

6 Ornithology

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6 Ornithology

6.1 Executive Summary

- 6.1.1 This chapter provides an update to the 2019 and 2020 ornithological assessments (presented in the 2019 Environmental Impact Assessment (EIA) Report and 2020 Supplementary Environmental Information (SEI) respectively) to account for the 2021 Layout, and to address stakeholder comments received in response to the 2020 SEI submission.
- 6.1.1 The assessment has accounted for measures designed into the Proposed Development and those that will be secured by the project Construction Environment Management Plan (CEMP). The assessment has also considered the Proposed Development in combination with other wind farm schemes in Shetland.
- 6.1.2 The 2021 Layout has resulted in the removal of five turbines and 3.9 km of access tracks, in addition to other associated infrastructure. As a result, the predicted disturbance and displacement impacts on red throated diver during construction and operation of the Proposed Development has reduced and is now of negligible significance; a reduction of 2020 SEI. In addition, the assessment has concluded that residual effects of disturbance and displacement during the construction and operation phases to all other species will be reduced from those predicted in the 2020 SEI. Any displaced territories will be accommodated through habitat enhancement to create more favourable nesting habitat. It is expected that displacement effects can be fully mitigated through habitat enhancement.
- 6.1.3 Following correction and update of the collision risk model, collision-related mortality is now predicted to be significant at the level of the Site for great skua. This increase is not because of the design iterations but it a result of the updated model. The collision risk model for this SEI 2 has been revised and peer reviewed to ensure there are no errors. Collision-related mortality remains not significant at any geographical level for all other species.
- 6.1.4 Overall, construction and operational phase ornithological effects are likely to be localised, and adverse effects on the integrity of internationally designated sites are unlikely to occur (as set out in the 2021 Shadow Habitats Regulations Assessment (HRA) report).

6.2 Introduction

- 6.2.1 The Proposed Development, as described in Chapter 3, represents a reduction in the scale of the Proposed Development. The purpose of this chapter is, therefore, to update the existing assessments presented in the 2019 EIA Report and 2020 SEI of likely significant effects of the Proposed Development on birds. This updated assessment (hereafter referred to as SEI 2) will be based on the 2021 Layout and will address comments received by stakeholders. This document should be read in conjunction with the 2019 EIA Report and 2020 SEI submissions.
- 6.2.2 Further revisions to the layout of the Proposed Development, upon which this SEI 2 is based on, include the removal of five turbines and associated infrastructure, refinement of remaining infrastructure, and all remaining turbines set at 180 m height. Full details of the 2021 Layout are provided in Chapter 3.

6.3 Assessment Methodology

Survey Area

- 6.3.1 The definitions of Survey Area relate to a given perimeter of turbine locations based on the 2019 Layout. The extent of the Survey Area remains the same for the purposes of this assessment since there has been no updated survey work to inform the 2021 Layout. The extent of the Site boundary remains unchanged. The Survey areas and Site boundary are presented in Figure 6.1.

Desk Study and Field Survey

6.3.2 The scope of desk study and field survey is presented in the 2019 EIA Report and the 2020 SEI. Any additional sources of information used to inform the assessment within this SEI 2 are referenced in the text.

EclA Assessment Process

6.3.3 The evaluation and assessment within this chapter has been undertaken with reference to relevant parts of the 2018 Guidelines for Ecological Impact Assessment in the United Kingdom developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, September 2018). The methods for determining importance of ecological features, characterising effects, and determining significance are outlined in the 2019 EIA Report and the 2020 SEI.

Collision Risk Analysis

6.3.4 Consultees identified some inaccuracies relating to the collision risk analysis used in the 2020 SEI. These have been addressed and peer reviewed as part of updating the analysis within this SEI 2. Further details are provided in Section 6.5.

6.4 Baseline Conditions and Evaluation of Resources

6.4.1 The 2019 EIA Report assessment “scoped out” some species and statutory sites that are not likely to be significantly affected. For example, by virtue of the design or operation of the Proposed Development, (for species) because they are very commonplace and / or of very low conservation value, or (for designated sites) because impacts on the qualifying features or conservation objectives of the site are unlikely to occur. Those sites and species scoped out of the assessment within the 2019 EIA Report are not considered here. Those that are considered in this assessment are provided in Table 6.1 below. The evaluation given for each receptor is presented in terms of the importance of that receptor within a defined geographical context (following the CIEEM (2018) guidelines). The following frame of reference has been used:

- International: European¹.
- National: United Kingdom.
- Country: Scotland.
- Regional: Shetland.
- County: Yell.
- Local: mid and north Yell.
- Site (the red line application boundary of the Proposed Development).

Table 6.1. The importance of the site (evaluation) for each receptor considered in the 2019 EIA Report.

Receptor		Evaluation
Statutory Sites (SPA)	Bluemull and Colgrave Sounds	International

¹ Guidance from the Scottish Government has been provided on the application of the relevant legislation in the post-Brexit period in their policy document published on 23 Dec 2020 available at <https://www.gov.scot/publications/eu-exit-habitats-regulations-scotland-2/>.

Receptor		Evaluation
	Otterswick and Graveland	International
	Fetlar	International
	Herma ness, Saxa Vord and Valla Field	International
Statutory Sites (SSSI)	East Mires	National
	Graveland	National
	Valla Field	National
	Hascosay	National
	North Fetlar	National
	Hill of Colvadale and Sobul	National
	Lamb Hoga	National
Birds	Greylag Goose	Local
	Mallard	Site
	Red-throated diver	International
	Curlew	National
	Dunlin	National
	Golden plover	National
	Lapwing	Site
	Oystercatcher	Local
	Redshank	Local
	Ringed Plover	Local
	Whimbrel	National
	Snipe	Regional
	Great skua	International
	Arctic skua	National

Receptor		Evaluation
	Arctic tern	County
	Fulmar	County
	Great black-backed gull	Local
	Lesser black-backed gull	Local
	Herring gull	Local
	Black-headed gull	Local
	Common gull	Local
	Merlin	Regional
	Other Species	Site (for breeding passerines only)

6.5 Response to Consultation Responses

6.5.1 The 2020 SEI received objections on ornithological grounds from:

- NatureScot (dated 09 October 2020).
- Royal Society for the Protection of Birds (RSPB) Scotland (dated 09 October 2020).
- Shetland Bird Club (SBC) (dated 08 October 2020).

6.5.2 The comments from each are summarised below, each followed with the Applicant response. The full responses are provided in Appendix 2.1.

