collision risk analysis was informed by the recorded VP survey flight lines (Figure 7.6); full details of the calculations are provided in Technical Appendix 7.3.
- 7.8.75 It is predicted that 0.0215 collisions will occur annually and that over a period of 25 years (which is the time period used for comparison within the cumulative section of the report) this will result in 0.54 collisions. The breeding population of Orkney is an estimated 5000 pairs or 0.7 % of the UK total breeding population. The mortality predicted represents 0.0054 % of the Orkney population and is therefore not considered to be significant.
- 7.8.76 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects **not significant**.

Golden plover

- 7.8.77 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.
- 7.8.78 An analysis of collision risk was undertaken following best practice guidance (SNH, 2013 and SNH, 2017). The collision risk analysis was informed by the recorded VP survey flight lines (Figure 7.4); full details of the calculations are provided in Technical Appendix 7.3.
- 7.8.79 It is predicted that 0.04 collisions will occur annually and that over a period of 25 years (which is the time period used for comparison within the cumulative section of the report) this will result in 1.1 collisions. The wintering population on Orkney is estimated at 10,000. The mortality predicted represents 0.008% of the Orkney population and is therefore not considered to be significant.
- 7.8.80 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects **not significant**.

Oystercatcher

- 7.8.81 There is very little publicly available literature on collision of oystercatcher with turbines. SNH have therefore accepted a default avoidance rate of 95 % for this species. An analysis of collision risk was undertaken following best practice guidance (SNH, 2013 and SNH, 2017). The collision risk analysis was informed by the recorded VP survey flight lines (Figure 7.7); full details of the calculations are provided in Technical Appendix 7.3.

7.8.82 It is predicted that 0.002 collisions will occur annually and that over a period of 25 years (which is the time period used for comparison within the cumulative section of the report) this will result in 0.05 collisions. The breeding population on Orkney is estimated at 10,000 pairs. The mortality predicted represents 0.00025 % of the Orkney population and is therefore not considered to be significant.

7.8.83 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects **not significant**.

Redshank

7.8.84 There is very little publicly available literature on collision of redshank with turbines. SNH have therefore accepted a default avoidance rate of 98 % for this species. An analysis of collision risk was undertaken following best practice guidance (SNH, 2013 and SNH, 2017). The collision risk analysis was informed by the recorded VP survey flight lines (Figure 7.9); full details of the calculations are provided in Technical Appendix 7.3.

7.8.85 It is predicted that 0.001 collisions will occur annually and that over a period of 25 years (which is the time period used for comparison within the cumulative section of the report) this will result in 0.03 collisions. The breeding population on Orkney is estimated at 1,700 pairs. The mortality predicted represents 0.0009 % of the Orkney population and is therefore not considered to be significant.

7.8.86 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects **not significant**.

Decommissioning

7.8.87 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

7.9 Additional Mitigation and Enhancement

7.9.1 In the event of consent and in addition to the provision of generic mitigation measures (see Section 7.7), the following specific measures designed to avoid, reduce and offset identified ornithological effects are proposed.

Waders

7.9.2 Specific mitigation for waders will focus on habitat improvement through grazing management and avoidance of direct mortality and disturbance. A Grazing Management Plan (GMP) outlined below details the approach to improve habitats for breeding waders throughout the Proposed Development site.

7.9.3 The half of the area of land shown in Figure 7.13 will only be grazed by sheep from the beginning of April to the end of May meaning that nest building and early incubation stages will be unaffected through trampling by cattle. This low intensity grazing will mean nesting attempts will be unlikely to be damaged by cattle and the grass within the site will grow and provide good cover for incubating adults and young alike, without being so long it chokes nesting attempts.

7.9.4 This grazing management will provide suitable grassland habitat for wader species within the site such as lapwing, oystercatcher and curlew. This area contains 50% of curlew, 45% of the lapwing, territories and 75% of the redshank territories within the site boundary as well as all arctic tern and ringed plover territories.

7.9.5 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.

