



# Balgray Wind Farm

## Chapter 7: Ornithology

June 2025



# Contents

|                                                           |          |
|-----------------------------------------------------------|----------|
| <b>7. ORNITHOLOGY .....</b>                               | <b>3</b> |
| 7.1. Introduction .....                                   | 3        |
| 7.2. Legislation, Policy and Guidance .....               | 4        |
| 7.3. Consultation .....                                   | 6        |
| 7.4. Methodology .....                                    | 7        |
| Scope of Assessment.....                                  | 7        |
| Baseline Characterisation .....                           | 8        |
| Assessment Methodology .....                              | 14       |
| 7.5. Baseline .....                                       | 17       |
| Statutory Protected Sites.....                            | 17       |
| Current Baseline .....                                    | 18       |
| Future Baseline .....                                     | 26       |
| Ornithological Conservation Evaluation.....               | 26       |
| 7.6. Assessment of Potential Effects .....                | 34       |
| NatureScot Key Species Potentially at Risk .....          | 35       |
| Construction Effects .....                                | 35       |
| Potential Operational Effects .....                       | 44       |
| Direct Effects: Collision Mortality .....                 | 46       |
| Indirect Effects: Barrier Effect.....                     | 52       |
| Assessment of Effects on Other High Value Species.....    | 52       |
| Assessment of Effects on Other Medium Value Species ..... | 52       |
| Assessment of Effects on Other Low Value Species.....     | 52       |
| Effects on Protected Sites .....                          | 53       |
| 7.7. Mitigation .....                                     | 53       |
| Mitigation of the Construction Phase.....                 | 53       |
| Mitigation of the Operational Phase .....                 | 54       |
| 7.8. Assessment of Residual Effects .....                 | 55       |
| 7.9. Assessment of Cumulative Effects .....               | 55       |
| 7.10. Summary .....                                       | 57       |



**List of Abbreviations**

| Abbreviation | Description                                                  |
|--------------|--------------------------------------------------------------|
| BBPP         | Breeding Bird Protection Plan                                |
| BTO          | British Trust for Ornithology                                |
| CEMP         | Construction Environmental Management Plan                   |
| CIEEM        | Chartered Institute for Ecology and Environmental Management |
| ECoW         | Ecological Clerk of Works                                    |
| NHZ          | Natural Heritage Zone                                        |
| NS           | NatureScot                                                   |
| OBHMP        | Outline Biodiversity and Habitat Management Plan             |
| SBL          | Scottish Biodiversity List                                   |
| SNH          | Scottish Natural Heritage, now NatureScot                    |
| SPA          | Special Protection Area                                      |
| SSSI         | Site of Special Scientific Interest                          |
| VP           | Vantage Point                                                |



## 7. Ornithology

### 7.1. Introduction

7.1.1. This chapter considers the likely significant effects on ornithology associated with the construction and operation of the Proposed Development. The specific objectives of the chapter are to:

- describe the current ornithological baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

7.1.2. The assessment has been carried out by Dr Steve Percival of Ecology Consulting.

7.1.3. The chapter is supported by the following figures and technical appendices:

- Technical Appendices, Volume 4:
  - Technical Appendix 7.1: Breeding Bird Surveys 2021;
  - Technical Appendix 7.2: Breeding Bird Surveys 2022;
  - Technical Appendix 7.3: Wintering Bird Surveys 2021-22;
  - Technical Appendix 7.4: Wintering Bird Surveys 2022-23;
  - Technical Appendix 7.5: Autumn Bird Surveys 2023;
  - Technical Appendix 7.6: Collision Risk Modelling Calculations;
  - Technical Appendix 7.7: Draft Breeding Bird Protection Plan;
  - Technical Appendix 7.8: Shadow Habitats Regulations Assessment; and
  - Technical Appendix 7.9: Confidential Information on Schedule 1 Breeding Birds.
- Figures, Volume 3a:
  - Figure 7.1: Special Protection Areas and Ramsar Sites within 20 km
  - Figure 7.2: Viewshed and Survey Area
  - Figure 7.3: Breeding Bird Survey



- Figure 7.4: Flight Lines – Whooper Swan
- Figure 7.5: Flight Lines – Pink-footed Goose
- Figure 7.6: Flight Lines – Greylag Goose
- Figure 7.7: Flight Lines – Osprey
- Figure 7.8: Flight Lines – Golden Plover
- Figure 7.9: Flight Lines – Lapwing
- Figure 7.10: Flight Lines – Curlew
- Figure 7.9.1 (Confidential) – Goshawk
- Figure 7.9.2 (Confidential) – Red Kite Breeding
- Figure 7.9.3 (Confidential) – Red Kite Winter
- Figure 7.9.4 (Confidential) – Barn Owl and Crossbill

## 7.2. Legislation, Policy and Guidance

7.2.1. The ornithological assessment followed the guidance produced by Scottish Natural Heritage (SNH) (now NatureScot (NS)) (SNH 2017<sup>1</sup>). Additionally, the following documents were taken into account:

- Legislation and Policy
  - The Wildlife and Countryside Act 1981, as amended;
  - European Union (EU) Council Directive 79/409/EEC and 2009/147/EC on the Conservation of Wild Birds (the ‘Birds Directive’);
  - EU Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the ‘Habitats Directive’);
  - The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004 (as amended), which implements the Birds and Habitats Directives into Scottish Law;
  - The Conservation of Habitats and Species (Amendments) Regulations 2017, relating to matters in Scotland;
  - Environmental Impact Assessment Directive 85/337/EEC (the EIA Directive);
  - The Nature Conservation (Scotland) Act 2004;

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<sup>1</sup> Scottish Natural Heritage. 2017. Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH Guidance



- 
- The Wildlife and Natural Environment (Scotland) Act 2011;
  - The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended);
  - National Planning Framework 4 (NPF4) – sets out the spatial principles, regional priorities, national developments and national planning policy;
  - Planning Advice Note (PAN) 1/2013 – Environmental Impact Assessment (Scottish Government 2013);
  - PAN 51: Planning, Environmental Protection and Regulation (Scottish Government, revised 2006);
  - PAN 60: Planning for Natural Heritage (Scottish Government 2000);
  - Guidance
    - Scottish Executive Circular 6/1995 EIR release (as amended June 2000). Information request and response under the Environmental Information (Scotland) Regulations 2004;
    - Planning Circular 1/2017; Environmental Impact Assessment Regulations. Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (Scottish Government, 2017);
    - ‘Managing Natura 2000 Sites’ (European Communities 2000);
    - Guidelines for Ecological Impact Assessment in the UK and Ireland; Terrestrial, Freshwater and Coastal (CIEEM 2018<sup>2</sup>);
    - Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH 2017);
    - Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al.* 2007<sup>3</sup>);
    - Avoidance rates for the onshore SNH collision risk model (SNH 2017b);
    - Assessing the significance of impacts from onshore windfarms on birds outwith designated areas: version 2 (SNH 2018a<sup>4</sup>);
- 

<sup>2</sup> CIEEM. 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Winchester: Chartered Institute of Ecology and Environmental Management.

<sup>3</sup> Band, W., Madders, M. and Whitfield, D. P. 2007. Developing field and analytical methods to assess avian collision risk at wind farms. In *Birds and Wind Farms*. (eds. M. Lucas, de, G. F. E. Janss & M. Ferrer), pp. 15pp. Madrid: Quercus.

<sup>4</sup> Scottish Natural Heritage. 2018a. Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas. SNH.



- Assessing the cumulative impact of onshore wind energy developments (SNH 2018b<sup>5</sup>);
- Assessing connectivity with Special Protection Areas (SPAs) (SNH 2016a<sup>6</sup>);
- Environmental Statements and Annexes of Environmentally Sensitive Bird Information Guidance for Developers, Consultants and Consultees. Version 2 (SNH 2016b<sup>7</sup>);
- Good Practice during Wind Farm Construction (Scottish Renewables *et al.* 2019<sup>8</sup>);
- Birds of Conservation Concern (BoCC) 5: the Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man (Stanbury *et al.* 2021<sup>9</sup>);
- The UK Biodiversity Framework 2024;
- The draft Scottish Biodiversity Strategy comprising: 2020 Challenge for Scotland's Biodiversity; Scottish Biodiversity List (SBL, NatureScot 2020: <https://www.nature.scot/doc/scottish-biodiversity-list>); and
- Scottish Biodiversity Strategy to 2045 Biodiversity: delivery plan 2024 to 2030.

### 7.3. Consultation

7.3.1. Consultation was undertaken primarily through the scoping process. The issues raised and key outcomes of this consultation relating to ornithology are summarised in Table 7.1.

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<sup>5</sup> Scottish Natural Heritage. 2018b. Assessing the cumulative impacts of onshore wind farms on birds. Guidance. SNH.

<sup>6</sup> Scottish Natural Heritage. 2016a. Assessing Connectivity with Special Protection Areas (SPAs) - Version 3. Vol. Version 3. SNH Guidance.

<sup>7</sup> Scottish Natural Heritage. 2016b. Environmental Statements and Annexes of Environmentally Sensitive Bird Information Guidance for Developers, Consultants and Consultees. Version 2. SNH Guidance.

<sup>8</sup> Scottish Renewables. 2019. Good Practice during Wind Farm Construction. v.4.

<sup>9</sup> Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D. and Win, I. 2021. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114:723-747.



Table 7.1. Consultation Responses

| Consultee and Date   | Scoping / Other Consultation | Issue Raised                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Response / Action Taken                                                                                                                                                |
|----------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NatureScot<br>5/3/24 | Scoping Opinion              | NatureScot agrees that the scope of the ornithological survey and assessment seems appropriate for the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Noted                                                                                                                                                                  |
|                      |                              | Policy 3 of National Planning Framework 4 (NPF4) requires that new developments deliver positive net gain for biodiversity. For a wind farm, the main mode of delivery is through the implementation of a biodiversity and habitat management plan (BHMP) that compensates for any residual effects resulting from the proposal. We strongly advise that the application includes a well-developed BHMP that allows consultees to assess the merits of the proposal in line with NPF4. We recommend taking account of our developing with nature guidance and our habitat management plans guidance to inform the proposal and plans. | Noted. An outline biodiversity and habitat management plan (OBHMP) is given in Technical Appendix 8.5.                                                                 |
|                      |                              | NatureScot commented that the site is in proximity to the South Scotland Golden Eagle Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Noted. The site is not preferred golden eagle habitat (as it is entirely below 300 m), as supported by the very low use of the site shown by the baseline survey data. |

## 7.4. Methodology

### Scope of Assessment

7.4.1. The key issues for the assessment of potential ornithological effects relating to onshore wind farms include the following, based on NS (formerly Scottish National Heritage (SNH)) guidance published in 2018a:

- direct loss of bird habitat through the construction of the wind farm infrastructure;
- disturbance of birds during construction and operation (including displacement of flight activity through barrier effects);
- mortality of birds through collision with turbine blades or towers during operation; and



- cumulative effects of wind farm operational disturbance and collision mortality, on the national and Natural Heritage Zone (NHZ) populations of key target species.

7.4.2. No ornithological issues have been scoped out from this assessment, though, following SNH 2018a guidance, the assessment has focussed on the key species likely to be affected by the Proposed Development.

7.4.3. Key target species for the assessment have been identified following SNH 2018a guidance using the following criteria:

- species listed on Annex 1 of the EU Birds Directive;
- species listed on Schedule 1 of the 1981 Wildlife & Countryside Act;
- species identified by SNH 2018a as 'Priority bird species for assessment when considering the development of onshore wind farms in Scotland'. These include:
  - species that are widespread across Scotland which utilise habitats or have flight behaviours that may be adversely affected by a wind farm;
  - 'restricted range' species; and
  - red-listed species on the Birds of Conservation Concern list (Stanbury *et al.* 2021).

7.4.4. The ornithological assessment has, therefore, given particular consideration to all species recorded during the baseline surveys at the site that meet any of these criteria.