NatureScot

Collision risk analysis

6.5.3 NatureScot stated that *“The SEI states in Chapter 6 (Ornithology) and the text in Appendix 6.1 that watches were carried out for 36 hours at each of four VPs in 2016 and 2018. This is in accordance with NatureScot guidance and constitutes a total of 36 hours observation over the whole site, each VP view-shed being essentially independent of the others. However, in the collision risk calculations the observation times at the four VPs have been added to give a total of 144 hours per season. This is incorrect and causes a significant underestimate of collision risk for all species.....Consequently our advice remains that it is not possible to conclude, on the basis of this assessment, that there will not be an adverse effect on the integrity of Bluemull and Colgrave Sounds SPA. Nor can we assess impacts on Natural Heritage Zone (NHZ) populations of species of high conservation importance..”*

6.5.4 The Applicant has reviewed the collision risk analysis, both in light of the reduced 2021 Layout and turbine dimensions, and the specific comments from NatureScot. The following section, and information presented in Appendix 6.1 of this SEI 2, presents the relevant information with regard to clarifying the collision risk analysis to enable NatureScot and the Scottish Ministers to determine the likely effect on the integrity of the SPA.

Amendment to the Collision Risk Model

- 6.5.5 The collision risk analysis has been updated in Appendix 6.1 of this SEI 2. The amendments are provided in detail within the covering text in the appendix, and include:
- An amendment to the number of turbines from 23 (as presented in the 2020 SEI) to 18 to reflect the 2021 Layout.
 - Removal of the observational time and all flights recorded at VPs 4 and 1 from the analysis (as the viewsheds from these VPs do not cover any part of the 2021 Layout). The observational time at VPs 2, 3 and 6, and all flightlines at collision risk height recorded from these VP locations were entered into the model.
 - Setting of the total combined observation time for VPs 2, 3 and 6 for each season of VP survey to 36 hours².
 - The “wind farm area” as defined in the model has been adjusted to equal a 500 m perimeter area around Proposed Turbine locations in the 2021 Layout.
- 6.5.6 The worked collision risk analysis for greylag goose, red-throated diver, curlew, golden plover, great skua, arctic skua, arctic tern and fulmar is provided in Appendix 6.1 of SEI 2. The analysis has been undertaken by BSG Ecology, and as agreed by NatureScot was independently reviewed. This peer review was undertaken by MacArthur Green and the information and results considered to be robust.
- 6.5.7 The combined visible area as entered into the model, and flight-lines at collision risk height (> 40 m) for each species are presented in Figures 6.2 to 6.18.

RSPB Scotland

- 6.5.8 RSPB Scotland’s response reflected the concerns presented by NatureScot and have been addressed above and in Appendix 6.1.

Shetland Bird Club

- 6.5.9 The Shetland Bird Club state that *“The area of the proposed development is of importance for Red-throated Diver, Merlin, Dunlin, Golden Plover, Artic Skua, Curlew and Snipe. It acknowledged that the development is likely to result in a significant reduction in Dunlin at a Shetland level. We do not agree that adverse effects on other species will be very low or negligible and we do not agree that these adverse effects can be fully mitigated through habitat enhancement.*
- 6.5.10 *We welcome the proposal in the DHMP to improve nesting habitat for Merlin. However, there is no guarantee that this will mitigate the adverse effects on the 1-2 pairs that currently breed in the area.*
- 6.5.11 *We also welcome proposals to improve several lochs for breeding red-throated divers. However, we do not consider that this will mitigate the adverse effects of the proposed development on this species.”*
- 6.5.12 The 2021 Layout is considered to reduce likely significant disturbance and displacement effects on for red-throated diver and merlin. The footprint of the 2021 Layout is in excess of 500 m of breeding lochans and merlin territories recorded during the 2016 and 2018 survey work. The proposed footprint of the 2019 Layout and 2020 layout was within 500 m of six and three breeding lochans respectively. Therefore, it is considered unlikely that disturbance or displacement of red throated diver or merlin arising as a result of the 2021 Layout will occur (considering publicly available data relating to the disturbance distances of each species).

² This level of survey effort to inform the Collision Risk Model is in line with the number of survey hours per VP per season recommended by industry standard guidance (SNH, 2017).

- 6.5.13 Accounting for the reduced scale of impact and scope of habitat management, the measures proposed to benefit red-throated diver and merlin will mitigate any adverse impacts on these species. A summary of on and off-site management is detailed in the Outline Habitat Management Plan (OHMP) in Appendix 7.1.

6.6 Mitigation

Construction-Phase Mitigation

- 6.6.1 This assessment assumes that all standard construction-phase mitigation detailed within the 2019 EIA Report and 2020 SEI is undertaken. In summary, this will include general measures to comply with the provisions of the Wildlife and Countryside Act 1981 (as amended) as well as adherence to current environmental protection policies and guidance, including but not limited to:
- Good Practice During Wind Farm Construction (SNH, 2015a)
 - Constructed tracks in the Scottish uplands (SNH, 2015b);
 - WAT-SG-75 (SEPA, 2018);
 - A Practical Guide to the CAR Regulations (SEPA, 2019); and
 - LUPS-GU31 (SEPA, 2014).
- 6.6.2 A CEMP will also be developed (and agreed in consultation with stakeholders) which will set out the roles of an Ecological Clerk of Works, contain a program of pre-construction and construction-phase ornithological survey work, and set out method statements to ensure current best practice working methods are implemented.
- 6.6.3 Further, additional species-specific measures to be implemented during construction (including the setting out of appropriate exclusion zones around identified nest sites) are set out in paragraphs 6.73 (*et seq*) of the 2020 SEI.

Operational Phase Mitigation

- 6.6.4 The operational phase mitigation measures summarised in the 2019 EIA Report and 2020 SEI have been revised in respect of the 2021 Layout. The revised mitigation measures are provided in the accompanying Outline Habitat Management Plan (OHMP) (see SEI 2 Appendix 7.1) and summarised below.
- 6.6.5 Post-construction management of breeding bird habitats within the Proposed Development site will be undertaken for the operational life of the Proposed Development (30 years). General measures to benefit red-throated diver, waders and merlin have been provided in the 2019 EIA Report. The precise management regime will be detailed in a Management Plan once all necessary land agreements have been secured and will build on the outline objectives and measures provided in the OHMP.
- 6.6.6 The focus of habitat management for birds will be on land within the Site (but distant from the wind farm infrastructure).
- 6.6.7 Enhancement of small, degraded lochans and/ or creation of new lochans locally (beyond 500 m of turbines and infrastructure) will be undertaken during the construction phase (so that enhancement measures are allowed to establish as early into the operation phase of the Proposed Development as possible).
- 6.6.8 Measures for enhancement of lochans for divers will include one or more of the following:
- Profiling of degraded or poached margins.
 - Creating peat islands.
 - Providing nesting rafts (on sheltered lochans).