- 7.9.6 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.
- 7.9.7 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.
- 7.9.8 The ECoW will undertake construction phase surveys of birds within the Proposed Development 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.

Farmland and Grassland Breeding Bird Assemblage

- 7.9.9 No additional, specific mitigation (beyond the generic mitigation discussed in Paragraphs 7.7.1 to 7.7.8 above) is considered to be warranted with respect to farmland and grassland breeding birds.

7.10 Residual Effects

- 7.10.1 Following the application of mitigation measures, which include land management, residual effects of the Proposed Development on ornithological interest are as follows:
- 7.10.2 During the construction phase the following impacts may occur:
- Disturbance and displacement of wintering greylag goose, wintering pink-footed goose, curlew (no direct displacement, up to 6 territories disturbance), lapwing (potentially two displaced and up to 20 territories disturbed), golden plover (up to 2 territories), oystercatcher (four displaced and up to 30 territories disturbed), redshank (up to 4 territories), ringed plover (3 territories), snipe (up to 4 territories) and Arctic tern (1 territory) may occur but this will be minimised through the timing of the work and the use of buffer zones.
- 7.10.3 Pre-development surveys, the appointed ECoW and the adoption of grazing management measures will ensure that death or injury of any bird is not likely.
- 7.10.4 During the operation phase the following impacts could potentially occur due to the proximity of turbines:
- Displacement of curlew (up to 5 territories within 500 m of turbines), lapwing (up to 5 territories within 200 m), golden plover (up to 2 territories within 200 m), oystercatcher (up to 10 territories within 200 m), redshank (up to 2 territories within 200 m), ringed plover (1 territory within 200m), snipe (up to 4 territories within 500 m) and Arctic tern (1 territory within 200 m); and

- Collision with turbines of greylag goose (1 bird every 12 years), curlew (1 bird every 20 years), lapwing (1 bird every 47 years), golden plover (1 bird every 23 years), oystercatcher (1 bird every 469 years) and redshank (1 bird every 911 years).
- 7.10.5 Given the proposed changes to the grazing regime in the northwest field of the site (See Figure 7:13) which contains the highest density of ground nesting birds within the site (see paragraph 7.9.4), it is considered that this will lead to a more favourable nesting habitat in this area for waders and other ground nesting species, particularly with the exclusion of cattle during critical egg developmental stages. With grazing densities reduced during incubation and the subsequent reduction in disturbance and nest destruction through cattle poaching lead to a net gain of successful fledgling rates for ground nesting species such as lapwing and curlew.
- 7.10.6 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.
- 7.10.7 Taking into account the proposed mitigation measures, it is concluded that the Proposed Development will not have a significant adverse effect at greater than the Local level for any species using the site and immediate surrounding area and in fact will have a barely perceptible beneficial impact on ground nesting waders.
- 7.10.8 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 any of the statutory designated sites identified as having potential connectivity with the Proposed Development.
- 7.10.9 There is an inherent level of uncertainty associated with ecological assessment (as is acknowledged in CIEEM Guidance). However, post-construction monitoring (PCM) is proposed to assess the efficacy of the HMP, in terms of breeding waders, on an ongoing basis and will consist of breeding wader and habitat surveys across consecutive operational years (i.e. years 0, 1, 2, 3, 5 and 10). Survey methods and timings may be adjusted across monitoring years according to each year's survey results, as well as informing other HMP factors (i.e. grazing densities).
- 7.10.10 This assessment has fully considered the principles of and guidance provided by Scottish Planning Policy, the Nature Conservation (Scotland) Act 2004, the Orkney Local Development Plan 2017, and the Orkney LBAP. In particular, consideration has been given to international responsibilities and the protection of designated sites.