## Baseline Characterisation

### Study Area

7.4.5. The ornithology study areas were chosen to include all areas within the potential zone of ornithological influence of the Proposed Development, with reference to SNH (2017) guidance. The specific study areas were as follows:

- Ornithological designated sites: sites designated for ornithological interests within 5 km of the site (all statutory protected sites) and within 20 km (internationally important sites), see Figure 7.1;
- Core breeding and wintering bird surveys: included the site boundary (the site), plus a 500 m buffer for the main breeding bird surveys (the core breeding bird survey area), shown in Figure 7.2. Access to a wider area around this was not possible because of land ownership restrictions. The site (to which full access was allowed) covered a total area of 12.7 km<sup>2</sup>, and the area including the 500 m buffer 22.0 km<sup>2</sup>;
- Key species surveys (the wider breeding bird survey area): a 2km buffer, where access was possible, covering an additional 34 km<sup>2</sup>. Surveys comprised walkovers (restricted to the site and public access),



supplemented by a series of mini-vantage points (shorter watches from additional vantage points (VP)) to cover other areas (looking out from the site itself);

- Flight activity (VP) surveys, as shown in Figure 7.2; and
- Cumulative effects: other wind farms within the 'Border Hills' NatureScot Natural Heritage Zone (NHZ20)<sup>10</sup> were included in the assessment of potential cumulative ornithological effects.

## Desk Study

7.4.6. The ornithological desk study provided information on the ornithological interest of the study area out to 20 km from the site, including the locations of any relevant statutory protected sites and collation of data on key species such as raptors and breeding waders. Data from the following sources of information were sought for the desk study:

- NatureScot website (<https://sitelink.nature.scot/home>) – statutory designated site boundaries, including Sites of Special Scientific Interest (SSSI) and SSSI citation details;
- Joint Nature Conservation Committee (JNCC) website (<https://jncc.gov.uk/our-work/special-protection-areas-overview/>) – European protected site boundaries and designations (SPA/Ramsar);
- Wetland Bird Survey annual reports (Woodward *et al.* 2024<sup>11</sup>);
- The Birds of Scotland (Forrester *et al.* 2007<sup>12</sup>);
- Bird Atlas 2007-11: The Breeding and Wintering Birds of Britain and Ireland (Balmer *et al.* 2013<sup>13</sup>); and
- Information published in Environmental Statements (ES) and Environmental Impact Assessment (EIA) Reports for other developments in the NHZ 20 'Border Hills'.

## Field Survey

7.4.7. A comprehensive range of bird surveys have been undertaken at the site between April 2021 and October 2023. This has included surveys over two full breeding seasons (2021 and 2022) and two winter periods (2021-22 and 2022-23). These surveys comprised:

<sup>10</sup> <https://raptormonitoring.org/natural-heritage-zones>

<sup>11</sup> Woodward, I.D., Calbrade, N.A., Birtles, G.A., Feather, A., Peck, K., Wotton, S.R., Shaw, J.M., Balmer, D.E. and Frost, T.M. 2024. Waterbirds in the UK 2022/23: The Wetland Bird Survey and Goose & Swan Monitoring Programme. BTO, RSPB, JNCC and NatureScot. British Trust for Ornithology, Thetford.

<sup>12</sup> Forrester, R. W., Andrews, I., McInerny, C. J., and Scott, H. I. 2007. The Birds of Scotland. Scottish Ornithologists' Club.

<sup>13</sup> Balmer, D., Gillings, S., Caffrey, B. J., Swann, R. L., Downie, I. S. and Fuller, R. J. 2013. Bird Atlas 2007-11: the breeding and wintering atlas of Britain and Ireland, Thetford: BTO Book.



- year-round VP surveys to quantify bird flight activity;
- breeding bird walkover mapping survey;
- species-specific breeding bird surveys; and
- autumn/winter walkover surveys.

7.4.8. Full details of the surveys, dates and weather conditions are given in Technical Appendices 6.1-6.5.

### Vantage Point Surveys (year-round)

7.4.9. VP surveys were carried out to determine flight activity within the site and its surrounds. The VP surveys quantified the bird numbers that could potentially be at risk of collision (including roost flight observations at dawn/dusk). All flight lines of target species were mapped, and the flight height and duration of each flock/individual recorded. The following species were recorded:

- all birds of prey and owls;
- all waders (including lapwing and golden plover) and gulls;
- all ducks, geese, swans, cormorants, herons, coot and grebes;
- large flocks (>100 birds) of other species (except woodpigeon and rook); and
- any other notable species, including SNH 2018a priority species.

7.4.10. Two VPs were used, to give sufficient coverage of the site and its surrounds. Computer GIS-generated (Global Mapper v21) viewsheds are shown in Figure 7.2. The same locations were used for all surveys, with the following surveys being undertaken at each VP:

- breeding season:
  - April-August 2021 – 42 hours per VP (36 hours per VP, plus an additional 6 hours in April to cover goose migration); and
  - April-August 2022 – 42 hours per VP (36 hours per VP, plus an additional 6 hours in April to cover goose migration).
- autumn/winter:
  - September-March 2021-22 – 72 hours per VP (6 hours per VP per month plus an additional 6 hours each month in September-November and February-March to cover goose migration);
  - November-March 2022-23 – 48 hours per VP (6 hours per month plus an additional 6 hours each month in November and February-March to cover goose migration); and
  - September-October 2023 – 24 hours per VP (6 hours per month plus an additional 6 hours each month to cover goose migration).



## Core Breeding Bird Walkover Surveys

- 7.4.11. The breeding bird walkover survey followed the standard Brown and Shepherd 1993<sup>14</sup> moorland survey method with two additional visits as recommended in SNH 2017 guidance. These surveys covered the site plus a 500 m buffer (where access/viewing was possible). The extent of the breeding bird survey area is shown in Figure 7.2.
- 2021 – four visits during April-July; and
  - 2022 – four visits during April-July.
- 7.4.12. All bird locations and behaviour were mapped at 1:10,000 scale, using the standard British Trust for Ornithology (BTO) Common Birds Census notation, and all species were recorded. In addition, the survey effort per unit area was standardised to make the surveys as repeatable as possible, recording systematically for approximately two hours per km<sup>2</sup>. A route was chosen to ensure that all parts of the ornithology study area were covered within approximately 100 m of the observer, where access was possible. The survey route was plotted on the survey map as it was undertaken.
- 7.4.13. The surveys avoided strong winds, heavy rain, fog and low cloud. Birds were located by walking, listening and scanning by eye and with binoculars. Standard BTO notation was used to record the birds' activities; singing, calling, carrying nest material, nests or young found, repetitively alarmed adults, disturbance displaying, carrying food or in territorial dispute.
- 7.4.14. The survey data were analysed to determine spatially distinct clusters of records, equivalent to breeding territories, with the number of such territories used to calculate the breeding population for each species (Gilbert *et al.* 1998<sup>15</sup>). A record in potentially suitable breeding habitat on a single visit was considered sufficient to indicate a potential breeding attempt.

## Species-specific Breeding Bird Surveys (Wider Area Surveys)

- 7.4.15. As the site and its surrounds supported potentially suitable habitat for a range of scarce raptors and black grouse, additional species-specific surveys were undertaken during April-August 2021 and 2022, as set out in the Scoping Report. Surveys were undertaken within the site and a 2 km buffer zone (the 'wider breeding bird survey area') where potentially suitable breeding habitat for these species are present. Walkovers were carried out where access was allowed, supplemented by a series of mini-VPs (short watches from additional VPs) chosen to observe over all of the site plus a 2 km buffer. This comprised surveys for black grouse, goshawk, red kite, peregrine, barn owl and short-

<sup>14</sup> Brown, A. F., and K. B. Shepherd (1993). A method for censusing upland breeding waders. *Bird Study* 40:189-195.

<sup>15</sup> Gilbert, G., Gibbons, D. W. and Evans, J. 1998. *Bird Monitoring Methods: a manual of techniques for key UK species*. RSPB /BTO/WWT/JNCC/ITE/The Seabird Group.



eared owl, following the standard methodologies detailed in Gilbert *et al.* (1998) and Hardey *et al.* (2013)<sup>16</sup>:

- black grouse surveys – dawn surveys during April-May 2021 and 2022 over 2-3 visits for each of the two baseline survey years; and
- raptor/owl surveys – walkover and mini-VP surveys, each month for each of the two baseline survey years during April-July 2021 and 2022.

7.4.16. In addition, any other key target species observed during these surveys were recorded, including lapwing, curlew and golden plover.

### Autumn/Winter Walkover Surveys

7.4.17. Walkover mapping surveys of the wintering birds within the survey area took place in accordance with NS guidance (Figure 7.2). The survey focused on key target species, as set out above for the VP surveys, within 500m of the site. As well as counting and mapping each species, the behaviour of each flock was also recorded, e.g. feeding/roosting. The surveys included work at dawn and dusk to check the area specifically for roosting hen harriers and other important raptors, carried out as follows:

- 2021-22 – approximately fortnightly surveys, September-March;
- 2022-23 – approximately fortnightly surveys, November-March; and
- 2023 – approximately fortnightly surveys, September-October.

### Wintering Waterfowl Feeding Distribution Surveys

7.4.18. Additional surveys were undertaken twice monthly of all possible habitats within 2 km of the site that could be used by wintering waterfowl as feeding/roosting sites (to give contextual information about where goose feeding flocks were located and provide further information on possible linkage to the Castle Loch, Lochmaben SPA, see Figure 7.2). The counts were carried out as instantaneous 'look-see' counts, recording a snapshot of the birds present in each field/count sector when surveyed (Gilbert *et al.* 1998).

### Collision Risk Modelling

7.4.19. In order to further inform the determination of the likelihood of significant adverse effects occurring, collision risk modelling was carried out for all the key target species (as per SNH guidance 2018a and Band *et al.* 2007) recorded flying through the collision risk zone at rotor height. The rotor height envelope would be 38-200 m. Further details are provided in Technical Appendix 7.6: Collision Risk Modelling Calculations. The modelling included six target raptor

<sup>16</sup> Hardey, J., Crick, H. Q. P., Wernham, C.V., Riley, H.T., Etheridge, B. and Thompson, D. B. A. 2013. Raptors: a field guide to survey and monitoring. The Stationary Office Ltd, Edinburgh. Third Edition.



species (goshawk, red kite, golden eagle, marsh harrier, peregrine and merlin) and three breeding waders (curlew, lapwing and golden plover). The collision risk for each of these species was modelled using the non-direct flight model. In addition, wintering/migrating whooper swans, greylag geese, pink-footed geese and herring gulls were observed flying through the collision risk zone and were also modelled to determine their collision risk. As their flights were largely directly through the site, the direct flight model was applied. No other key species was recorded flying through the collision risk zone at rotor height.

- 7.4.20. The NS-recommended collision risk model was used in this assessment. The model runs as a two-stage process. Firstly, the risk is calculated with the assumption that flight patterns are unaffected by the presence of the wind turbines, i.e. that no avoidance action is taken. This is essentially a mechanistic calculation, with the collision risk calculated as the product of (i) the probability of a bird flying through the rotor swept area, and (ii) the probability of a bird colliding if it does so. This probability is then multiplied by the estimated numbers of bird movements through the wind farm rotors at the risk height (i.e. the height of the rotating rotor blades) in order to estimate the theoretical numbers at risk of collision if they take no avoiding action.
- 7.4.21. The second stage then incorporates the probability that the birds, rather than flying blindly into the wind turbines, will actually take a degree of avoiding action, as shown to occur in all studies of birds at existing wind farms. NS has recommended a precautionary approach, using a value of 98% as a general default avoidance rate, 99% for some larger raptors (including red kite and hen harrier, Urquhart and Whitfield 2016<sup>17</sup>) and 99.8% for geese<sup>18</sup>. This precautionary approach is useful as an initial filter to identify sites where collision risk is clearly not an issue but does not necessarily provide a realistic estimate of actual likely collision rates when compared with data from existing wind farms. The magnitude of the impact was determined as a percentage increase in the existing baseline mortality (to put the potential wind farm mortality into the ecological context of the birds' population dynamics), though professional judgement was also applied in the assessment of any non-negligible magnitude collision risks predicted.

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<sup>17</sup> Urquhart, B., and Whitfield, D. P. 2016. Derivation of an Avoidance Rate for Red Kite Suitable for Onshore Wind Farm Collision Risk Modelling. Natural Research Report.

<sup>18</sup> Scottish Natural Heritage. 2017b. Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model. SNH.



- 7.4.22. Details of the input data and the collision risk calculations are given in Technical Appendix 7.6. Body sizes and baseline mortality rates were taken from Robinson 2005<sup>19</sup> and flight speeds from Alerstam *et al.* 2007<sup>20</sup>.