- Damming lochan outflows to raise and stabilise water levels.
 - Expanding lochans by combining them with adjacent lochans.
- 6.6.9 The enhancement of lochans will provide new nesting opportunities for those red-throated divers that may be displaced by the presence of operating wind turbines and the occasional presence of maintenance personnel. These measures are likely to fully mitigate impacts on displaced red-throated diver during the operation phase of the Proposed Development (no breeding lochans within 500 m of the 2021 Layout were recorded during baseline survey work, but suitable habitat exists).
- 6.6.10 The enhancement of upland habitats (at locations in excess of 400 m of turbines and infrastructure) will provide new nesting opportunities for breeding waders that are displaced by the presence of operating wind turbines and the occasional presence of maintenance personnel.
- 6.6.11 Habitat enhancement measures will include:
- Create new wader scrapes.
 - Enclose each parcel with use of stock-proof fencing to allow controlled grazing.
 - Prevent occurrence of muir burn through landholder agreements.
 - Allow development of a heathland mosaic.
- 6.6.12 The proposed enhancement measures are likely to fully mitigate impacts on displaced waders during the operation phase of the Proposed Development. It is also expected that measures that result in controlled grazing and development of heathland mosaics will provide enhancements for breeding and foraging merlin.
- 6.6.13 All management measurements outlined in the OHMP will be subject to reactive monitoring for the duration of the Management Plan. Monitoring will:
- Record the use of the management parcels by red-throated diver, waders and merlin through targeted survey work.
 - Record the condition of lochans, including water levels, bank erosion, and dam integrity.
 - Record the establishment of heather.
 - Assess the recovery of blanket bog habitats through recording of sphagnum cover and presence of other indicator species.
 - Inspect the integrity of stock fencing.
- 6.6.14 The information obtained through monitoring will be presented in annual reports, and issued to stakeholders, including NatureScot, RSPB Scotland, The Shetland Amenity Trust, Shetland Bird Club, and Shetland Islands Council. The monitoring regime as set out in the Management Plan will be subject to review based on management outcomes presented in each annual report. The annual reports will also enable a process of fine-tuning, allowing for the alteration or addition of new management projects to the work programme for subsequent years.
- 6.6.15 On site population monitoring will also take place at a frequency set out in the HMP and agreed by stakeholders. The outcome of on-site monitoring will be assessed in each annual management review and will inform changes to the breadth of management for subsequent years. This will allow for a dynamic management plan to ensure that residual effects on all species are maintained at or below the level predicted in this SEI 2 report.
- 6.6.16 There may be a need for regular engagement with stakeholders through on-site meetings. Due to the site works anticipated during the first few years of the implementation of the Management Plan there will be a more pressing need for annual meetings during this period. However, once the

management becomes more regular and the monitoring reveals typical results, the requirement for annual meetings is likely to diminish.

Decommissioning Phase Mitigation

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

6.7 Assessment of Residual Effects

- 6.7.1 Following the change in design of the Proposed Development, a re-assessment of the residual effects of the Proposed Development upon the receptors identified in the 2019 EIA Report has been undertaken. The full assessment of potential effects presented in the 2019 EIA Report and updated in the 2020 SEI (following consultee comment) should be followed in conjunction with this assessment. The following text presents an overview of residual effects during construction and operation of the Proposed Development based on the 2021 layout. Table 6.4 provides a summary of residual effects on ornithological receptors. These include a comparison of residual effects between the 2020 Layout and 2021 Layout for construction phase disturbance and displacement, operational phase disturbance, displacement and collision mortality.

Construction

- 6.7.2 The distance over which disturbance and displacement effects occur has been based on evidence presented in paragraphs 6.524 and 6.523 in the 2020 SEI. Table 6.2 below sets out the published disturbance distances for each species (as described in the 2020 SEI) in this assessment, and the number of territories recorded during both the 2016 and 2018 survey work within each described distance from the 2021 Layout. Figures 6.3 to 6.20 illustrates the distribution of territories recorded during the 2016 and 2018 survey work.
- 6.7.3 Based on the number of recorded territories for each species within published disturbance distances of infrastructure, the following construction phase effects (rounded to the nearest whole territory) are predicted to occur (in the absence of mitigation):
- Temporary disturbance and displacement of greylag goose (up to 4 territories³), great skua (14 territories), Arctic skua (2 territories), curlew (up to 2 territories), dunlin (up to 10 territories), snipe (up to 14 territories), golden plover (up to 6 territories), redshank (up to 2 territories) and ringed plover (1 territory),
- 6.7.4 The recorded territories for red throated diver, Arctic tern, lapwing, oystercatcher, whimbrel and merlin are beyond the published disturbance distances from the 2021 Layout. Territory maps for these species are presented in Figures 6.11, 6.15, 6.19 and 6.20.
- 6.7.5 Construction phase effects will be minimised through the timing of the work and the use of protection buffer zones. Pre-development surveys and the adoption of habitat management measures will ensure that disturbance and displacement effects will be minimised, and that death or injury of any bird is avoided.

³ Based on the maximum number of territories recorded /year within published disturbance distance of infrastructure.

Table 6.2. Published disturbance distances (as described in the 2020 SEI) for each species considered in this assessment, and number of territories recorded within each described distance from construction work.

Species	Disturbance / displacement distance (with source reference)	Number of territories recorded within disturbance distance of infrastructure	Number of territories likely to be disturbed or displaced accounting for the published reduction in abundance within disturbance distance (derived from source reference)
Greylag goose	100 m	1 (2016) to 4 (2018)	1 to 4 (assuming all territories displaced)
Red throated diver	500 m (Ruddock & Whitfield, 2007)	0	0
Great Skua	400 m (Sansom <i>et al.</i> , 2016)	18 (2016)	14.22 (based on 79% reduction in abundance)
Arctic skua	400 m (Sansom <i>et al.</i> , 2016)	2 (2016)	1.58 (based on 79% reduction in abundance)
Arctic tern	400 m (Sansom <i>et al.</i> , 2016)	0	0
Curlew	620 m (Pearce-Higgins <i>et al.</i> , 2012)	6 (2016) to 3 (2018)	1.2 to 2.4 (based on 40% reduction in abundance)
Whimbrel	620 m (Pearce-Higgins <i>et al.</i> , 2012; inferred from curlew)	0	0
Dunlin	400 m (Sansom <i>et al.</i> , 2016)	13 (2016 and 2018)	10.27 (based on 79% reduction in abundance)
Golden plover	400 m (Sansom <i>et al.</i> , 2016)	4 (2016) to 8 (2018)	3.16 to 6.32 (based on 79% reduction in abundance)
Snipe	500 m (Pearce-Higgins <i>et al.</i> , 2012)	15 (2016) to 26 (2018)	7.95 to 13.78 (based on 53% reduction in abundance)
Lapwing,	400 m (Sansom <i>et al.</i> , 2016)	0	0
Oystercatcher	400 m (Sansom <i>et al.</i> , 2016)	0	0
Redshank	400 m (Sansom <i>et al.</i> , 2016)	1 (2016) to 3 (2018)	0.79 to 2.37 (based on 79% reduction in abundance)
Ringed plover	400 m (Sansom <i>et al.</i> , 2016)	1 (2016 and 2018)	1 (assuming all territories displaced)