7.11 Cumulative Assessment

- 7.11.1 The cumulative assessment of effects to receptors takes into consideration other operational, under construction and in planning developments. The assessment does not include for developments at the scoping stage, in accordance with SPP and given the lack of detailed information on such proposed developments. The assessment takes into account all types of developments considered to be relevant in the context of the assessed impacts, not just wind farm developments.
- 7.11.2 The assessment of ornithological effects associated with the Proposed Development alone predicted no significant effects for every IOF due to the low suitability of habitat within the site, lack of breeding records, and the relatively low activity levels of IOFs recorded during baseline surveys.
- 7.11.3 The Proposed Development lies within the Natural Heritage Zone: NHZ2 and so a qualitative cumulative assessment of the likely effects of local wind farm projects (within NHZ2) as shown in Table 7.5, on local IOF populations, is considered. There are approximately 500 single turbine wind farms on Orkney and in NHZ2 which generally have no collision risk data and given the large number those out of immediate vicinity of the site are not considered within this assessment.
- 7.11.4 For the purpose of this assessment it is considered that all other developments included in cumulative calculations remain as they were at installation and remain so for the assessment (25 year) period.
- 7.11.5 In addition to wind farm developments, other large-scale developments that may impact on IOF's at the site have been considered. The Cursiter Quarry expansion was considered the only project within the zone of influence of the Proposed Development which will result in the loss of 18 hectares

of improved grassland and 1.6 hectares of semi-improved grassland fields. Given the large amount of similar habitat in the local area the impacts of this development are not considered to be significant.

- 7.11.6 The cumulative assessment has been limited to disturbance-displacement and collision risk, with negligible effects predicted for habitat loss or lighting effects associated with the Proposed Development.

Greylag goose

Cumulative Disturbance-displacement

- 7.11.7 Greylag geese were recorded roosting, foraging and utilising the airspace above the fields within the site and immediate surrounds with the largest group recorded being 2000 birds. Greylag geese are widespread, in particular during winter months preferring open areas of lowland grassland. Some habitat suitable for roosting or feeding may become unavailable to greylag geese due to displacement effects around turbines and other infrastructure. It is likely the geese will simply relocate to similar grassland areas in direct vicinity to the Proposed Development.
- 7.11.8 Overall, the residual cumulative effect on the local greylag goose population from operational displacement is classified as **barely perceptible** adverse and is **not significant**. This is also likely to be the level of significance for the contribution of wind farm projects within NHZ 2 when scaled up to the relevant population (national/Scottish wintering or migrating populations).

Cumulative Collision Risk

- 7.11.9 It is predicted that a cumulative 8.27 (4.3 Berriedale @ 99% not the updated 99.8% avoidance rate) collisions will occur annually (See Table 7.5) and that over a period of 25 years, the time period outlined as a typical lifetime for wind farms, this will result in 207 collisions at a NHZ 2 level. Mitchell et al (2012) estimate that the wintering population of greylag geese on Orkney numbers approximately 70,000 (estimated at 10,000 of the naturalised population and 60,000 migratory Icelandic birds). The mortality predicted represents 0.30 % of the winter greylag population and is therefore not considered to be significant. Therefore, direct mortality impacts as a result of turbine collision are of **low** level and the effects **not significant**.

Curlew, Lapwing, Oystercatcher and Redshank

Cumulative Disturbance-displacement

- 7.11.10 Curlew, oystercatcher, lapwing and redshank were all recorded breeding within the site and some habitat suitable for roosting or feeding may become unavailable due to displacement effects around turbines and other infrastructure. These wader species were recorded breeding within most local wind farm sites (See Table 7.5) and are relatively common breeding species in Orkney where suitable open habitats are present. A small number of breeding pairs may be affected by displacement due to the construction and operation of wind farms, although in some cases, grazing management measures may help offset such losses of habitat.
- 7.11.11 Overall, the residual cumulative effect on the local curlew, oystercatcher, lapwing and redshank population from operational displacement is classified as **barely perceptible** adverse and is **not significant** in the context of the EIA Regulations. This is also likely to be the level of significance for the contribution of wind farm projects within NHZ 2 when scaled up to the relevant population (national/Scottish wintering or migrating populations).