### Assessment Methodology

- 7.4.23. The significance of the potential effects of the Proposed Development has been classified by professional consideration of the value of the receptor and the magnitude of the potential effect.
- 7.4.24. The assessment includes a full evaluation of the ornithological importance of the bird populations at the site and identification of any particularly sensitive areas. The assessment has been carried out with reference to the assessment methodologies produced by NS (SNH 2018a) for the wider countryside, and the CIEEM Guidelines (2018).
- 7.4.25. An assessment of the effects of the Proposed Development on European Protected Sites under the Habitats Regulations is presented separately in Technical Appendix 7.8.

### Criteria for Assessing Value (Conservation Importance)

- 7.4.26. Value (conservation importance) was assigned using the criteria set out in Table 7.2, drawing upon those adopted by NS in Guidelines for Selection of Biological SSSI, using 1% of the resource to define international and national importance (very high and high values) (Woodward *et al.* 2024). An additional category of regional importance (medium value) was assigned for species approaching the threshold for national importance and those for which the survey area held a notable concentration in a county context. A further category of 'local importance' (low value) was used for species that did not reach regional or national importance at the site but were still of some conservation interest. This included all species on the red or amber lists of the 'Birds of Conservation Concern' (Stanbury *et al.* 2021). National reference populations have been taken from Woodward *et al.* 2020<sup>21</sup> and regional NHZ populations from Wilson *et al.* 2015<sup>22</sup>. In addition, listings on Annex 1 of the EU Birds Directive, Schedule 1 of the Wildlife and Countryside and Scottish Biodiversity List (SBL) species were all considered in the evaluation process.

<sup>19</sup> Robinson, R.A. 2005. BirdFacts: profiles of birds occurring in Britain & Ireland (BTO Research Report 407). BTO, Thetford (<http://www.bto.org/birdfacts>).

<sup>20</sup> Alerstam, T., Rosén, M., Bäckman, J., Ericson, P. and Hellgren, O. 2007. Flight speeds among bird species: allometric and phylogenetic effects. PLoS biology, 5.

<sup>21</sup> Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., D. Stroud, D. and Noble, D. 2020. Population estimates of birds in Great Britain and the United Kingdom. British Birds 113:69-104.

<sup>22</sup> Wilson, M. W., Austin, G. E. and C. V. Wernham, C.V. 2015. Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number 1504.



7.4.27. The sensitivity (conservation importance, as defined in Table 7.2) of the receptors present in the 20 km study area were identified, and then the magnitude of the possible impact on those receptors were determined (as described in Table 7.3).

**Table 7.2: Value (conservation importance) of bird species**

| Value      | Definitions                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very High  | Cited interest of SPAs, Special Areas of Conservation (SACs) and SSSIs. Cited means mentioned in the citation text for those protected sites as a species for which the site is designated (SPAs/SACs) or notified (SSSIs).                                                                                                                                                                                                                                     |
| High       | Other species that contribute to the integrity of an SPA or SSSI.<br>A local population of more than 1% of the national population of a species.<br>Any ecologically sensitive species, e.g. large birds of prey or rare birds (<300 breeding pairs in the UK).<br>EU Birds Directive Annex 1, EU Habitats Directive priority habitat/species and/or Wildlife and Countryside Act Schedule 1 species (if not covered above). Other specially protected species. |
| Medium     | Regionally important population of a species, either because of population size or distributional context.<br>NERC Act Section 41/UK Biodiversity Action Plan (BAP) priority species (if not covered above).                                                                                                                                                                                                                                                    |
| Low        | Any other species of conservation interest, e.g. species listed on the Birds of Conservation Concern not covered above, present in only locally important numbers. Scottish BAP species (if not covered above).                                                                                                                                                                                                                                                 |
| Negligible | Green-listed species (Stanbury <i>et al.</i> 2021) of favourable conservation status.                                                                                                                                                                                                                                                                                                                                                                           |

## Magnitude of Impact

7.4.28. An impact is defined as a change of particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. The magnitude of impact is assessed in terms of the extent of the impact (spatial) and the temporal aspects of the impact, in terms of timing, frequency, duration and reversibility. Table 7.3 shows the definitions of the impact magnitude classification used for the assessment.

**Table 7.3: Definition of terms relating to the magnitude of ornithological impacts**

| Magnitude | Definition                                                                                                                                                                                                                                                                |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very High | Total loss or very major alteration to key elements/ features of the baseline conditions such that post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether.<br>Guide: >80% of population/habitat lost. |
| High      | Major alteration to key elements/ features of the baseline conditions such that post development character/composition/attributes will be fundamentally changed.<br>Guide: 20-80% of population/habitat lost.                                                             |



| Magnitude  | Definition                                                                                                                                                                                                                                                                           |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Medium     | Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/ composition/ attributes of baseline will be partially changed.<br>Guide: 5-20% of population/habitat lost.                                                  |
| Low        | Minor shift away from baseline conditions. Change arising from the loss/ alteration will be discernible but underlying character/composition/ attributes of baseline condition will be similar to pre-development circumstances/patterns.<br>Guide: 1-5% of population/habitat lost. |
| Negligible | Very slight change from baseline condition. Change barely distinguishable, approximating to the 'no change' situation.<br>Guide: <1% of population/habitat lost.                                                                                                                     |

### Significance Criteria

7.4.29. The combined assessment of the magnitude of an impact and the value of the receptor was used to determine the significance of potential effects. These two criteria were cross tabulated to assess the overall effect and significance of that effect (Table 7.4). This gives a guide as to the determination of significance, though the final assessment was still subject to professional judgment.

**Table 7.4: Matrix of magnitude of impact and sensitivity used to test the significance of effects.**

Each cell shows the significance category of each combination. Shaded cells indicate potentially significant effects in terms of the EIA Regulations.

|           |            | SENSITIVITY |                |                |            |            |
|-----------|------------|-------------|----------------|----------------|------------|------------|
|           |            | Very high   | High           | Medium         | Low        | Nil        |
| MAGNITUDE | Very high  | Major       | Major          | Major-moderate | Moderate   | Negligible |
|           | High       | Major       | Major          | Moderate       | Minor      | Negligible |
|           | Medium     | Major       | Major-moderate | Minor          | Negligible | Negligible |
|           | Low        | Moderate    | Minor          | Minor          | Negligible | Negligible |
|           | Negligible | Minor       | Negligible     | Negligible     | Negligible | Negligible |

7.4.30. The interpretation of these significance categories was as follows:

- Negligible and minor are not normally of concern, though normal design care should be exercised to minimise any adverse effects;
- Moderate represents a potentially significant adverse effect on which professional judgment must be made, though it is likely that mitigation will reduce it below the significance threshold; and
- Major and major/moderate represent significant adverse effects on bird populations which are regarded as significant for the purposes of EIA.

7.4.31. The SNH (2018a) wider countryside assessment guidance defines the key significance test as follows: "An impact should be judged as of concern where



it would adversely affect the favourable conservation status of a species or stop a recovering species from reaching favourable conservation status, at international or national level or regionally.” It notes that the key baseline population against which the assessment should be made is the NS Natural Heritage Zone (NHZ) population (NHZ 20, ‘Border Hills’, in this case). The site lies on the fringe of this NHZ, bordering NHZ 19 ‘Western Southern Uplands and Inner Solway’, so consideration has been given to populations in that NHZ which could be affected.

- 7.4.32. A cumulative ornithological assessment (using the same criteria as the main assessment) has been undertaken following the SNH 2018b guidance on ‘Assessing the cumulative impacts of onshore wind farms on birds’, considering impacts on the favourable conservation status of key species within the relevant NHZ, in this case NHZ 20 ‘Border Hills’.
- 7.4.33. As the 20 km study area held species specially protected under Schedule 1 of the 1981 Wildlife and Countryside Act, information on the breeding sites and associated flight activity of the species listed on that Schedule is provided in a Confidential Appendix 7.9. It is important that their breeding locations are kept confidential to minimise the risk of persecution and disturbance. Following SNH (2016b) guidance, the amount of information contained in that Confidential Appendix has been kept to a minimum but includes all data that indicate breeding locations.

### Limitations and Assumptions

- 7.4.34. No significant information gaps have been identified. Inevitably, with any ornithological survey, it cannot be guaranteed to detect all target species/individuals and surveys cannot be fully representative of all conditions (e.g. severely reduced visibility). However, in this case it was concluded that the baseline surveys provide a robust data set on which to carry out the assessment.

## 7.5. Baseline

### Statutory Protected Sites

- 7.5.1. There are three statutory designated nature conservation sites in the search area around the Proposed Development (5km for nationally important Sites of Special Scientific Interests (SSSI) and 20km for internationally important European Protected Special Protection Areas (SPA) and Ramsar Sites) – see Figure 7.1:

- Perchall Loch SSSI – 4.3 km west from the site – notified for its wetland basin fen habitat and water beetle fauna but not for any ornithological interest features;
- Castle Loch, Lochmaben SPA/Ramsar/SSSI – 7.6 km south-west from the site – designated for its internationally important wintering population of



pink-footed geese. The SPA citation cites a population of 8,300 pink-footed geese (4% of the international population), though numbers have been rather lower in more recent years, probably as a result of more geese roosting on the Solway Firth rather than at this site (Mitchell 2012, Frost *et al.* 2021). It also supports a nationally important wintering population of goosander (winter peak mean of 66, 1% of the British population);

- Langholm, Newcastleton Hills SPA/SSSI – 20 km east from the site – upland moorland designated for its breeding hen harrier population (SPA), its upland breeding bird assemblage, upland habitats and geological interest (SSSI). The site lies well outside the core range of 2 km for hen harrier, making any effect on this SPA unlikely, but this will be further informed by analysis of the baseline site survey data.

7.5.2. The potential connectivity of each of the SPAs to the site is summarised in Table 7.5. This lists the qualifying features for each SPA, the distance from the site at its closest point and an initial assessment of whether the site falls within the core range of each (as set out in SNH 2016a). As set out in this guidance, “In most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests”, so this has been used for this assessment (though with consideration of the maximum ranges too).

**Table 7.5: Special Protection Areas within 20 km of the Proposed Development, their qualifying features and likely connectivity to the site.**

| SPA                          | Distance from site | Qualifying features             | Qualifying features for which site lies within core range (SNH 2016a) |
|------------------------------|--------------------|---------------------------------|-----------------------------------------------------------------------|
| Castle Loch, Lochmaben       | 7.6 km             | Wintering pink-footed goose     | Pink-footed goose (15-20 km)                                          |
| Langholm, Newcastleton Hills | 20 km              | Breeding hen harrier population | None                                                                  |

## Current Baseline

### Field Survey Results: Breeding Birds

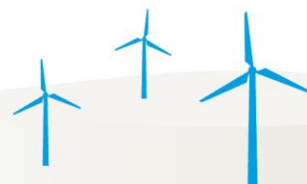
7.5.3. Table 7.6 summarises the breeding bird populations found within the survey area during each of the breeding bird surveys. It shows the estimated number of breeding pairs recorded during each of the two survey years (2021 and 2022). Technical Appendices 6.1 and 6.2 provide details of all the breeding bird populations.