Species	Disturbance / displacement distance (with source reference)	Number of territories recorded within disturbance distance of infrastructure	Number of territories likely to be disturbed or displaced accounting for the published reduction in abundance within disturbance distance (derived from source reference)
Merlin	500 m (Ruddock & Whitfield, 2007)	0	0

Operation

- 6.7.6 The distance over which disturbance and displacement effects occur has been based on evidence presented in paragraphs 6.524 and 6.523 in the 2020 SEI. Table 6.3 below sets out the published disturbance distances for each species in this assessment, and the number of territories recorded during both the 2016 and 2018 survey work within each described distance from turbine locations within the 2021 Layout. Figures 6.3 to 6.20 illustrate the distribution of territories recorded during the 2016 and 2018 survey work.
- 6.7.7 During the operation phase the following impacts (rounded to the nearest whole territory) may occur due to the proximity of turbines:
- Displacement of greylag goose (up to 2 territories), great skua (13 territories), Arctic skua (2 territories), curlew (up to 2 territories), dunlin (up to 10 territories), golden plover (up to 6 territories), snipe (up to 12 territories), and redshank (up to 2 territories).
 - Collision with turbines of greylag goose (1 bird every 9.6 to 25.8 years), red-throated diver (1 bird every 3.5 to 4.7 years), great skua (1 bird every year), Arctic skua (1 bird every 14.4 to 70.7 years), Arctic tern (1 bird every 9.3 to 17.7 years), fulmar (1 bird every 0.96 to 12.2 years), curlew (1 bird every 27.7 to 154.4 years) and golden plover (1 bird every 9.4 to 37.2 years).
- 6.7.8 Any displaced territories will be accommodated through habitat enhancement to create more favourable nesting habitat. It is expected that displacement effects will be fully mitigated through habitat enhancement.
- 6.7.9 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.

Table 6.3. Published disturbance distances for each species considered in this assessment, and number of territories recorded within each described distance from turbine locations. The source reference for each species is presented in column 2 of Table 6.2.

Species	Disturbance / displacement		Collision
	Number of territories recorded within disturbance distance of proposed turbine locations	Applied published reduction in abundance within disturbance distance (derived from source reference)	Collision rate as predicted by the model presented in Appendix 6.1.
Greylag goose	1 (2016) to 2 (2018)	Up to 2 (assuming all territories displaced)	0.04 to 0.1 birds per annum 1 bird every 9.6 to 25.8 years
Red throated diver	0	0	0.21 to 0.29 birds per annum 1 bird every 3.5 to 4.7 years
Great Skua	17 (2016)	13.43 (based on 79% reduction in abundance)	0.95 birds per annum 1 bird every 1 year
Arctic skua	2 (2016)	1.58 (based on 79% reduction in abundance)	0.01 to 0.06 birds per annum 1 bird every 14.4 to 70.7 years
Arctic tern	0	0	0.05 to 0.1 birds per annum 1 bird every 9.3 to 17.7 years
Fulmar	0	0	0.08 to 1.03 birds per annum 1 bird every 0.96 to 12.2 years
Curlew	5 (2016) to 3 (2018)	1.2 to 2 (based on 40% reduction in abundance)	0.006 to 0.04 birds per annum 1 bird every 26.7 to 154.4 years
Whimbrel	0	0	Insufficient flight activity to model
Dunlin	12 (2018) to 13 (2016)	9.48 to 10.27 (based on 79% reduction in abundance)	Insufficient activity to model

	Disturbance / displacement		Collision
Species	Number of territories recorded within disturbance distance of proposed turbine locations	Applied published reduction in abundance within disturbance distance (derived from source reference)	Collision rate as predicted by the model presented in Appendix 6.1.
Golden plover	4 (2016) to 7 (2018)	3.16 to 5.53 (based on 79% reduction in abundance)	0.03 to 0.1 birds per annum 1 bird every 9.4 to 37.2 years
Snipe	14 (2016) to 23 (2018)	7.42 to 12.19 (based on 53% reduction in abundance)	Collision mortality not modelled
Lapwing,	0	0	Insufficient flight activity to model
Oystercatcher	0	0	0.02 birds per annum 1 bird every 54.3 years
Redshank	1 (2016) to 2 (2018)	0.79 to 1.58 (based on 79% reduction in abundance)	Insufficient flight activity to model
Ringed plover	0	0	Insufficient flight activity to model
Merlin	0	0	Insufficient flight activity to model