Cumulative Collision Risk

- 7.11.12 No collision risk modelling was recorded for these four species from the other wind farm sites in Orkney therefore the cumulative collision risk remains as per the individual assessments listed above.

Golden Plover

Cumulative Disturbance-displacement

- 7.11.13 Sansom *et al.* (2016) have shown information to suggest that breeding golden plovers may be affected up to 400 m away from operational turbines. Presence of golden plover was only recorded during the April surveys, where a large flock was recorded flying over the site. In addition two possible breeding territories were identified during the initial breeding bird survey in April and some habitat suitable for roosting or feeding may become unavailable due to displacement effects around turbines and other infrastructure.
- 7.11.14 Overall, the residual cumulative effect on the local golden plover population from operational displacement is classified as **barely perceptible** adverse and is **not significant**. This is also likely to be the level of significance for the contribution of wind farm projects within NHZ 2 when scaled up to the relevant population (national/Scottish wintering or migrating populations).

Cumulative Collision Risk

- 7.11.15 A local cumulative annual collision rate of around 2.879 birds is predicted, mainly due to the flight activity recorded at Hammers Hill (See Table 7.5). The wintering population on Orkney is estimated at 10,000. The mortality predicted represents 0.029% of the Orkney population annually and is therefore not considered to be significant. Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects **not significant**.

Table 7.5 – Cumulative Assessment of Likely Ornithological Effects: Wind Farm Development in NH22 (including single turbine developments within 2 km).

Site Name	Distance from Proposed Development	Stage	Details / Description of Significant Residual Effects
Hammars Hill, Evie	8.9 km north.	Installed	<p>Short eared owl nests regularly within 1km of the development. At about 1km distance there are two more pairs of owls and a former site for Hen Harriers (not used since 2004). At about 2km there are up to five more pairs of owls to three more Hen Harrier sites, and up to twelve pairs of Red-throated divers.</p> <p>Waders were recorded breeding within the site including (Oystercatcher: 9, Lapwing: 7, Golden Plover: 1, Snipe: 10, Curlew: 12, Redshank: 5, Short-eared owl: 1). A maximum count of 400 greylag geese was recorded.</p> <p>Collision Risk Modelling (CRM) predicted greylag goose (1.6 fatalities per year), non-breeding golden plover (2.15).</p>
Rennibister, Firth	1.3 km east	Operational	No collision risk modelling was undertaken for this single turbine site. Given the similar location to the Proposed Development, albeit close to the built up area of Kirkwall, impacts are predicted to be at most one sixth of the Proposed Development and insignificant.
Crowness Business Park, Kirkwall	1.6 km east	Operational	No collision risk modelling was undertaken for this single turbine site. Given the similar location to the Proposed Development, albeit close to the built up area of Kirkwall, impacts are predicted to be at most one sixth of the Proposed Development and insignificant.
Holodyke Wind Turbine, Birsay	11.6 km north-west	Operational	SNH request for ornithology assessment (due to potential impacts on hen harrier, short-eared owl and red-throated diver), no details found on Planning Portal.
Berriedale Wind Farm, Caithness	20.7 km south	Under Construction	RSPB considered the area important for short-eared owl and waders. Collision risk modelling was undertaken for a number of species including greylag goose (4.3 fatalities calculated at 99% avoidance) and golden plover (0.6 fatalities at 98%) of relevance to this assessment.