**Table 7.6: Breeding Bird Populations in the Core Study Area (April-August 2021 and 2022)**

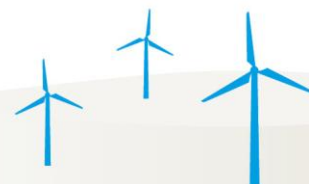
| Species   | Number of pairs in 2021 | Number of pairs in 2022 |
|-----------|-------------------------|-------------------------|
| Mute Swan | 3                       | 2                       |



| Species                       | Number of pairs in 2021 | Number of pairs in 2022 |
|-------------------------------|-------------------------|-------------------------|
| Greylag Goose <sup>2</sup>    | 0                       | 1                       |
| Canada Goose                  | 4                       | 2                       |
| Teal <sup>3</sup>             | 0                       | 3                       |
| Mallard                       | 9                       | 6                       |
| Tufted Duck                   | 7                       | 5                       |
| Red-legged Partridge          | 1                       | 3                       |
| Pheasant                      | 65                      | 50                      |
| Little Grebe <sup>3</sup>     | 2                       | 2                       |
| Red Kite                      | 1                       | 1                       |
| Goshawk                       | 0                       | 1                       |
| Sparrowhawk                   | 0                       | 3                       |
| Buzzard <sup>2</sup>          | 10                      | 10                      |
| Kestrel                       | 1                       | 0                       |
| Moorhen                       | 4                       | 4                       |
| Coot                          | 2                       | 1                       |
| Oystercatcher <sup>2</sup>    | 2                       | 0                       |
| Lapwing                       | 5                       | 7                       |
| Snipe <sup>2</sup>            | 9                       | 12                      |
| Curlew <sup>2</sup>           | 5                       | 5                       |
| Common Sandpiper <sup>2</sup> | 1                       | 0                       |
| Feral Pigeon                  | 1                       | 2                       |
| Stock Dove                    | 5                       | 1                       |
| Woodpigeon                    | 70                      | 55                      |
| Collared Dove                 | 1                       | 1                       |
| Cuckoo <sup>2.5</sup>         | 2                       | 7                       |
| Barn Owl                      | 0                       | 1                       |
| Great Spotted Woodpecker      | 5                       | 3                       |
| Skylark                       | 124                     | 161                     |
| Sand Martin                   | 3                       | 0                       |
| Swallow                       | 34                      | 13                      |
| House Martin                  | 8                       | 0                       |
| Tree Pipit                    | 3                       | 0                       |
| Meadow Pipit                  | 327                     | 340                     |
| Grey Wagtail <sup>2</sup>     | 4                       | 1                       |
| Pied Wagtail                  | 25                      | 24                      |
| Dipper <sup>2.5</sup>         | 2                       | 0                       |
| Wren                          | 68                      | 69                      |



| Species                | Number of pairs in 2021 | Number of pairs in 2022 |
|------------------------|-------------------------|-------------------------|
| Dunnock                | 12                      | 8                       |
| Robin                  | 55                      | 40                      |
| Redstart               | 7                       | 6                       |
| Whinchat <sup>2</sup>  | 1                       | 0                       |
| Stonechat <sup>2</sup> | 11                      | 8                       |
| Wheatear <sup>1</sup>  | 13                      | 12                      |
| Blackbird              | 52                      | 29                      |
| Song Thrush            | 41                      | 23                      |
| Mistle Thrush          | 16                      | 4                       |
| Sedge Warbler          | 7                       | 3                       |
| Blackcap               | 5                       | 3                       |
| Whitethroat            | 3                       | 2                       |
| Chiffchaff             | 4                       | 4                       |
| Willow Warbler         | 64                      | 37                      |
| Goldcrest              | 24                      | 17                      |
| Spotted Flycatcher     | 2                       | 2                       |
| Long-tailed Tit        | 2                       | 0                       |
| Blue Tit               | 26                      | 15                      |
| Great Tit              | 24                      | 12                      |
| Coal Tit               | 32                      | 17                      |
| Nuthatch               | 1                       | 1                       |
| Treecreeper            | 4                       | 7                       |
| Jay                    | 4                       | 4                       |
| Magpie                 | 1                       | 1                       |
| Jackdaw                | 24                      | 13                      |
| Carrion Crow           | 40                      | 40                      |
| Raven <sup>3</sup>     | 6                       | 2                       |
| Starling               | 11                      | 5                       |
| House Sparrow          | 7                       | 8                       |
| Chaffinch              | 145                     | 126                     |
| Goldfinch              | 34                      | 15                      |
| Siskin                 | 34                      | 21                      |
| Linnet                 | 12                      | 10                      |
| Lesser Redpoll         | 16                      | 11                      |
| Common Crossbill       | 4                       | 0                       |
| Bullfinch              | 2                       | 2                       |
| Reed Bunting           | 28                      | 28                      |



## Species-Specific Breeding Bird Survey Results

7.5.4. A pair of red kites bred in the survey area in 2021 and 2022. Further details are given in Confidential Appendix 7.9.

7.5.5. A pair of goshawks was seen in the survey area in 2021 and 2022, likely breeding in the conifer plantation. Further details are given in the Confidential Appendix 7.9.

7.5.6. Barn owl was seen on the western edge of the survey area and is likely to have been breeding. Further details are given in the Confidential Appendix 7.9.

7.5.7. The following key target species were recorded within the survey area, but no evidence was found for any of them breeding.

- Osprey;
- Merlin; and
- Peregrine.

7.5.8. There were no records of black grouse during the species-specific surveys or during any of the other baseline surveys.

## Vantage Point Survey Results: Breeding Season

7.5.9. The rates of bird flight movement observed across the site during the breeding season VP surveys are summarised in Table 7.7. This gives the flight rate per hour of observation in each year, and the overall total number of flights recorded.

7.5.10. Table 7.7 also gives the percentage of flights of each species that were recorded at rotor height over both years' baseline data (rotor height would be 38-200 m).

**Table 7.7: Key Species Flight Rates recorded over the VP survey area during the 2021 and 2022 breeding season vantage point surveys**

| Species           | Flight rate in 2021 (birds/hour) | Flight rate in 2022 (birds/hour) | Total number observed | % flights at rotor height (38-200 m) |
|-------------------|----------------------------------|----------------------------------|-----------------------|--------------------------------------|
| Mute Swan         | 0.06                             | 0.07                             | 11                    | 0%                                   |
| Whooper Swan      | -                                | 0.18                             | 15                    | 50%                                  |
| Pink-footed Goose | -                                | 5.33                             | 448                   | 80%                                  |
| Greylag Goose     | 0.14                             | 0.20                             | 29                    | 40%                                  |
| Canada Goose      | 0.07                             | 0.11                             | 15                    | 29%                                  |
| Mallard           | 0.08                             | 0.14                             | 19                    | 43%                                  |
| Tufted Duck       | -                                | 0.04                             | 3                     | 0%                                   |



| Species                  | Flight rate in 2021 (birds/hour) | Flight rate in 2022 (birds/hour) | Total number observed | % flights at rotor height (38-200 m) |
|--------------------------|----------------------------------|----------------------------------|-----------------------|--------------------------------------|
| Goosander                | -                                | 0.02                             | 2                     | 0%                                   |
| Cormorant                | -                                | 0.01                             | 1                     | 100%                                 |
| Grey Heron               | 0.07                             | 0.07                             | 12                    | 50%                                  |
| Red Kite                 | 0.50                             | 0.67                             | 98                    | 51%                                  |
| Goshawk                  | 0.14                             | 0.11                             | 21                    | 45%                                  |
| Sparrowhawk              | 0.08                             | 0.02                             | 9                     | 22%                                  |
| Buzzard                  | 3.14                             | 2.17                             | 446                   | 58%                                  |
| Osprey                   | 0.02                             | 0.01                             | 3                     | 100%                                 |
| Kestrel                  | 1.01                             | 0.80                             | 152                   | 11%                                  |
| Merlin                   | 0.01                             | 0.01                             | 2                     | 0%                                   |
| Peregrine                | 0.02                             | 0.01                             | 3                     | 67%                                  |
| Oystercatcher            | 0.02                             | 0.01                             | 3                     | 0%                                   |
| Golden Plover            | 9.87                             | 2.76                             | 1061                  | 48%                                  |
| Lapwing                  | 0.77                             | 1.20                             | 166                   | 2%                                   |
| Snipe                    | 0.57                             | 0.38                             | 80                    | 30%                                  |
| Curlew                   | 0.56                             | 0.42                             | 82                    | 21%                                  |
| Common Gull              | 0.04                             | 0.57                             | 51                    | 100%                                 |
| Lesser Black-backed Gull | 11.48                            | 2.51                             | 1175                  | 72%                                  |
| Herring Gull             | 0.71                             | 0.24                             | 80                    | 83%                                  |
| Great Black-backed Gull  | 0.35                             | 0.15                             | 42                    | 75%                                  |
| Black-headed Gull        | 0.02                             | 0.11                             | 12                    | 40%                                  |
| Kittiwake                | -                                | 0.01                             | 1                     | 100%                                 |

### Field Survey Results: Wintering Walkover Surveys

7.5.11. The results of the autumn/winter walkover surveys are summarised in Table 7.8. The table shows the mean and peak counts recorded in each of the survey years (September 2021-March 2022 and November 2022-March 2023/September-October 2023).

**Table 7.8: Autumn/Winter Bird Populations (wintering bird walkover survey area during 2021-22 and 2022-23)**

| Species           | Mean count 2021-22 | Mean count 2022-23 | Peak count 2021-22 | Peak count 2022-23 |
|-------------------|--------------------|--------------------|--------------------|--------------------|
| Mute Swan         | 8.1                | 6.1                | 11                 | 11                 |
| Whooper Swan      | 1.1                | 1.5                | 6                  | 6                  |
| Pink-footed Goose | 4.8                | -                  | 36                 | 0                  |
| Greylag Goose     | 0.1                | -                  | 1                  | 0                  |



| Species                  | Mean count<br>2021-22 | Mean count<br>2022-23 | Peak count<br>2021-22 | Peak count<br>2022-23 |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Canada Goose             | 0.3                   | 0.4                   | 4                     | 6                     |
| Wigeon                   | 0.4                   | 3.1                   | 2                     | 21                    |
| Teal                     | 18.6                  | 28.5                  | 60                    | 170                   |
| Mallard                  | 14.6                  | 31.7                  | 37                    | 75                    |
| Pintail                  | -                     | 0.3                   | 0                     | 4                     |
| Tufted Duck              | 1.5                   | 1.2                   | 9                     | 5                     |
| Goldeneye                | 0.2                   | -                     | 1                     | 0                     |
| Goosander                | -                     | 0.1                   | 0                     | 2                     |
| Red Grouse               | 0.0                   | 0.1                   | 0                     | 1                     |
| Little Grebe             | 0.7                   | 1.3                   | 3                     | 5                     |
| Cormorant                | 0.1                   | -                     | 2                     | 0                     |
| Grey Heron               | 0.6                   | 0.4                   | 2                     | 1                     |
| Red Kite                 | 3.7                   | 1.1                   | 13                    | 5                     |
| Marsh Harrier            | -                     | 0.1                   | 0                     | 1                     |
| Hen Harrier              | 0.1                   | 0.1                   | 1                     | 1                     |
| Goshawk                  | 0.1                   | -                     | 1                     | 0                     |
| Sparrowhawk              | 0.1                   | 0.1                   | 1                     | 1                     |
| Buzzard                  | 8.3                   | 5.1                   | 16                    | 16                    |
| Kestrel                  | 1.0                   | 2.5                   | 4                     | 5                     |
| Peregrine                | -                     | 0.1                   | 0                     | 1                     |
| Moorhen                  | -                     | 1.1                   | 0                     | 4                     |
| Coot                     | 0.1                   | -                     | 1                     | 0                     |
| Lapwing                  | 1.1                   | 1.1                   | 13                    | 8                     |
| Jack Snipe               | 0.1                   | -                     | 1                     | 0                     |
| Snipe                    | 3.3                   | 2.7                   | 14                    | 9                     |
| Woodcock                 | 0.1                   | -                     | 1                     | 0                     |
| Green Sandpiper          | 0.1                   | -                     | 2                     | 0                     |
| Common Gull              | -                     | 0.1                   | 0                     | 2                     |
| Lesser Black-backed Gull | 0.5                   | -                     | 3                     | 0                     |
| Great Black-backed Gull  | 0.1                   | -                     | 2                     | 0                     |
| Barn Owl                 | -                     | 0.2                   | 0                     | 2                     |
| Short-eared Owl          | 0.3                   | 0.1                   | 2                     | 2                     |

### Results: Wintering Waterfowl Feeding Distribution Surveys

7.5.12. The results of the wider wintering waterfowl surveys are summarised in Table 7.9. The table shows the mean and peak counts recorded in each of the survey



years (September 2021-March 2022 and November 2022-March 2023/September-October 2023).