Decommissioning

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

Table 6.4. Summary of residual effects

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Bluemull and Colgrave Sounds SPA: disturbance and displacement of red-throated diver	Negligible	Adverse	Displacement effects on red throated diver are unlikely to occur based on a 500 m disturbance distance from the 2021 layout. The 2020 SEI predicted that up to 4 territories may be affected, and the 2019 EIA Report predicted that up to 6 territories may be affected. Residual effects will remain Negligible.	Negligible (no change)	Adverse
Fetlar SPA: disturbance and displacement of dunlin and great skua	Negligible	Adverse	The 2020 SEI predicted that between 16 and 17 Dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to 10 territories. For great skua, the predicted number of territories disturbed or displaced have reduced from 21 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. Residual effects arising during the construction phase are likely to remain Negligible, and temporary in nature.	Negligible (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
East Mires SSSI: disturbance and displacement of moorland breeding birds	Negligible	Adverse	The footprint of the 2021 Layout is smaller than that of the 2020 Layout and 2019 Layout. Residual effects are likely to remain negligible.	Negligible (no change)	Adverse
Hascosay SSSI: disturbance and displacement of dunlin	Negligible	Adverse	The 2020 SEI predicted that between 16 and 17 Dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to 10 territories. Residual effects arising during the construction phase are likely to remain Negligible, and temporary in nature.	Negligible (no change)	Adverse
North Fetlar SSSI: disturbance and displacement of great skua	Negligible	Adverse	The predicted number of great skua territories disturbed or displaced have reduced from 21 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. The 2019 EIA report predicted that 12 territories would be affected based on impacts extending to 100 m from the infrastructure footprint. Residual effects arising during the construction phase are likely to remain Negligible, and temporary in nature.	Negligible (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Lamb Hoga SSSI: disturbance and displacement of dunlin and great skua	Negligible	Adverse	<p>The 2020 SEI predicted that between 16 and 17 Dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to 10 territories</p> <p>The predicted number of great skua territories disturbed or displaced have reduced from 21 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout.</p> <p>Residual effects arising during the construction phase are likely to remain Negligible, and temporary in nature.</p>	Negligible (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Greylag Goose disturbance and displacement.	Negligible	Adverse	<p>Between 1 and 4 previously used territories (recorded during the breeding seasons of 2018 and 2016 respectively) may be temporarily affected (based on disturbance effects extending to 100 m from construction work).</p> <p>The 2019 EIA report predicted between 9 and 15 territories would be affected.</p> <p>Residual effects are likely to remain Negligible.</p>	Negligible (no change)	Adverse
Red-throated diver disturbance and displacement.	Local	Adverse	<p>Displacement effects on red throated diver are unlikely to occur based on a 500 m disturbance distance from the 2021 layout. The 2020 SEI predicted that up to 4 territories may be affected, and the 2019 EIA Report predicted that up to 6 territories may be affected. Both the 2020 SEI and 2019 EIA Report concluded that effects would be significant at the Local level.</p> <p>Given that no recorded territories are present within 500 m of the 2021 Layout, residual effects arising as a result of the 2021 layout are considered to be Negligible.</p>	Negligible (minor beneficial change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Curlew disturbance and displacement.	Local	Adverse	<p>The 2020 SEI predicted that between 2 and 3 curlew territories would be disturbed or displaced. This is unchanged for the 2021 Layout, and a reduction in the number of affected territories (up to 8) predicted by the 2019 EIA Report.</p> <p>Residual effects are likely to remain significant at the Local level.</p>	Local (no change)	Adverse
Dunlin disturbance and displacement.	Local	Adverse	<p>The 2020 SEI predicted that between 16 and 17 dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to 10 territories.</p> <p>Residual effects are likely to remain significant at the Local level.</p>	Local (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Golden plover disturbance and displacement.	Local	Adverse	The 2019 EIA Report predicted that the number of territories potentially affected was between 8 and 11 (based on presence within 200 m of the infrastructure footprint). The 2020 SEI predicted a reduction of abundance by up to 8 golden plover territories within 400 m of construction work. This has reduced to 6 for the 2021 Layout. Residual effects are likely to remain significant at the Local level.	Local (no change)	Adverse
Redshank disturbance and displacement.	Negligible	Adverse	The 2021 Layout may result in a reduction in abundance of between one territory (based on 2016 data) and two territories (based on 2018 data). The 2020 SEI predicted that one territory would be affected, and the 2019 EIA Report considered that up to 3 territories could be affected (within 200 m of infrastructure). Residual effects are likely to remain Negligible.	Negligible (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Ringed Plover disturbance and displacement.	Negligible	Adverse	There is no difference in infrastructure layout within 200 m of the ringed plover territory recorded during survey work (one territory was recorded near the site access of the 2021 Layout in both 2016 and 2018). Residual effects are likely to remain Negligible.	Negligible (no change)	Adverse
Snipe disturbance and displacement.	Local	Adverse	Up to 14 territories are predicted to be affected by the 2021 Layout Up to 33 territories were recorded within 500 m of the 2020 Layout, and up to 42 territories were recorded within 500 m of the 2019 Layout. Residual effects are likely to remain significant at the Local level for the 2021 Layout given the locally scattered distribution of this species.	Local (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Great skua disturbance and displacement.	Local	Adverse	The predicted number of great skua territories disturbed or displaced have reduced from 21 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. The 2019 EIA report predicted that 12 territories within 100 m of infrastructure would be affected. Residual effects are likely to remain significant at the Local level for the 2021 Layout.	Local (no change)	Adverse
Arctic skua disturbance and displacement.	Local	Adverse	The 2021 Layout may result in disturbance and displacement of up to 2 Arctic skua territories. This is consistent with the conclusions of the 2020 SEI and 2019 EIA Report. Residual effects are likely to remain significant at the Local level.	Local (no change)	Adverse
Merlin disturbance and displacement.	Local	Adverse	The reduced footprint of the 2021 Layout will result in loss of a small proportion of the total nesting and foraging habitat available. The 2021 Layout is in excess of 500 m from recorded nest sites. Residual effects are likely to remain significant at the Local level.	Local (no change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Bluemull and Colgrave Sounds SPA: displacement of red-throated diver	Negligible	Adverse	Displacement effects on red throated diver are unlikely to occur based on a 500 m disturbance distance from the 2021 layout. The 2020 SEI predicted that up to 4 territories may be affected and the 2019 EIA Report predicted that up to 6 territories may be affected. Residual effects will remain Negligible.	Negligible (No change)	Adverse
Fetlar SPA: displacement of dunlin and great skua	Negligible	Adverse	The 2020 SEI predicted that between 16 and 17 Dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to 10 territories. For great skua, the predicted number of territories disturbed or displaced have reduced from 20.54 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. The 2019 EIA report predicted that 12 territories would be affected based on impacts extending to 100 m from turbines. Residual effects arising during the operational phase are likely to remain Negligible, and temporary in nature.	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
East Mires SSSI: displacement of moorland breeding birds	Negligible	Adverse	The footprint of the 2021 Layout is smaller than that of the 2020 Layout. Residual effects are likely to remain negligible.	Negligible (No change)	Adverse
Hascosay SSSI: displacement of dunlin	Negligible	Adverse	The 2020 SEI predicted that between 16 and 17 Dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to no more than 10 territories. Residual effects are likely to remain Negligible.	Negligible (No change)	Adverse
North Fetlar SSSI: displacement of great skua	Negligible	Adverse	The predicted number of great skua territories disturbed or displaced have reduced from 21 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. The 2019 EIA report predicted that 12 territories would be affected based on impacts extending to 100 m from turbines. Residual effects are likely to remain Negligible.	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Lamb Hoga SSSI: displacement of dunlin and great skua	Negligible	Adverse	<p>The 2020 SEI predicted that between 16 and 17 Dunlin territories would be impacted. This is reduced under the 2021 Layout to no more than 10 territories</p> <p>The predicted number of great skua territories disturbed or displaced have reduced from 21 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. The 2019 EIA report predicted that 12 territories would be affected based on impacts extending to 100 m from turbines.</p> <p>Residual effects are likely to remain Negligible.</p>	Negligible (No change)	Adverse
Greylag goose displacement.	Negligible	Adverse	<p>Up to 2 territories recorded during the breeding seasons of 2018 and 2016 may be affected (based on disturbance effects extending to 100 m from proposed turbine locations).</p> <p>The 2019 EIA report predicted between 9 and 15 territories would be affected.</p> <p>Residual effects are likely to remain Negligible.</p>	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Greylag goose collision.	Negligible	Adverse	<p>Modelling has resulted in a predicted rate of collision of between 0.04 (2016) and 0.1 (2017/18) birds per annum (based on 99.8 % avoidance). This equates to one bird killed every 9.6 to 25.8 years.</p> <p>The 2020 SEI predicted between 0.14 and 0.15 collisions per annum, and the 2019 EIA report predicted between 0.12 and 0.15 collisions per year. Therefore, the predicted collision mortality has been reduced for the 2021 Layout.</p> <p>It is unlikely that the predicted collision mortality will have a discernible effect on the local or wider population.</p> <p>Residual effects are likely to remain Negligible.</p>	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Red-throated diver displacement.	Local	Adverse	<p>Displacement effects on red throated diver are unlikely to occur based on a 500 m disturbance distance from the 2021 layout. The 2020 SEI predicted that up to 4 territories may be affected, and the 2019 EIA Report predicted that up to 6 territories may be affected. Both the 2020 SEI and 2019 EIA Report concluded that effects would be significant at the Local level.</p> <p>Given that no recorded territories are present within 500 m of the 2021 Layout, residual effects arising as a result of the 2021 Layout are considered to be Negligible.</p>	Negligible (Reduced significance of effects)	Adverse
Red-throated diver collision.	Negligible	Adverse	<p>Modelling has resulted in a predicted rate of collision of between 0.21 (2016) and 0.29 (2018) birds per annum (based on 99.8 % avoidance). This equates to one bird killed every 3.5 to 4.7 years, and a predicted 7.3 collisions over the 30-year life of the Proposed Development.</p> <p>This represents a slight increase of up to 0.07 collisions per annum (or an additional 2.1 birds over the 30-year operation of the wind farm) compared to the collision rate predicted in the 2021 SEI. This increase is due to</p>	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
			<p>errors identified within the previous collision risk model which has been revised and peer reviewed for this SEI 2.</p> <p>The assessment provided in the 2020 SEI is considered to remain valid. Based on an average productivity rate of 6.38 birds per year within the Site (following mean success rates recorded in SBC, 2018), a reduction of productivity by an average 0.25 birds per annum (a total of 7.3 birds over the 30-year operational life of the wind farm) is considered unlikely to have a significant adverse effect on the population of red-throated diver (as set out in paragraphs 6.7.96 to 6.7.94 of the 2019 EIA Report). In addition, the turbines within the 2021 Layout are in excess of 500 m distant from lochans at which breeding was either confirmed or considered probable during the 2016 and 2018 survey work. The turbine locations also do not intersect observed regular flight routes between lochans and offshore foraging areas (as presented in Figure 6.4). It is therefore likely that the level of collision mortality predicted by the model is overestimated by inclusion of notably high concentrations of flight activity at the boundaries of the 2021 Layout.</p>		