Site Name	Distance from Proposed Development	Stage	Details / Description of Significant Residual Effects
Hesta Head, South Ronaldsay	25.3 km south-east	Approved	<p>Golden plovers were seen relatively frequently during the spring and autumn passage periods, sizeable flocks were occasional, foraging in the general area with up to 350 present on 7 April 2011 and 16 April 2011 and 260 on 11 December 2015. Otherwise the records were occasional to frequent between late September and early May and appeared to relate to local movements of 1–50 birds, in various directions over and past the Proposed Development, often at risk height.</p> <p>Other listed species observed at the proposed development include; Greylag goose, Oystercatcher, Lapwing, Redshank and Curlew.</p> <p>The surveys for breeding birds in 2011 found two pairs of redshank and five pairs of curlew within the Survey Area, although it seemed likely that up to seven or eight pairs of curlews may have been present. No snipe were confirmed as breeding in 2011, but in 2016 up to two were seen drumming. No CRM was undertaken on greylag goose wader species.</p>
Bu arm Repowering, Stronsay	21.09 km north-east	Installed	<p>It was assessed that four species were at risk from collision with turbine (red-throated diver, golden plover, dunlin and arctic skua). No CRM details were available.</p>
Evie Wind Energy Project, Evie	12.79 km north-west	Application	<p>Hen harrier, red-throated diver, greylag goose, short-owl and golden plover were frequently observed from VP watches.</p> <p>Breeding bird surveys identified oystercatcher (18), greylag goose (2), ringed plover (1), red grouse (1), lapwing (2), arctic skua (1–2), snipe (2), great skua (1–2), curlew (11), common gull (5), dunlin (1) and redshank (3) territories.</p> <p>CRM was undertaken for greylag goose (1.15 per year) and golden plover (breeding 0.047, non-breeding 0.163) as well as hen harrier, red-throated diver.</p>

Site Name	Distance from Proposed Development	Stage	Details / Description of Significant Residual Effects
Work Farm, St Ola	5.25 km east	Approved	No collision risk modelling was undertaken. Ornithology surveys identified both breeding and wintering greylag geese and golden plover in the vicinity of the site. A desk study outlined the presence of wintering wading birds in the vicinity, most notably golden plover and redshank. Small numbers of breeding curlew, lapwing and oystercatcher breed in the local area.
Burgar Hill, Evie	12.79 km north-west	Installed	As Evie wind farm. (No detailed ornithology results were detected for later turbine applications but red-throated diver were noted breeding in the vicinity of one site.)
Spurness Wind Farm, Sanday	26.8 km north-east	Installed	Surveys undertaken by RSPB at the site identified breeding gulls, Arctic tern, Arctic skua and fulmar. No collision risk modelling was undertaken.
Costa Head, Birsay	18.7 km south-east	Application	Curlew and golden plover were recorded regularly from VP surveys. Curlew, lapwing and redshank were recorded breeding within the site in small numbers. No CRM was undertaken for any wading bird species.
Barns of Ayre, Deerness	19 km south-east	Installed	No ornithology surveys were undertaken or collision risk modelling.
Akla	8.45 km south-west	Application	Hen harrier, red-throated diver, great skua most frequently recorded from VP watches as well as golden plover, greylag goose and whimbrel. Oystercatcher (14,18), lapwing (8,3), Snipe (12,18) Curlew (15,12), redshank (5,1) were recorded breeding good numbers. CRM was undertaken for greylag goose (1.12 per year) and golden plover (non-breeding 0.052) as well as hen harrier, red-throated diver.

7.12 Summary

- 7.12.1 The ornithology study area varies dependent on the bird survey undertaken, however all surveys were carried out in accordance with relevant legislation and best practice guidelines.
- 7.12.2 The following birds were recorded on site:
- Wildfowl and divers – two species of goose, two species of diver and eight duck species during the non-breeding season, none were recorded as breeding season.
 - Gull – five species during both the breeding and non-breeding seasons.
 - Raptors and owls - three species of scarce raptors and owls and one species of common raptor during the year, although none were recorded breeding in the site one species was recorded breeding within the 2 km survey buffer with a further species recorded historically.
 - Wader - eight species of waders were recorded, seven were recorded breeding.
 - Other grassland and moorland birds - species of conservation concern recorded during breeding surveys included two red-listed species: house sparrow and twite.
- 7.12.3 An assessment of likely effects on ornithological receptors identified no predicted significant effects.
- 7.12.4 An ECoW will oversee the implementation of mitigation measures including the application of best practice guidance and the avoidance, where possible, of site clearance during the bird breeding season. Should nests be discovered then they will be clearly demarcated and buffer zones established around nesting sites to prevent damage to the nests and disturbance of adults caring for young.
- 7.12.5 When all mitigation measures are implemented, negligible effects on birds are anticipated due to the Proposed Development and the implementation of grazing management plan may lead to net gains with regards to ground nesting bird species such as lapwing, curlew and oystercatcher as reduced cattle numbers will lead to less nesting attempts being trampled during the incubation period.