**Table 7.9: Autumn/Winter Bird Populations (wintering waterfowl survey area during 2021-22 and 2022-23)**

| Species                  | Mean count<br>2021-22 | Mean count<br>2022-23 | Peak count<br>2021-22 | Peak count<br>2022-23 |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Mute Swan                | 0.1                   | 0.0                   | 2                     | 0                     |
| Pink-footed Goose        | 6.9                   | 0.0                   | 96                    | 0                     |
| Greylag Goose            | 0.0                   | 0.1                   | 0                     | 2                     |
| Teal                     | 0.0                   | 1.6                   | 0                     | 6                     |
| Mallard                  | 4.7                   | 1.3                   | 24                    | 4                     |
| Goldeneye                | 0.0                   | 0.1                   | 0                     | 1                     |
| Goosander                | 0.1                   | 0.0                   | 2                     | 0                     |
| Grey Heron               | 0.6                   | 0.9                   | 4                     | 4                     |
| Red Kite                 | 8.4                   | 4.2                   | 23                    | 15                    |
| Goshawk                  | 0.1                   | 0.0                   | 1                     | 0                     |
| Sparrowhawk              | 0.1                   | 0.0                   | 1                     | 0                     |
| Buzzard                  | 13.5                  | 5.6                   | 25                    | 23                    |
| Kestrel                  | 0.4                   | 0.3                   | 2                     | 2                     |
| Peregrine                | 0.0                   | 0.1                   | 0                     | 1                     |
| Oystercatcher            | 0.1                   | 0.2                   | 2                     | 2                     |
| Lapwing                  | 0.0                   | 0.1                   | 0                     | 2                     |
| Curlew                   | 0.1                   | 0.1                   | 1                     | 1                     |
| Common Gull              | 0.0                   | 2.4                   | 0                     | 15                    |
| Lesser Black-backed Gull | 5.1                   | 0.0                   | 47                    | 0                     |
| Herring Gull             | 0.4                   | 0.1                   | 6                     | 1                     |
| Great Black-backed Gull  | 0.3                   | 0.1                   | 2                     | 1                     |

### Vantage Point Survey Results: Winter

7.5.13. The rates of bird flight movement observed across the site during the autumn/winter VP surveys are summarised in Table 7.10. This shows a comparison of the flight rates recorded in each of the two autumn/winters (2021-22 and 2022-23). Table 7.10 also gives the overall percentage of flights of each species that were recorded at rotor height (38-200 m).



**Table 7.10: Key Species Flight Rates recorded over the VP survey area during the 2021-22 and 2022-23 autumn/winter vantage point surveys**

| Species           | Flight rate in 2021-22 (birds/hour) | Flight rate in 2022-23 (birds/hour) | Total number observed over-flying | % flights at rotor height (38-200 m) |
|-------------------|-------------------------------------|-------------------------------------|-----------------------------------|--------------------------------------|
| Mute Swan         | 0.17                                | 0.03                                | 30                                | 8%                                   |
| Whooper Swan      | 0.00                                | 0.31                                | 45                                | 80%                                  |
| Pink-footed Goose | 22.49                               | 4.66                                | 3910                              | 64%                                  |
| Greylag Goose     | -                                   | 0.10                                | 14                                | 100%                                 |
| Canada Goose      | 0.05                                | 0.03                                | 11                                | 50%                                  |
| Teal              | -                                   | 1.10                                | 158                               | 11%                                  |
| Mallard           | 0.12                                | 0.87                                | 142                               | 24%                                  |
| Tufted Duck       | -                                   | 0.03                                | 5                                 | 0%                                   |
| Goldeneye         | -                                   | 0.01                                | 2                                 | 100%                                 |
| Goosander         | 0.03                                | 0.03                                | 8                                 | 33%                                  |
| Cormorant         | 0.04                                | -                                   | 6                                 | 0%                                   |
| Grey Heron        | 0.05                                | -                                   | 7                                 | 20%                                  |
| Red Kite          | 2.24                                | 1.25                                | 503                               | 42%                                  |
| Marsh Harrier     | -                                   | 0.01                                | 2                                 | 0%                                   |
| Hen Harrier       | 0.15                                | 0.09                                | 34                                | 7%                                   |
| Goshawk           | 0.11                                | 0.14                                | 36                                | 29%                                  |
| Sparrowhawk       | 0.05                                | 0.11                                | 23                                | 38%                                  |
| Buzzard           | 2.33                                | 1.53                                | 556                               | 40%                                  |
| Golden Eagle      | 0.03                                | -                                   | 5                                 | 40%                                  |
| Osprey            | 0.01                                | -                                   | 1                                 | 100%                                 |
| Kestrel           | 0.77                                | 0.90                                | 241                               | 7%                                   |
| Merlin            | 0.03                                | 0.01                                | 6                                 | 0%                                   |
| Hobby             | -                                   | 0.01                                | 1                                 | 0%                                   |
| Peregrine         | 0.01                                | 0.03                                | 5                                 | 100%                                 |
| Oystercatcher     | 0.01                                | 0.02                                | 4                                 | 67%                                  |
| Golden Plover     | 0.42                                | 0.14                                | 81                                | 50%                                  |
| Lapwing           | 0.19                                | 1.15                                | 193                               | 53%                                  |
| Snipe             | 0.10                                | 0.12                                | 31                                | 15%                                  |
| Woodcock          | 0.01                                | 0.01                                | 3                                 | 0%                                   |
| Curlew            | -                                   | 0.01                                | 2                                 | 100%                                 |
| Redshank          | 0.01                                | -                                   | 1                                 | 0%                                   |
| Common Gull       | -                                   | 0.32                                | 46                                | 100%                                 |



| Species                  | Flight rate in 2021-22 (birds/hour) | Flight rate in 2022-23 (birds/hour) | Total number observed over-flying | % flights at rotor height (38-200 m) |
|--------------------------|-------------------------------------|-------------------------------------|-----------------------------------|--------------------------------------|
| Lesser Black-backed Gull | 0.58                                | 0.06                                | 92                                | 73%                                  |
| Herring Gull             | 0.08                                | -                                   | 11                                | 75%                                  |
| Great Black-backed Gull  | 0.10                                | 0.06                                | 22                                | 65%                                  |
| Short-eared Owl          | 0.05                                | 0.02                                | 10                                | 13%                                  |

## Future Baseline

7.5.14. In the “do nothing” scenario without the construction of the Proposed Development, it is anticipated that the current management of the site will continue as part of wider estate management activities and that the bird populations currently present will continue at the site, though subject to changes occurring at the national and regional levels, such as the national decline in curlew population (Franks *et al.* 2017<sup>23</sup>). Local future trends in numbers will be dependent primarily on habitat change. Further afforestation could reduce open-ground species, such as the breeding waders, but temporarily improve conditions for black grouse and hen harriers. The main current land use within the site (sheep grazing) would likely continue into the future. Changes are also likely to occur as a result of climate change, though would be anticipated to be minor over the lifetime of the Proposed Development.

## Ornithological Conservation Evaluation

### Conservation Evaluation of Breeding Bird Populations

7.5.15. The conservation value of the breeding bird populations was determined using the criteria specified in Table 7.2. The results are summarised in Table 7.11. All species with very high – low value have been taken forward in the ornithological assessment (i.e. only those with negligible value have been scoped out at this stage).

<sup>23</sup> Franks, S. E., Douglas, D. J. T., Gillings, S. and Pearce-Higgins, J. W. 2017. Environmental correlates of breeding abundance and population change of Eurasian Curlew *Numenius arquata* in Britain. *Bird Study*, 64: 393-409.



Table 7.11: Conservation Evaluation of the Breeding Bird Populations at the Site (2021 and 2022)

| Species                       | Number breeding pairs 2021 | Number breeding pairs 2022 | >1% NHZ | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value |
|-------------------------------|----------------------------|----------------------------|---------|--------------------|------------------------------------|------------------------|----------------|-----------------|--------------------|
| <i>Breeding Species:</i>      |                            |                            |         |                    |                                    |                        |                |                 |                    |
| Mute Swan                     | 3                          | 2                          |         |                    |                                    |                        |                |                 | Negligible         |
| Greylag Goose <sup>2</sup>    | 0                          | 1                          |         |                    |                                    | A                      |                |                 | Low                |
| Canada Goose                  | 4                          | 2                          |         |                    |                                    |                        |                |                 | Negligible         |
| Teal <sup>3</sup>             | 0                          | 3                          |         |                    |                                    | A                      |                |                 | Low                |
| Mallard                       | 9                          | 6                          |         |                    |                                    | A                      |                |                 | Low                |
| Tufted Duck                   | 7                          | 5                          |         |                    |                                    |                        |                |                 | Negligible         |
| Red-legged Partridge          | 1                          | 3                          |         |                    |                                    |                        |                |                 | Negligible         |
| Pheasant                      | 65                         | 50                         |         |                    |                                    |                        |                |                 | Negligible         |
| Little Grebe <sup>3</sup>     | 2                          | 2                          |         |                    |                                    |                        |                |                 | Negligible         |
| Red Kite                      | 1                          | 1                          | ✓       | ✓                  | ✓                                  |                        |                | ✓               | High               |
| Goshawk                       | 0                          | 1                          | ✓       |                    | ✓                                  |                        |                |                 | High               |
| Sparrowhawk                   | 0                          | 3                          |         |                    |                                    | A                      |                |                 | Low                |
| Buzzard <sup>2</sup>          | 10                         | 10                         |         |                    |                                    |                        |                |                 | Negligible         |
| Kestrel                       | 1                          | 0                          |         |                    |                                    | A                      |                | ✓               | Low                |
| Moorhen                       | 4                          | 4                          |         |                    |                                    | A                      |                |                 | Low                |
| Coot                          | 2                          | 1                          |         |                    |                                    |                        |                |                 | Negligible         |
| Oystercatcher <sup>2</sup>    | 2                          | 0                          |         |                    |                                    | A                      |                |                 | Low                |
| Lapwing                       | 5                          | 7                          |         |                    |                                    | R                      | ✓              | ✓               | Medium             |
| Snipe <sup>2</sup>            | 9                          | 12                         |         |                    |                                    | A                      |                |                 | Low                |
| Curlew <sup>2</sup>           | 5                          | 5                          |         |                    |                                    | R                      | ✓              | ✓               | Medium             |
| Common Sandpiper <sup>2</sup> | 1                          | 0                          |         |                    |                                    | A                      |                |                 | Low                |
| Feral Pigeon                  | 1                          | 2                          |         |                    |                                    |                        |                |                 | Negligible         |
| Stock Dove                    | 5                          | 1                          |         |                    |                                    | A                      |                |                 | Low                |
| Woodpigeon                    | 70                         | 55                         |         |                    |                                    | A                      |                |                 | Low                |
| Collared Dove                 | 1                          | 1                          |         |                    |                                    |                        |                |                 | Negligible         |
| Cuckoo <sup>2,5</sup>         | 2                          | 7                          |         |                    |                                    | R                      | ✓              | ✓               | Medium             |
| Barn Owl                      | 0                          | 1                          |         |                    | ✓                                  |                        |                | ✓               | High               |



| Species                   | Number breeding pairs 2021 | Number breeding pairs 2022 | >1% NHZ | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/ Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value |
|---------------------------|----------------------------|----------------------------|---------|--------------------|------------------------------------|-------------------------|----------------|-----------------|--------------------|
| Great Spotted Woodpecker  | 5                          | 3                          |         |                    |                                    |                         |                |                 | Negligible         |
| Skylark                   | 124                        | 161                        |         |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Sand Martin               | 3                          | 0                          |         |                    |                                    |                         |                |                 | Negligible         |
| Swallow                   | 34                         | 13                         |         |                    |                                    |                         |                |                 | Negligible         |
| House Martin              | 8                          | 0                          |         |                    |                                    | R                       |                |                 | Low                |
| Tree Pipit                | 3                          | 0                          |         |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Meadow Pipit              | 327                        | 340                        |         |                    |                                    | A                       |                |                 | Low                |
| Grey Wagtail <sup>2</sup> | 4                          | 1                          |         |                    |                                    | A                       |                |                 | Low                |
| Pied Wagtail              | 25                         | 24                         |         |                    |                                    |                         |                |                 | Negligible         |
| Dipper <sup>2,5</sup>     | 2                          | 0                          |         |                    |                                    | A                       |                |                 | Low                |
| Wren                      | 68                         | 69                         |         |                    |                                    | A                       |                |                 | Low                |
| Dunnock                   | 12                         | 8                          |         |                    |                                    | A                       | ✓              |                 | Medium             |
| Robin                     | 55                         | 40                         |         |                    |                                    |                         |                |                 | Negligible         |
| Redstart                  | 7                          | 6                          |         |                    |                                    |                         |                |                 | Negligible         |
| Whinchat <sup>2</sup>     | 1                          | 0                          |         |                    |                                    | R                       |                |                 | Low                |
| Stonechat <sup>2</sup>    | 11                         | 8                          |         |                    |                                    |                         |                |                 | Negligible         |
| Wheatear <sup>1</sup>     | 13                         | 12                         |         |                    |                                    | A                       |                |                 | Low                |
| Blackbird                 | 52                         | 29                         |         |                    |                                    |                         |                |                 | Negligible         |
| Song Thrush               | 41                         | 23                         |         |                    |                                    | A                       | ✓              | ✓               | Medium             |
| Mistle Thrush             | 16                         | 4                          |         |                    |                                    | R                       |                |                 | Low                |
| Sedge Warbler             | 7                          | 3                          |         |                    |                                    | A                       |                |                 | Low                |
| Blackcap                  | 5                          | 3                          |         |                    |                                    |                         |                |                 | Negligible         |
| Whitethroat               | 3                          | 2                          |         |                    |                                    |                         |                |                 | Negligible         |
| Chiffchaff                | 4                          | 4                          |         |                    |                                    |                         |                |                 | Negligible         |
| Willow Warbler            | 64                         | 37                         |         |                    |                                    | A                       |                |                 | Low                |
| Goldcrest                 | 24                         | 17                         |         |                    |                                    |                         |                |                 | Negligible         |
| Spotted Flycatcher        | 2                          | 2                          |         |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Long-tailed Tit           | 2                          | 0                          |         |                    |                                    |                         |                |                 | Negligible         |
| Blue Tit                  | 26                         | 15                         |         |                    |                                    |                         |                |                 | Negligible         |
| Great Tit                 | 24                         | 12                         |         |                    |                                    |                         |                |                 | Negligible         |
| Coal Tit                  | 32                         | 17                         |         |                    |                                    |                         |                |                 | Negligible         |