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
			Residual effects are likely to remain Negligible.		
Curlew displacement.	Local	Adverse	<p>The 2020 SEI predicted that between 2 and 3 curlew territories would be disturbed or displaced as a result of the 2020 Layout. This number was up to 8 territories in the 2019 EIA Report. Up to 2 territories are predicted to be displaced by the 2021 Layout (less than 1% of the Shetland NHZ population).</p> <p>Residual effects are likely to remain significant at the Local level.</p>	Local (No change)	Adverse
Curlew collision.	Negligible	Adverse	<p>Modelling has resulted in a predicted rate of collision of between 0.006 (2018) and 0.04 (2016) birds per annum (based on 99 % avoidance). On average, this equates to one bird killed every 90.6 years.</p> <p>This predicted rate of collision is lower than the average predicted in the 2020 SEI of 1 bird killed every 88 years, and the 2019 EIA Report of 1 bird killed every 41 years.</p> <p>Taking this predicted rate of collision, it is unlikely that the Proposed Development will kill any curlew during its 30-year operation.</p> <p>Residual effects are likely to remain Negligible.</p>	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Whimbrel displacement	Negligible	Adverse	Impacts on whimbrel are limited to very minor loss of suitable habitat as a result of land take. However, whimbrel territories have not been recorded within the site. Residual effects are likely to remain Negligible.	Negligible (No change)	Adverse
Whimbrel collision	Negligible	Adverse	No flights were recorded within the collision risk zone of the 2021 Layout. It is unlikely that the Proposed Development will kill any whimbrel during its 30-year operation.	Negligible (No change)	Adverse
Dunlin displacement.	Site	Adverse	The 2020 SEI predicted that between 16 and 17 Dunlin territories would be affected, and the 2019 EIA Report predicted that between 20 and 25 Dunlin territories would be affected. This is reduced under the 2021 Layout to 11 territories. Residual effects are unlikely to be greater for the 2021 Layout and remain significant at the Site level.	Site (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Golden plover displacement.	Site	Adverse	<p>The 2020 SEI predicted a reduction of abundance by up to 8 golden plover territories within 400 m of construction work. The 2019 EIA Report predicted that between 8 and 11 territories would be affected (within 200m of turbines). This is reduced to up to 6 territories for the 2021 Layout.</p> <p>Residual effects are less for the 2021 Layout, but likely to remain significant at the Site level.</p>	Site (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Golden plover collision.	Negligible	Adverse	<p>Modelling has resulted in a predicted rate of collision of between 0.03 (2016) and 0.1 (2018) birds per annum (based on 98 % avoidance) for the 2021 Layout. This equates to one bird killed every 9.4 to 37.2 years. The collision rate predicted in the 2019 EIA report was between 0.004 and 0.2 collisions per annum (1 bird killed every 5 to 250 years).</p> <p>The 2020 SEI estimated one bird would be killed every 2.8 to 203.8 years.</p> <p>The predicted mortality rate based on 2018 data is likely to be an overestimate, based on the exceptionally low mortality rate recorded by Dürr (2020), and likelihood that a 99 % avoidance rate can be applied to golden plover. Collision is considered unlikely to result in a significant impact on the local population, and effects will be indiscernible over the life of the Proposed Development.</p> <p>Residual effects are likely to remain Negligible.</p>	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Redshank displacement.	Negligible	Adverse	One territory was recorded within 400 m of the 2021 Layout turbines in 2016 and two territories in 2018. This is consistent with the 2019 Layout and 2020 Layout. Residual effects are likely to remain negligible.	Negligible (No change)	Adverse
Snipe displacement.	Local	Adverse	Up to 13 territories are predicted to be affected by the 2021 Layout (representing 0.19 % of the Shetland NHZ population). Up to 33 territories were recorded within 500 m of the 2020 Layout, and up to 42 territories were recorded within 500 m of the 2019 Layout. Residual effects are likely to remain significant at the Local level for the 2021 Layout given the locally scattered distribution of this species.	Local (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Great skua displacement.	Local	Adverse	The predicted number of great skua apparent occupied territories (AOT) disturbed or displaced have reduced from 20.54 (as predicted in the 2020 SEI) to 14 based on the 2021 Layout. This represents 3.6 % of the Regional (Yell) population (currently 392 AOT; SBC, 2019) and 0.13 % of the Shetland NHZ population (10,377 AOT; Wilson, et al. 2015). Residual effects are likely to remain significant at the Local level.	Local (No change)	Adverse
Great skua collision.	Negligible	Adverse	Modelling has resulted in a predicted rate of collision of 0.95 (2016) birds per annum (based on 99.5 % avoidance). This equates to one bird killed every year and is an increase to the collision rate predicted in the 2020 SEI (0.4 collisions per annum) and 2019 EIA Report (0.35 collisions per annum) ⁴ . Collision events are therefore likely to occur more frequently than predicted in the 2020 SEI and 2019 EIA Report. However, the predicted number of annual collisions represent 0.1 % of the Regional (Yell) population (currently 784 individuals;	Site (Minor adverse change)	Adverse