Table 7.6 – Summary of Effects

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Greylag goose disturbance and displacement.	Barely Perceptible	Adverse	None	Barely Perceptible	Adverse
Proposed SPA qualifying wildfowl and divers disturbance and displacement.	Barely Perceptible	Adverse	None	Barely Perceptible	Adverse
Curlew disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Low	Adverse
Lapwing disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Low	Adverse
Golden plover disturbance and displacement.	Barely Perceptible	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible	Adverse
Oystercatcher disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Low	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Redshank disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Low	Adverse
Other wader disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible	Adverse
Arctic tern disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible	Adverse
Gull disturbance and displacement.	Low	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible	Adverse
Operation					
Greylag goose displacement and collision mortality	Low	Adverse	None	Low	Adverse
Curlew displacement and collision mortality	Barely Perceptible	Adverse	Grazing management to improve breeding habitat on-site to retain and improve local population density.	Barely perceptible	Beneficial
Lapwing displacement and collision mortality	Barely Perceptible	Adverse	Grazing management to improve breeding habitat on-site to retain and improve local population density.	Barely perceptible	Beneficial
Golden Plover displacement and collision mortality	Barely Perceptible	Adverse	Grazing management to improve breeding habitat on-site to retain and improve local population density.	Barely perceptible	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Oystercatcher displacement and collision mortality	Barely Perceptible	Adverse	Grazing management to improve breeding habitat on-site to retain and improve local population density.	Barely perceptible	Beneficial
Redshank displacement and collision mortality	Barely Perceptible	Adverse	Grazing management to improve breeding habitat on-site to retain and improve local population density.	Barely perceptible	Beneficial
Other wader species displacement and collision mortality	Low	Adverse	Grazing management to improve breeding habitat on-site to retain and improve local population density.	Barely perceptible	Beneficial

Table 7.7 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Curlew	Disturbance, displacement and collision mortality	No Collision risk values were available from other windfarm developments on Orkney. Some temporary displacement is likely during construction however with a HMP in place this will be offset.	Barely Perceptible	Adverse

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Lapwing	Disturbance, displacement and collision mortality	No Collision risk values were available from other windfarm developments on Orkney. Some temporary displacement is likely during construction however with a HMP in place this will be offset.	Barely Perceptible	Adverse
Golden Plover	Disturbance, displacement and collision mortality	Cumulative collision risk values for this species are very low. Some temporary displacement is likely during construction however with a HMP in place this will be offset.	Barely Perceptible	Adverse
Oystercatcher	Disturbance, displacement and collision mortality	No Collision risk values were available from other windfarm developments on Orkney. Some temporary displacement is likely during construction however with a HMP in place this will be offset.	Barely Perceptible	Adverse
Redshank	Disturbance, displacement and collision mortality	No Collision risk values were available from other windfarm developments on Orkney. Some temporary displacement is likely during construction	Barely Perceptible	Adverse

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
		however with a HMP in place this will be offset.		
Greylag Goose	Disturbance, displacement and collision mortality	Cumulative collision mortality across Orkney is considered to be 3.9 birds per annum for this species of which the Proposed Development contributes 0.1. Some temporary displacement is likely during construction however with a HMP in place this will be offset.	Low	Adverse