| Species                                 | Number breeding pairs 2021 | Number breeding pairs 2022 | >1% NHZ | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/ Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value |
|-----------------------------------------|----------------------------|----------------------------|---------|--------------------|------------------------------------|-------------------------|----------------|-----------------|--------------------|
| Nuthatch                                | 1                          | 1                          |         |                    |                                    |                         |                |                 | Negligible         |
| Treecreeper                             | 4                          | 7                          |         |                    |                                    |                         |                |                 | Negligible         |
| Jay                                     | 4                          | 4                          |         |                    |                                    |                         |                |                 | Negligible         |
| Magpie                                  | 1                          | 1                          |         |                    |                                    |                         |                |                 | Negligible         |
| Jackdaw                                 | 24                         | 13                         |         |                    |                                    |                         |                |                 | Negligible         |
| Carrion Crow                            | 40                         | 40                         |         |                    |                                    |                         |                |                 | Negligible         |
| Raven <sup>3</sup>                      | 6                          | 2                          |         |                    |                                    |                         |                |                 | Negligible         |
| Starling                                | 11                         | 5                          |         |                    |                                    | R                       | ✓              |                 | Medium             |
| House Sparrow                           | 7                          | 8                          |         |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Chaffinch                               | 145                        | 126                        |         |                    |                                    |                         |                |                 | Negligible         |
| Goldfinch                               | 34                         | 15                         |         |                    |                                    |                         |                |                 | Negligible         |
| Siskin                                  | 34                         | 21                         |         |                    |                                    |                         |                | ✓               | Low                |
| Linnet                                  | 12                         | 10                         |         |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Lesser Redpoll                          | 16                         | 11                         |         |                    |                                    |                         | ✓              | ✓               | Medium             |
| Common Crossbill                        | 4                          | 0                          |         |                    | ✓                                  |                         |                |                 | High               |
| Bullfinch                               | 2                          | 2                          |         |                    |                                    | A                       | ✓              | ✓               | Medium             |
| Reed Bunting                            | 28                         | 28                         |         |                    |                                    |                         |                |                 | Negligible         |
| <i>Additional non-breeding species:</i> |                            |                            |         |                    |                                    |                         |                |                 |                    |
| Whooper Swan                            | 0                          | 10                         |         | ✓                  |                                    | A                       |                | ✓               | High               |
| Pink-footed Goose                       | 0                          | 190                        |         |                    |                                    | A                       |                |                 | Very high          |
| Goosander                               | 0                          | 1                          |         |                    |                                    |                         |                |                 | Nil                |
| Cormorant                               | 0                          | 1                          |         |                    |                                    |                         |                |                 | Nil                |
| Grey Heron                              | 1                          | 1                          |         |                    |                                    |                         |                |                 | Nil                |
| Osprey                                  | 1                          | 1                          |         | ✓                  | ✓                                  | A                       |                | ✓               | High               |
| Merlin                                  | 1                          | 1                          |         | ✓                  | ✓                                  | R                       |                | ✓               | High               |
| Peregrine                               | 1                          | 1                          |         | ✓                  | ✓                                  |                         |                | ✓               | High               |
| Golden Plover                           | 0                          | 140                        |         | ✓                  |                                    |                         |                | ✓               | High               |
| Green Sandpiper                         | 1                          | 0                          |         |                    |                                    | A                       |                | ✓               | Low                |
| Common Gull                             | 0                          | 32                         |         |                    |                                    | A                       |                |                 | Low                |



| Species                  | Number breeding pairs 2021 | Number breeding pairs 2022 | >1% NHZ | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/ Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value |
|--------------------------|----------------------------|----------------------------|---------|--------------------|------------------------------------|-------------------------|----------------|-----------------|--------------------|
| Lesser Black-backed Gull | 48                         | 20                         |         |                    |                                    | A                       |                |                 | Low                |
| Herring Gull             | 25                         | 25                         |         |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Great Black-backed Gull  | 1                          | 2                          |         |                    |                                    | A                       |                |                 | Low                |
| Black-headed Gull        | 0                          | 4                          |         |                    |                                    | A                       |                |                 | Low                |
| Kittiwake                | 0                          | 1                          |         |                    |                                    | R                       |                |                 | Low                |
| Swift                    | 38                         | 26                         |         |                    |                                    | A                       |                | ✓               | Low                |
| Fieldfare                | 343                        | 10                         |         |                    |                                    | R                       |                |                 | Low                |
| Redwing                  | 1                          | 0                          |         |                    |                                    | R                       |                | ✓               | Low                |
| Rook                     | 154                        | 296                        |         |                    |                                    | A                       |                |                 | Low                |

7.5.16. Four high-value species were recorded breeding within the breeding bird survey area during 2021 and 2022: red kite, goshawk, barn owl and common crossbill. Merlin and barn owl are EU Birds Directive Annex 1 species. Merlin and common crossbill are protected under Schedule 1 of the Wildlife and Countryside Act.

7.5.17. Fourteen breeding species were classed as medium conservation value: lapwing, curlew, cuckoo, skylark, tree pipit, dunnoek, song thrush, spotted flycatcher, starling, house sparrow, linnet, lesser redpoll, bullfinch and reed bunting. All were classed as medium value because of their listing on the UK Biodiversity Action Plan list of priority species and/or were present in regionally important numbers (>1% NHZ). They are mostly farmland species that have declined widely across Britain but are still common and widespread.

7.5.18. A further 22 breeding species were classed as low sensitivity, through their listing on RSPB *et al.*'s (Stanbury *et al.* 2021) amber lists of Birds of Conservation Concern and/or the Scottish Biodiversity List.

7.5.19. The overall conservation value of the breeding bird community in 2021 and 2022, measured from the core survey data as the breeding bird assemblage score, was 33. This is below the threshold for national importance (40) but above the threshold for regional importance (20) for the main habitat within the survey area, 'Upland moorland and grassland with water bodies' (Drewitt *et al.*



2020<sup>24</sup>). The core survey area, therefore, supports a regionally important breeding bird community.

- 7.5.20. Other non-breeding species recorded during the surveys (Table 7.10) included one very high value species (pink-footed goose, a qualifying feature of the Castle Loch, Lochmaben SPA), five high value species (whooper swan, osprey, merlin, peregrine and golden plover, all EU Annex 1/Wildlife and Countryside Act Schedule 1 species), one medium value (herring gull, a UK BAP priority species), and ten additional low value species (through their red/amber listing). All these species were seen only infrequently in generally low numbers during the breeding bird surveys.

### Conservation Evaluation of Wintering Bird Populations

- 7.5.21. The conservation value of the wintering bird populations was determined using the criteria specified in Table 7.2. The results are summarised in Table 7.12. All species with very high – low value have been taken forward in the ornithological assessment (i.e. only those with negligible value have been scoped out at this stage).
- 7.5.22. This included one very high sensitivity species (pink-footed goose – the birds seen could be ecologically linked to the Castle Loch SPA), 15 high-sensitivity species (whooper swan, goldeneye, osprey, red kite, golden eagle, marsh harrier, hen harrier, goshawk, peregrine, merlin, hobby, golden plover, green sandpiper, short-eared owl and common crossbill) that are EU Birds Directive Annex 1/Wildlife and Countryside Act Schedule 1 species, three medium sensitivity species (UK BAP priority/red-listed species of conservation concern: lapwing, curlew and herring gull), and 12 low sensitivity species.

**Table 7.12: Conservation Evaluation of the Wintering Bird Populations at the Site (September 2021 – March 2022, November 2022 – March 2023 and September – October 2023)**

| Species           | Peak count (core) | Peak count (wide r) | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/ Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value |
|-------------------|-------------------|---------------------|--------------------|------------------------------------|-------------------------|----------------|-----------------|--------------------|
| Mute Swan         | 11                | 7                   |                    |                                    |                         |                |                 | Negligible         |
| Whooper Swan      | 6                 | 8                   | ✓                  | ✓                                  | A                       |                | ✓               | High               |
| Pink-footed Goose | 96                | 91                  |                    |                                    | A                       |                |                 | Very high (SPA)    |

<sup>24</sup> Drewitt, A. L., S. Whitehead, and S. Cohen. 2020. Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17: Birds (Version 1.1). Joint Nature Conservation Committee, Peterborough.



| Species       | Peak count (core) | Peak count (wide r) | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/ Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value  |
|---------------|-------------------|---------------------|--------------------|------------------------------------|-------------------------|----------------|-----------------|---------------------|
|               |                   |                     |                    |                                    |                         |                |                 | qualifying species) |
| Greylag Goose | 1                 | 4                   |                    |                                    | A                       |                |                 | Low                 |
| Canada Goose  | 4                 | 6                   |                    |                                    |                         |                |                 | Negligible          |
| Wigeon        | 21                | 2                   |                    |                                    | A                       |                |                 | Low                 |
| Teal          | 60                | 170                 |                    |                                    | A                       |                |                 | Medium              |
| Mallard       | 75                | 62                  |                    |                                    | A                       |                |                 | Low                 |
| Tufted Duck   | 9                 | 5                   |                    |                                    |                         |                |                 | Negligible          |
| Goldeneye     | 1                 | 2                   |                    | ✓                                  | R                       |                |                 | High                |
| Goosander     | 2                 | 4                   |                    |                                    |                         |                |                 | Negligible          |
| Red Grouse    | 0                 | 1                   |                    |                                    |                         | ✓              |                 | Medium              |
| Little Grebe  | 5                 | 4                   |                    |                                    |                         |                |                 | High                |
| Cormorant     | 2                 | 0                   |                    |                                    |                         |                |                 | Negligible          |
| Grey Heron    | 2                 | 1                   |                    |                                    |                         |                |                 | Negligible          |
| Red Kite      | 13                | 23                  | ✓                  | ✓                                  |                         |                | ✓               | High                |
| Marsh Harrier | 1                 | 0                   | ✓                  | ✓                                  | A                       |                | ✓               | High                |
| Hen Harrier   | 1                 | 1                   | ✓                  | ✓                                  | R                       |                | ✓               | High                |
| Goshawk       | 1                 | 1                   |                    | ✓                                  |                         |                |                 | High                |
| Sparrowhawk   | 1                 | 1                   |                    |                                    | A                       |                |                 | Low                 |
| Buzzard       | 16                | 25                  |                    |                                    |                         |                |                 | Negligible          |
| Golden Eagle  | 1                 | 0                   | ✓                  | ✓                                  |                         |                | ✓               | High                |
| Osprey        | 1                 | 0                   | ✓                  | ✓                                  | A                       |                | ✓               | High                |
| Kestrel       | 5                 | 3                   |                    |                                    | A                       |                | ✓               | Low                 |
| Hobby         | 1                 | 0                   |                    | ✓                                  |                         |                | ✓               | High                |
| Merlin        | 1                 | 1                   | ✓                  | ✓                                  | R                       |                | ✓               | High                |
| Peregrine     | 2                 | 1                   | ✓                  | ✓                                  |                         |                | ✓               | High                |
| Moorhen       | 0                 | 4                   |                    |                                    | A                       |                |                 | Low                 |
| Oystercatcher | 2                 | 2                   |                    |                                    | A                       |                |                 | Low                 |
| Golden Plover | 20                | 13                  | ✓                  |                                    |                         |                | ✓               | High                |
| Lapwing       | 13                | 74                  |                    |                                    | R                       | ✓              | ✓               | Medium              |
| Jack Snipe    | 1                 | 0                   |                    |                                    |                         |                |                 | Negligible          |
| Snipe         | 14                | 4                   |                    |                                    | A                       |                |                 | Low                 |
| Woodcock      | 1                 | 1                   |                    |                                    | R                       |                | ✓               | Low                 |