⁴ This increase is due to errors identified within the previous collision risk model which has been revised and peer reviewed for this SEI 2.

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
			<p>SBC, 2019) and 0.005 % of the Shetland NHZ population (20,754 individuals; Wilson, <i>et al.</i> 2015).</p> <p>The significant adverse effects are unlikely to occur at the Regional level (given the small proportion of the regional population predicted to be affected). The collision mortality represents approximately 1 % of the population within the Proposed Development site (of a total 48 AOTs / 96 individuals recorded during survey work in 2018). It is reasonable to assume that the loss of birds from within the Site would rapidly be replaced through recruitment from the local population, given the current great skua population increases reported in Shetland (as described in the 2019 EIA Report), and likely high productivity of the Proposed Development site and surrounding area. Collision events are, therefore, unlikely to have any discernible effect on the population beyond the level of the Site itself.</p> <p>Residual effects are likely to be significant at the Site level.</p>		

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Arctic skua displacement	Local	Adverse	The 2021 Layout may result in disturbance and displacement of fewer than two Arctic skua territories (based on a reduction in abundance of 72 % within 400 m of infrastructure). This is consistent with the conclusions of the 2020 SEI and 2019 EIA Report. Residual effects are likely to remain significant at the Local level.	Local (No change)	Adverse
Arctic skua collision	Negligible	Adverse	Modelling has resulted in a predicted rate of collision of between 0.01 (2016) and 0.06 (2018) birds per annum (based on 99.5 % avoidance). On average, this equates to one bird killed every 42.5 years. Taking this predicted rate of collision, it is unlikely that the Proposed Development will kill any Arctic skua during its 30-year operation. Residual effects are likely to remain negligible for the 2021 Layout.	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Arctic tern collision	Negligible	Adverse	<p>Modelling has resulted in a predicted rate of collision of between 0.1 (2016) and 0.05 (2018) birds per annum (based on 98 % avoidance). This equates to one bird killed every 9.3 to 17.7 years. This is a slight increase from the predicted rate of collision made in the 2020 SEI of between 0.1 (2016) and 0.02 (2018) birds per annum. This increase is due to errors identified within the previous collision risk model which has been revised and peer reviewed for this SEI 2.</p> <p>The actual avoidance rate for Arctic tern may be greater than the default 98 % since no collisions have been documented in Europe by Dürr (2020) for this species, and the flight habits of terns are akin to gulls and skuas for which an accepted avoidance of 99.5 % is applied.</p> <p>The likelihood of collision of Arctic tern over the term of operation of the Proposed Development is very low.</p> <p>Residual effects are likely to be negligible for the 2021 Layout.</p>	Negligible (No change)	Adverse

Description of Effect	2020 Layout Residual Effects		Comparison of effects	2021 Layout Residual Effects	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Fulmar collision	Negligible	Adverse	<p>Modelling has resulted in a predicted rate of collision of between 0.08 (2018) and 1.03 (2016) birds per annum (based on 98 % avoidance). On average, this equates to one bird killed every 6.6 years.</p> <p>The 2020 SEI predicted an average collision rate of one bird every 11.05 years, and the 2019 EIA Report predicted an average collision rate of one bird every 22.2 years.</p> <p>Collision risk is more likely to impact on dispersing juvenile birds than breeding adults. In addition, the number of fatalities is likely to be less than the worst-case prediction due to variations in activity over the site (as borne out by the differences of model output between years), likelihood that avoidance rates in fulmar exceed the default 98 % (as suggested by Maclean <i>et al.</i>, 2009), and low occurrence of collision reported in Europe (Dúrr, 2021)⁵.</p> <p>Residual effects are therefore considered likely to remain negligible for the 2021 Layout.</p>	Negligible (No change)	Adverse

⁵ Three collisions have been reported in Europe for fulmar. One collision has been reported for the UK: at Blyth Harbour, Northumberland. The nine turbines that make up the Blyth wind farm are arranged along a pier extending from shore.

6.8 Assessment of Cumulative Effects

- 6.8.1 There are five consented wind farms within the Shetland NHZ for which the ornithological impact assessment has been reviewed. Further details of these wind farms, and the full assessment of cumulative effects following SNH (2012) guidance are presented in the 2020 SEI.
- 6.8.2 Table 6.5 (below) presents the total collision mortality (birds per year), and Table 6.6 presents the predicted displacement impacts (number of territories lost) reported for the 2021 Layout and all wind farms in the scope of cumulative assessment (with the exception of Gremista, for which there is no quantitative data). The species for which cumulative effects are considered are red-throated diver, Arctic skua, great skua, curlew, golden plover, dunlin and merlin. This scope of cumulative assessment was agreed by NatureScot (in their scoping opinion, dated 08 February 2018). Snipe have not been included in the below accounts, as effects on snipe were scoped out of the assessments for other schemes. Whimbrel have also been excluded from the assessment because no effects are predicted for this species as a result of the 2021 Layout.

Table 6.5. Cumulative assessment of collision mortality (birds per year).