7.13 References

- Band, W, Madders, M, & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms*. In: Janss, G, de Lucas, M & Ferrer, M (eds.) *Birds and Wind Farms*. Quercus, Madrid. 259-275
- BirdLife International (2004) *Birds in Europe: population estimates, trends and conservation status*. BirdLife Conservation Series No. 12, Cambridge, UK.
- Calladine, J., Garner, G., Wernham, C. & Thiel, A. (2009) The influence of survey frequency on population estimates of moorland breeding birds. *Bird Study*, 56: 3, 381-388.
- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester
- de Lucas, M.G.F., Janss, S.F.E & Ferrer, M. (2007). *Birds and wind farms: risk assessment and mitigation*. Quercus, Madrid, Spain.
- Devereux, C.L., Denny, M.J.H. & Whittingham, M.J. (2008) Minimal effects of wind turbines on the distribution of wintering farmland birds. *Journal of Applied Ecology*
- Douglas, D., Bellamy, P., & Pearce-Higgins, J. (2011) Changes in the abundance and distribution of upland breeding birds at an operational wind farm. *Bird Study* 58, Issue 1, 2011
- Dürr, T. (2019). *Vogelverluste an Windenergieanlagen / bird fatalities at wind turbines in Europe*. Available at: <http://ow.ly/wusS9> Accessed October 2019
- Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746. Available at: britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf (accessed June 2018). A summary leaflet is available from https://www.bto.org/sites/default/files/shared_documents/publications/birds-conservation-concern/birds-of-conservation-concern-4-leaflet.pdf
- European Parliament (2009). Council Directive 2009/147/EC: The Conservation of Wild Birds Directive. Available at: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF#>
- Fielding, A.H. & Haworth, P.F. (2010). Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2009. Haworth Conservation, Isle of Mull, Scotland.
- Fielding, A.H. & Haworth, P.F. 2012. Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines – 2011 update. Haworth Conservation, Isle of Mull, Scotland.
- Fielding, A.H. & Haworth, P.F. 2013. Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2013. Haworth Conservation, Isle of Mull, Scotland.
- Gill, J.P., Townsley, M. and Mudge, G.P., (1996). Review of the impacts of wind farms and other aerial structures upon birds. SNH Review 21: 68pp
- Gove, B., Langston, R.H.W., McCluskie, A., Pullan, J.D. & Scrase, I. (2013). Wind farms and birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment. Report

prepared by BirdLife International on behalf of the Bern Convention. Strasbourg, 17 September 2013. Hardey, J., Crick, H., Riley, H., Etheridge, B., and Thompson, D. (2013) *Raptors: A field guide to surveys and monitoring*. The Stationery Office; 3rd revised edition.

Harrison, C., Llyod, H. & Field, C. (2017). Evidence review of the impact of solar farms on birds, bats and general ecology. (NEER012). Natural England. First edition.

Hayhow, D. B., Ausden, M. A., Bradbury, R. B., Burnell, D., Copeland, A. I., Crick, H. Q. P., Eaton, M. A., Frost, T., Grice, P. V., Hall, C., Harris, S. J., Morecroft, M. D., Noble, D. G., Pearce-Higgins, J. W., Watts, O., Williams, J. M. (2017), *The state of the UK's birds 2017*. The RSPB, BTO, WWT, JNCC, NE and NRW, Sandy, Bedfordshire.

Hötcker, H., Thomsen, K-M & Koster, H. (2006) The impact of renewable energy generation on biodiversity with reference to birds and bats – facts, gaps in our knowledge, areas for further research and ornithological criteria for the expansion of renewables. NABU Report, Germany.

IEMA (1995). Guidelines for Baseline Ecological Assessment. Institute of Environmental Management and Assessment.

IEEM (2006) Guidelines for Ecological Impact Assessment. Institute of Ecology and Environmental Management.

Langston, R.H.W. & Pullan, J.D., (2003) Wind farms and Birds: An analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues. Birdlife International.

Madders, M. & Whitfield, D.P. (2006). Upland raptors and the assessment of wind farm impacts. *Ibis* 148, 43-56.