| Species                  | Peak count (core) | Peak count (wide r) | EU Birds Dir Ann 1 | Wildlife and Countryside Act Sch 1 | Red [R]/ Amber [A] List | UK priority sp | Scottish BAP sp | Conservation Value |
|--------------------------|-------------------|---------------------|--------------------|------------------------------------|-------------------------|----------------|-----------------|--------------------|
| Curlew                   | 1                 | 1                   |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Green Sandpiper          | 2                 | 0                   |                    | ✓                                  | A                       |                | ✓               | High               |
| Redshank                 | 1                 | 0                   |                    |                                    | A                       |                |                 | Low                |
| Common Gull              | 0                 | 15                  |                    |                                    | A                       |                |                 | Low                |
| Lesser Black-backed Gull | 47                | 0                   |                    |                                    | A                       |                |                 | Low                |
| Herring Gull             | 6                 | 1                   |                    |                                    | R                       | ✓              | ✓               | Medium             |
| Great Black-backed Gull  | 2                 | 1                   |                    |                                    | A                       |                |                 | Low                |
| Barn Owl                 | 0                 | 2                   |                    | ✓                                  |                         |                | ✓               | High               |
| Short-eared Owl          | 2                 | 2                   | ✓                  |                                    | A                       |                | ✓               | High               |
| Raven                    | 1                 | 4                   |                    |                                    |                         |                |                 | Negligible         |
| Common Crossbill         | 6                 | 11                  |                    | ✓                                  |                         |                |                 | High               |

#### 7.5.23. Key autumn/wintering bird populations recorded included:

- Over-flying Pink-footed Geese – apart from a brief period of higher activity in October 2021, the only records were small numbers of migrant flocks over-flying the survey area. There were no records of any feeding flocks within the survey area and no evidence of any clear link to Castle Loch SPA, so it is not an important goose feeding area.
- Teal – regionally important numbers were recorded only in winter 2022-23 and focused on the fringe of the site.
- Other wintering wildfowl – the core walkover survey area was used by a range of other wintering waterfowl species but only in low (locally important) numbers. This included whooper swan, wigeon, mallard and goldeneye.
- Red Kite – this species was observed regularly hunting and overflying the site. The site is important for this species during winter and autumn.
- Golden Eagle – only five flights were observed, all the same juvenile bird between 10-16 December 2021. Given the habitat present and the fact, it did not stay in the area, this suggests this area is not important for this species.



- Hen Harrier – this species was regularly observed hunting over the site through the winter. There was no evidence of any night roosts in the survey area in either winter, and most flights were below rotor height.
- Goshawk – this species was observed regularly during the winter VP surveys, mainly over the forestry rather than the site's open ground.
- Other scarce raptors – osprey, marsh harrier, peregrine, merlin, hobby, barn owl and short-eared owl were all recorded during the winter surveys, but only infrequently in low numbers. There was no indication that the survey area was important to any of these species at this time of the year.

## 7.6. Assessment of Potential Effects

7.6.1. The key issues for the assessment of potential ornithological effects relating to the Proposed Development are identified below (SNH 2018a):

- direct loss of bird habitat through construction of the new access track;
- disturbance of birds during construction and operation; and
- collision risk to birds during operation.

7.6.2. No ornithological issues were scoped out from this assessment, though, following SNH (2018a) guidance, the assessment has focussed on the key species likely to be affected by the Proposed Development. Key species were defined using the following criteria:

- species listed on Annex 1 of the EU Birds Directive;
- species listed on Schedule 1 of the 1981 Wildlife & Countryside Act; and
- species identified by SNH 2018a as 'Priority bird species for assessment when considering the development of onshore wind farms in Scotland'. These include:
  - species that are widespread across Scotland which utilise habitats or have flight behaviours that may be adversely affected by a wind farm;
  - 'restricted range' species; and
  - red-listed species on the Birds of Conservation Concern list.

7.6.3. The assessment also considers and applies the tests given in NS's guidance on the assessment of effects of wind farms in the wider countryside (SNH 2018a). This guidance lists a range of priority 'species potentially at risk of impact', of which the following were recorded during the baseline surveys: whooper swan, pink-footed goose, greylag goose, hen harrier, goshawk, red kite, osprey, golden eagle, merlin, peregrine, golden plover, lapwing, curlew, herring gull and short-eared owl. The potential effects of the Proposed Development on each of these have been specifically considered and assessed below.



## NatureScot Key Species Potentially at Risk

7.6.4. NS (SNH 2018a) has identified a range of key species as being at potential risk of impact from wind farms. These species form the key focus of the ornithological impact assessment in the following section. In total, five such species potentially at risk of impact were found breeding within the potential disturbance zone around the site (see Figure 7.3), these include:

- greylag goose (1 pair);
- red kite (1 pair);
- goshawk (1 pair);
- lapwing (3 pairs); and
- curlew (3 pairs).

7.6.5. Key species recorded using the potential disturbance zone outside the breeding season included red kite, hen harrier, goshawk, golden eagle, golden plover, lapwing, curlew, peregrine and merlin.

7.6.6. Key species recorded at risk of collision (i.e. flying through the site at rotor height) included whooper swan, pink-footed goose, greylag goose, osprey, red kite, goshawk, curlew, golden plover, lapwing, peregrine and short-eared owl.

## Construction Effects

### Direct Effects: Loss of Habitat (Direct loss or degradation of habitat through construction of the Proposed Development)

#### Nature of Impact

7.6.7. There will be a direct loss of habitat resulting from the construction of the Proposed Development. Table 8.16 sets out the losses of each habitat that would occur as a result of the Proposed Development.

7.6.8. The permanent land take would be limited to the wind turbine foundations, access tracks, permanent crane hardstands, substation and BESS compounds which account collectively for about 2.1% of the total area within the site. Additional temporary land take during construction would add further temporary habitat loss of about another 1.6% of the site area.

7.6.9. The use of existing tracks and the careful selection of routes for the access tracks and wind turbine locations, alongside use of proven construction techniques would ensure that such effects on birds would be of low/negligible magnitude (even in a local context). In addition, the applicant has committed to the production and implementation of a Construction Environmental Management Plan (CEMP) to the satisfaction of NS and other relevant stakeholders, before construction commences, and would follow Windfarm Good Construction Guidance by Scottish Renewables *et al.* (2019).



## Ornithological Receptor Value

- 7.6.10. Direct habitat loss will reduce habitat availability to the species breeding and foraging on the site, including red kite, goshawk and barn owl (high value), lapwing and curlew (both medium value) and greylag goose (low value).
- 7.6.11. Direct habitat loss will also reduce habitat availability for the other species foraging on the site, including five high value species (golden eagle, hen harrier, merlin, peregrine and short-eared owl).

## Magnitude of Impact

- 7.6.12. Direct habitat loss to breeding and non-breeding birds will be negligible in the context of the availability of the habitats that will be affected (predominantly open moorland), and in the context of the sizes of these birds' home ranges.

## Significance of Effects

- 7.6.13. The very small loss of breeding and foraging habitat of negligible magnitude on high/medium value receptors results in an effect of negligible significance (as per Table 7.4) for all bird species affected and would not be significant.

## Indirect Effects: Construction Disturbance (Noise and Visual)

- 7.6.14. Experience from existing UK wind farms has shown that many species are tolerant of the presence of operational wind turbines and not unduly disturbed by them. Some short-term displacement during wind farm operation of species such as curlew may occur following construction, but populations have subsequently re-established themselves<sup>25</sup>. Most species that have been studied have not been significantly affected<sup>26,27,28,29 and 30</sup> and an RSPB study (Pearce-Higgins *et al.* 2012<sup>31</sup>) reported partial displacement of breeding upland

<sup>25</sup> Bullen Consultants. 2002. Ovenden Moor Ornithological Monitoring - breeding bird survey 2002. Report to Powergen Renewables Ltd.

<sup>26</sup> Phillips, J. F. 1994. The effects of a windfarm on the Upland breeding bird communities of Bryn Titli, Mid-Wales: 1993-94. RSPB Report to National Windpower.

<sup>27</sup> Thomas, R. 1999. Renewable Energy and Environmental Impacts in the UK; Birds and Wind Turbines. In Thesis submitted for Master of Research degree in Environmental Science, University College London., MSc: University College London.

<sup>28</sup> Gill, J.P. 2004. Changes in Populations of Wading Birds Breeding at Dun Law Wind Farm 1999-2003. Report to Scottish Power plc, Renewable Energy Systems Ltd. & CRE Energy Ltd.

<sup>29</sup> Devereux, C. L., Denny, M. J. H. and Whittingham, M. J. 2008. Minimal effects of wind turbines on the distribution of wintering farmland birds. *Journal of Applied Ecology*, 45: 1689-1694pp.

<sup>30</sup> Percival, S. M. and Percival, T. 2011. Knab's Ridge Wind Farm: Post-construction breeding bird surveys 2010. Report to RWE Npower Renewables Ltd.

<sup>31</sup> Pearce-Higgins, J. W., Stephen, L., Douse, A. and Langston, R. H. W. 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: 386-394



birds around wind turbines for a distance up to 800 m and reported significant reductions in golden plover density up to 400 m from wind turbines, though another study on the same species found no significant operational disturbance to this species (Douglas *et al.* 2011<sup>32</sup>). The scale and pattern of displacement is similar to that reported for breeding waders in general<sup>33</sup>, with most studies reporting only small scale (0-200 m) displacement distances and a smaller number over a greater distance. It was assumed for the purposes of the assessment that all birds occurring within 500 m of wind turbines and other site infrastructure were at risk of disturbance.

- 7.6.15. The indirect effect of disturbance is likely to be highest during construction owing to the increased activity on site. Pearce-Higgins *et al.* (2012) found that red grouse, snipe and curlew densities all declined at wind farm sites during construction, whilst densities of skylark and stonechat increased. Construction also involves the presence of work personnel on site which itself can be an important source of potential disturbance. Pearce-Higgins *et al.*, for example, reported decreases in curlew density during construction of 40% and snipe by 53%. Other species, such as golden plover<sup>34</sup>, though have been shown to be unaffected by construction disturbance. The assessment of construction disturbance has assumed that all birds within 500 m of the Proposed Development could potentially be at risk of displacement<sup>35,36</sup>. It should be noted that only partial displacement within this zone might be expected<sup>37</sup>, but it is assumed for the purposes of this assessment that all birds occurring within the zone are at risk of disturbance. For SNH 2018a priority species consideration has also been given to the disturbance distances given in Goodship and Furness (2022)<sup>38</sup>.

### Nature of the Impact

- 7.6.16. The estimated on-site construction period for the Proposed Development is expected to last approximately 12 months. The construction works will take

<sup>32</sup> Douglas, D. J. T., Bellamy, P. E. and Pearce Higgins, J. W. 2011. Changes in the abundance and distribution of upland breeding birds at an operational wind farm. *Bird Study*, 58: 37-43pp.

<sup>33</sup> Hotker, H., Thomsen, K. M. and Jeromin, H. 2006. Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats - facts, gaps in knowledge, demands for further research, and ornithological guidelines for the development of renewable energy exploitation. Michael-Otto-Institut im NABU, Bergenhusen: 65pp.

<sup>34</sup> Sansom, A., Pearce-Higgins, J. W. and Douglas, D. J. T. 2016. Negative impact of wind energy development on a breeding shorebird assessed with a BACI study design. *Ibis*, 158: 541-555,

<sup>35</sup> Percival, S. M. 2005. Birds and wind farms: what are the real issues? *British Birds*, 98: 194-204.

<sup>36</sup> Drewitt, A. L. and Langston, R. H. W. 2006. Assessing the impacts of wind farms on birds. *Ibis*, 148: 29-42

<sup>37</sup> Pearce-Higgins, J. W., Stephen, L., Langston, R. H. W., Bainbridge, I. P. and Bullman, R. 2009. The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology*.

<sup>38</sup> Goodship, N.M. and Furness, R.W. 2022. Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.



place throughout the year, including the summer months when the weather is more favourable and ground conditions are drier.