<i>Species</i>	Population of Shetland NHZ (individuals)	Sum of collision mortality (birds/year) at other wind farms	% of NHZ population potentially killed by other wind farms per annum	Impact magnitude for other wind farms	Collision mortality (birds/year) at the Proposed Development	% of NHZ population potentially killed by the Proposed Development and other wind farms in combination per annum	Impact magnitude of Proposed Development and other wind farms in combination ⁶
<i>Red-throated diver</i>	814	1.58 - 2.98	0.19 - 0.37	Local	0.21 - 0.29	0.22 - 0.40	Local (no change from baseline)
<i>Arctic skua</i>	600	2.03	0.34	Local	0.01 - 0.06	0.34 - 0.35	Local (no change from baseline)
<i>Great skua</i>	20,754	10.59	0.05	Negligible	0.95	0.06	Negligible (no change from baseline)
<i>Curlew</i>	7,286	18.28	0.25	Local	0.006 - 0.04	0.25	Local (no change from baseline)
<i>Golden plover</i>	5,200	37.9 - 39.9	0.72 - 0.77	Local	0.03 - 0.1	0.72 - 0.77	Local (no change from baseline)

6.8.3 For great skua, the increase in collision mortality arising as a result of the Proposed Development is unlikely to be discernible at the level of the Shetland NHZ (an additional 0.01 % of the population will be affected over the baseline). The overall cumulative significance of effects is therefore considered to remain negligible (despite a Site-level significance predicted for the Proposed Development in isolation). Given the very low risk of collision predicted for all other species at the Proposed Development, the cumulative impact above the baseline collision impact predicted for other wind farms in the Shetland NHZ will be negligible (no change in the predicted significance of effects over the baseline).

⁶ The baseline condition is the cumulative impact of all other wind farms considered in the cumulative assessment in the absence of the Proposed Development.

Table 6.6. Cumulative assessment of displacement (number of territories adversely impacted by displacement or disturbance during operation).

<i>Species</i>	Population of Shetland NHZ (pairs)	Pairs displaced by other wind farms	% of NHZ population affected by other wind farms	Impact magnitude for other wind farms	Pairs displaced by Proposed Development	% of NHZ population affected by Proposed Development and other wind farms in combination	Impact magnitude of Proposed Development and other wind farms in combination
<i>Red-throated diver</i>	407	4 - 5	0.98 - 1.22	Negligible / Local	0	0.98 - 1.22	Negligible / Local (no change from baseline)
<i>Arctic skua</i>	300	5.5	1.83	Local	1.58	2.36	Local (no change from baseline)
<i>Great skua</i>	10,377	9	0.09	Negligible	13.43	0.22	Negligible (no change from baseline)
<i>Curlew</i>	3,643	25.5	0.7	Negligible	1.2 - 2	0.73 - 0.75	Negligible (no change from baseline)
<i>Golden plover</i>	2,600	18	0.69	Negligible	3.16 – 5.53	0.81 – 0.9	Negligible (no change from baseline)
<i>Dunlin</i>	1,700	11	0.64	Negligible	9.48 – 10.27	1.2 - 1.25	Local (minor change)
<i>Merlin</i>	357	1.45	4.14	Local	0	4.14	Local (no change from baseline)

- 6.8.4 Cumulative displacement impacts are predicted to be negligible / local for red throated diver, and negligible for great skua, curlew and golden plover (the percentage of the Regional (Shetland NHZ) population affected is predicted to be less than 1 %). For all other species, cumulative displacement impacts are considered to be Local significance (affecting between 1.58 % (for dunlin) and 4.14 % (for merlin) of the Regional (Shetland NHZ) population).
- 6.8.5 The assessment has indicated that the significance of cumulative displacement effects on red-throated diver, great skua, arctic skua, curlew, golden plover and merlin will not change in comparison to the baseline (considering the cumulative effects of other wind farms in the absence of the Proposed Development) during operation of the Proposed Development. For dunlin, the baseline significance of effects has been assessed as negligible (affecting < 1 % of the NHZ population) in the absence of the Proposed Development, but of Local significance in combination with the Proposed Development (cumulatively affecting between 1.2 and 1.25 % of the NHZ population). However, the magnitude of impacts on this species remains very low and is likely to be offset through habitat enhancement measures proposed to benefit breeding waders. Even in the absence of mitigation, it is likely that any pairs displaced by the Proposed Development would establish a territory elsewhere, and the significance of effects at the population level would be negligible.

Table 6.7 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	2020 Layout Cumulative Effect		2021 Layout Cumulative Effect	
			Significance	Beneficial/ Adverse	Significance	Beneficial/ Adverse
<i>Red-throated diver</i>	Collision mortality	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (no change from baseline)	Adverse
	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Negligible / Local (no change from baseline)	Adverse
<i>Arctic skua</i>	Collision mortality	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (no change from baseline)	Adverse
	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (no change from baseline)	Adverse
<i>Great skua</i>	Collision mortality	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Negligible	Adverse	Negligible (no change from baseline)	Adverse
	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Negligible	Adverse	Negligible (no change from baseline)	Adverse

Receptor	Effect	Cumulative Developments	2020 Layout Cumulative Effect		2021 Layout Cumulative Effect	
			Significance	Beneficial/ Adverse	Significance	Beneficial/ Adverse
<i>Curllew</i>	Collision mortality	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (no change from baseline)	Adverse
	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Negligible	Adverse	Negligible (no change from baseline)	Adverse
<i>Golden plover</i>	Collision mortality	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (no change from baseline)	Adverse
	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Negligible	Adverse	Negligible (no change from baseline)	Adverse
<i>Dunlin</i>	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (minor adverse change from baseline)	Adverse
<i>Merlin</i>	Operational phase disturbance and displacement	Garth, Beaw Field, Viking, Gremista, Mossy Hill	Local	Adverse	Local (no change from baseline)	Adverse

6.9 Comparison of Effects

- 6.9.1 Table 6.4 details the comparison of residual effects between the 2020 and 2021 Layout for both the construction and operational phases of the Proposed Development. Table 6.7 details the comparison of cumulative effects between 2020 and 2021 Layout. The differences presented reflect a combination of the reduced development size and amendments to the collision risk analysis method (applied in response to consultee comments on the 2020 SEI).
- 6.9.2 The extent of predicted disturbance and displacement impacts on most species during construction and operation of the Proposed Development has reduced for the 2021 Layout. Impacts on red throated diver during construction and operation of the Proposed Development are predicted to be reduced because of the reduction in the number of proposed turbines. For great skua, predicted collision impacts during the operational phase have increased due to changes made to the collision risk model (as set out in Appendix 6.1). However, the significance of collision effects remains low, and is unlikely to extend beyond the Site level.
- 6.9.3 For other species, changes made to the collision risk analysis through reduction of the Proposed Development, and amendments to the application of the model as suggested by stakeholders, has resulted in very minor (not significant) differences in the number of predicted collisions. The significance of collision risk effects is considered to be negligible (not significant) for all species.

6.10 References

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