Mitchell, C. 2012. *Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland*. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risley, K & Stroud, D. (2013). Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106: 64-100

Orkney Islands Council (2013). Orkney Local Biodiversity Action Plan 2013-2016. Available online at: http://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/DM_Guidance/The_Orkney_Local_Biodiversity_Action_Plan_2013-2016.pdf (accessed April 2019).

Pearce-Higgins, J.W., Stephen, L., Langton, R., Bainbridge, I. and Bullman, R. (2009) The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology* (46) 1323 -1331.

Pearce-Higgins, J.W., Stephen, L., Douse, A., Langston, R. (2012) Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. *Journal of Applied Ecology*. 49, 2, April 2012, 386-394

Percival, S.M. (1998). Birds and Turbines: managing potential planning issues. Proc. of the 20th BWEA Conference 1998: pp 345-350

Percival, S.M. (2005) *Birds and wind farms: what are the real issues?* *British Birds* 98: 194-204.

Ruddock & Whitfield (2007). A review of disturbance distances in selected bird species.

Scottish Government (2013). *Scottish Biodiversity List. Version 1.5*. Available online at: <http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>

- Sim, I.M.W., Dillon, I.A., Eaton, M.A., Etheridge, B., Lindley, P., Riley, H., Saunders, R., Sharpe, C. and Tickner, M. (2007). Status of the Hen Harrier *Circus cyaneus* in the UK and the Isle of Man in 2004, and a comparison with the 1988/89 and 1998 surveys. *Bird Study* 54, 256–267.
- SNH (2000) Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoiding Action Available at: <https://www.nature.scot/sites/default/files/2017-09/Guidance%20Note%20-%20Windfarms%20and%20birds%20-%20Calculating%20a%20theoretical%20collision%20risk%20assuming%20no%20avoiding%20action.pdf>.
- SNH (2000) *Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action*. SNH Guidance Note. Available at <http://www.snh.gov.uk/docs/C205425.pdf>
- SNH (2005). Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities. SNH Guidance Note Series
- SNH (2010) SNH Avoidance Rate Information and Guidance Note. Use of Avoidance Rates in the SNH Windfarm Collision Risk Model.
- SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: <https://www.nature.scot/sites/default/files/2017-09/Guidance%20note%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf>
- SNH (2013). Avoidance rates for wintering species of geese in Scotland at onshore wind farms. Available at <http://www.snh.gov.uk/docs/A916616.pdf>
- SNH (2017). Recommended Bird Survey Methods to inform Impact Assessment of Onshore Wind Farms. SNH Guidance Note Series
- Scottish Natural Heritage (2018a). *Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model*. Version 2. Scottish Natural Heritage, Inverness.
- SNH (2018b). Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (2014, updated 2018). SNH Information and Guidance Note. SNH, Battleby.
- Tait C (2012). The Orkney Guide Book. Nature and Environment pp28-41.
- Upton A (2014). Quanterness Proposed Wind Energy Project – Interim ecology report.
- Vauk, G. (1990) Biological and ecological study of the effects of construction and operation of wind power land ownerships. Jahrgang/Sonderheft, Endbericht. Norddeutsche Naturschutzakademie, Germany.
- Whitfield, D.P. Green, M. & Fielding, A.H. 2010. Are breeding Eurasian curlew *Numenius arquata* displaced by wind energy developments? Natural Research Projects Ltd, Banchory, Scotland.
- Wilson, M.W., Austin, G.E., Gillings, S. and Wernham, C.V. (2015) *Natural Heritage Zone Bird Population Estimates*. SWBSG Commissioned Report: 1504.
- Winkelmann, J.E. (1994) Bird/wind turbine investigations in Europe. Proc. of the National Avian Wind Power Planning Meeting, Denver, Colorado, pp 43-48.
- Yalden, D.W. & Yalden, P.E. (1989). The sensitivity of breeding Golden Plovers *Pluvialis apricaria* to human intruders. *Bird Study* 36: 49–55.
- Yalden, P.E. & Yalden, D.W. (1990). Recreational disturbance of breeding Golden Plovers *Pluvialis apricaria*. *Biol. Conserv.* 51: 243–262.