- 7.6.17. Noise and visual disturbance associated with construction activities could potentially affect breeding and foraging birds in the locality of the wind turbine positions, access tracks and other infrastructure components. Birds that are disturbed at breeding sites are vulnerable to a variety of potential effects that could lead to a reduction in the productivity or survival of their populations. These include the chilling or predation of exposed eggs and chicks and damage of eggs and chicks due to panicked adults. Birds subject to disturbance outside the breeding season may also feed less efficiently or resort to less favoured roosting areas, either of which may reduce their survival prospects. The potential impact will vary between species according to each species' tolerance of disturbance from human activity and the availability of suitable alternative breeding and foraging habitat.

### Ornithological Receptor Value

- 7.6.18. Table 7.13 shows the peak breeding bird populations of conservation importance that were found within 500 m of the proposed wind turbine locations and with the other associated infrastructure (including access tracks) during the baseline surveys, where this distance has been used to identify the potential disturbance zone (though also giving consideration to particularly sensitive species in a wider area around that).

**Table 7.13. Conservation Importance of Breeding Birds in the Wind Farm Potential Disturbance Zone**

| Species              | Peak breeding pairs <500 m from wind turbines | Peak breeding pairs <500 m from all infrastructure | Scale of Importance of Breeding Population Within Potential Disturbance Zone | Conservation Value Within Potential Disturbance Zone |
|----------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| Mute Swan            | 2                                             | 3                                                  |                                                                              | Negligible                                           |
| <b>Greylag Goose</b> | <b>1</b>                                      | <b>1</b>                                           |                                                                              | <b>Low</b>                                           |
| Canada Goose         | 3                                             | 4                                                  |                                                                              | Negligible                                           |
| Teal                 | 3                                             | 3                                                  |                                                                              | Low                                                  |
| Mallard              | 4                                             | 7                                                  |                                                                              | Low                                                  |
| Tufted Duck          | 5                                             | 7                                                  |                                                                              | Negligible                                           |
| Red-legged Partridge | 0                                             | 1                                                  |                                                                              | Negligible                                           |
| Pheasant             | 11                                            | 19                                                 |                                                                              | Negligible                                           |
| Little Grebe         | 2                                             | 2                                                  |                                                                              | Negligible                                           |
| Goshawk              | 1                                             | 1                                                  | Regional                                                                     | High                                                 |



| Species                  | Peak breeding pairs <500 m from wind turbines | Peak breeding pairs <500 m from all infrastructure | Scale of Importance of Breeding Population Within Potential Disturbance Zone | Conservation Value Within Potential Disturbance Zone |
|--------------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| Sparrowhawk              | 1                                             | 1                                                  |                                                                              | Low                                                  |
| Buzzard                  | 3                                             | 4                                                  |                                                                              | Negligible                                           |
| Moorhen                  | 4                                             | 4                                                  |                                                                              | Low                                                  |
| Coot                     | 2                                             | 2                                                  |                                                                              | Negligible                                           |
| <b>Lapwing</b>           | <b>3</b>                                      | <b>3</b>                                           |                                                                              | <b>Medium</b>                                        |
| Snipe                    | 9                                             | 9                                                  | Regional                                                                     | Medium                                               |
| <b>Curlew</b>            | <b>3</b>                                      | <b>3</b>                                           |                                                                              | <b>Medium</b>                                        |
| Common Sandpiper         | 0                                             | 1                                                  |                                                                              | Low                                                  |
| Woodpigeon               | 12                                            | 22                                                 |                                                                              | Low                                                  |
| Collared Dove            | 0                                             | 1                                                  |                                                                              | Negligible                                           |
| Cuckoo                   | 3                                             | 5                                                  |                                                                              | Medium                                               |
| Great Spotted Woodpecker | 1                                             | 1                                                  |                                                                              | Negligible                                           |
| Skylark                  | 107                                           | 125                                                |                                                                              | Medium                                               |
| Sand Martin              | 1                                             | 1                                                  |                                                                              | Negligible                                           |
| Swallow                  | 1                                             | 11                                                 |                                                                              | Negligible                                           |
| Tree Pipit               | 0                                             | 2                                                  |                                                                              | Medium                                               |
| Meadow Pipit             | 194                                           | 244                                                |                                                                              | Low                                                  |
| Pied Wagtail             | 3                                             | 8                                                  |                                                                              | Negligible                                           |
| Wren                     | 11                                            | 26                                                 |                                                                              | Low                                                  |
| Duncock                  | 0                                             | 3                                                  |                                                                              | Medium                                               |
| Robin                    | 8                                             | 16                                                 |                                                                              | Negligible                                           |
| Redstart                 | 0                                             | 1                                                  |                                                                              | Negligible                                           |
| Stonechat                | 3                                             | 6                                                  |                                                                              | Negligible                                           |
| Wheatear                 | 5                                             | 10                                                 |                                                                              | Low                                                  |
| Blackbird                | 7                                             | 20                                                 |                                                                              | Negligible                                           |
| Song Thrush              | 8                                             | 17                                                 |                                                                              | Medium                                               |
| Mistle Thrush            | 2                                             | 5                                                  |                                                                              | Low                                                  |
| Sedge Warbler            | 2                                             | 4                                                  |                                                                              | Low                                                  |
| Willow Warbler           | 10                                            | 25                                                 |                                                                              | Low                                                  |
| Goldcrest                | 5                                             | 9                                                  |                                                                              | Negligible                                           |
| Spotted Flycatcher       | 0                                             | 1                                                  |                                                                              | Medium                                               |



| Species          | Peak breeding pairs <500 m from wind turbines | Peak breeding pairs <500 m from all infrastructure | Scale of Importance of Breeding Population Within Potential Disturbance Zone | Conservation Value Within Potential Disturbance Zone |
|------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| Long-tailed Tit  | 0                                             | 1                                                  |                                                                              | Negligible                                           |
| Blue Tit         | 1                                             | 5                                                  |                                                                              | Negligible                                           |
| Great Tit        | 1                                             | 6                                                  |                                                                              | Negligible                                           |
| Coal Tit         | 5                                             | 11                                                 |                                                                              | Negligible                                           |
| Treecreeper      | 0                                             | 2                                                  |                                                                              | Negligible                                           |
| Jay              | 1                                             | 1                                                  |                                                                              | Negligible                                           |
| Jackdaw          | 0                                             | 2                                                  |                                                                              | Negligible                                           |
| Carrion Crow     | 9                                             | 16                                                 |                                                                              | Negligible                                           |
| Raven            | 1                                             | 3                                                  |                                                                              | Negligible                                           |
| Starling         | 0                                             | 3                                                  |                                                                              | Medium                                               |
| House Sparrow    | 0                                             | 3                                                  |                                                                              | Medium                                               |
| Chaffinch        | 25                                            | 56                                                 |                                                                              | Negligible                                           |
| Goldfinch        | 4                                             | 13                                                 |                                                                              | Negligible                                           |
| Siskin           | 4                                             | 14                                                 |                                                                              | Low                                                  |
| Linnet           | 1                                             | 3                                                  |                                                                              | Medium                                               |
| Lesser Redpoll   | 5                                             | 8                                                  |                                                                              | Medium                                               |
| Common Crossbill | 0                                             | 1                                                  |                                                                              | High                                                 |
| Bullfinch        | 0                                             | 1                                                  |                                                                              | Medium                                               |
| Reed Bunting     | 13                                            | 18                                                 |                                                                              | Medium                                               |

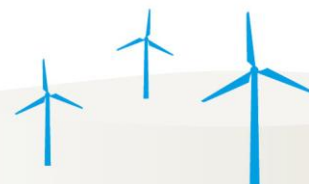
Note: Bold indicates species identified as 'Priority bird species for assessment when considering the development of onshore wind farms in Scotland' in SNH (2018a) guidance.

7.6.19. Table 7.14 shows the peak wintering bird populations of conservation importance that were found within 500 m of the proposed wind turbine locations and other associated infrastructure (including access tracks) during the baseline surveys, where this distance has been used to identify the potential disturbance zone (though also giving consideration to particularly sensitive species in a wider area around that).



**Table 7.14. Conservation Importance of Wintering Birds in the Wind Farm Potential Disturbance Zone**

| Species                  | Peak walkover count <500 m from wind turbines | Peak walkover count <500 m from all infrastructure | Scale of Importance of Breeding Population Within Potential Disturbance Zone | Conservation Value Within Potential Disturbance Zone |
|--------------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| Mute Swan                | 9                                             | 9                                                  |                                                                              | Negligible                                           |
| Whooper Swan             | 6                                             | 6                                                  |                                                                              | High                                                 |
| Pink-footed Goose        | 36                                            | 36                                                 |                                                                              | Low                                                  |
| Canada Goose             | 6                                             | 6                                                  |                                                                              | Negligible                                           |
| Wigeon                   | 21                                            | 21                                                 |                                                                              | Low                                                  |
| Teal                     | 170                                           | 170                                                | Regional                                                                     | Low                                                  |
| Mallard                  | 75                                            | 75                                                 |                                                                              | Low                                                  |
| Pintail                  | 4                                             | 4                                                  |                                                                              | High                                                 |
| Tufted Duck              | 5                                             | 9                                                  |                                                                              | Negligible                                           |
| Goosander                | 0                                             | 2                                                  |                                                                              | Negligible                                           |
| Little Grebe             | 4                                             | 5                                                  |                                                                              | Negligible                                           |
| Cormorant                | 0                                             | 2                                                  |                                                                              | Negligible                                           |
| Red Kite                 | 9                                             | 9                                                  | Regional                                                                     | High                                                 |
| Buzzard                  | 4                                             | 11                                                 |                                                                              | Negligible                                           |
| Kestrel                  | 2                                             | 2                                                  |                                                                              | Low                                                  |
| Moorhen                  | 4                                             | 4                                                  |                                                                              | Low                                                  |
| Lapwing                  | 13                                            | 13                                                 |                                                                              | Medium                                               |
| Snipe                    | 3                                             | 3                                                  |                                                                              | Low                                                  |
| Green Sandpiper          | 0                                             | 2                                                  |                                                                              | High                                                 |
| Lesser Black-backed Gull | 3                                             | 3                                                  |                                                                              | Low                                                  |
| Great Black-backed Gull  | 2                                             | 2                                                  |                                                                              | Low                                                  |
| Woodpigeon               | 160                                           | 160                                                |                                                                              | Low                                                  |
| Short-eared Owl          | 2                                             | 2                                                  | Regional                                                                     | High                                                 |
| Skylark                  | 19                                            | 19                                                 |                                                                              | Medium                                               |
| Meadow Pipit             | 4                                             | 17                                                 |                                                                              | Low                                                  |
| Wren                     | 3                                             | 3                                                  |                                                                              | Low                                                  |
| Stonechat                | 2                                             | 2                                                  |                                                                              | Negligible                                           |
| Fieldfare                | 200                                           | 200                                                |                                                                              | High                                                 |
| Song Thrush              | 12                                            | 12                                                 |                                                                              | Medium                                               |



| Species          | Peak walkover count <500 m from wind turbines | Peak walkover count <500 m from all infrastructure | Scale of Importance of Breeding Population Within Potential Disturbance Zone | Conservation Value Within Potential Disturbance Zone |
|------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| Redwing          | 2                                             | 9                                                  |                                                                              | High                                                 |
| Mistle Thrush    | 2                                             | 2                                                  |                                                                              | Low                                                  |
| Goldcrest        | 3                                             | 3                                                  |                                                                              | Negligible                                           |
| Great Tit        | 0                                             | 3                                                  |                                                                              | Negligible                                           |
| Coal Tit         | 2                                             | 3                                                  |                                                                              | Negligible                                           |
| Rook             | 0                                             | 6                                                  |                                                                              | Low                                                  |
| Carrion Crow     | 3                                             | 3                                                  |                                                                              | Negligible                                           |
| Raven            | 2                                             | 2                                                  |                                                                              | Negligible                                           |
| Starling         | 350                                           | 350                                                |                                                                              | Low                                                  |
| Chaffinch        | 2                                             | 29                                                 |                                                                              | Negligible                                           |
| Goldfinch        | 28                                            | 28                                                 |                                                                              | Negligible                                           |
| Siskin           | 12                                            | 12                                                 |                                                                              | Low                                                  |
| Lesser Redpoll   | 32                                            | 32                                                 |                                                                              | Low                                                  |
| Common Crossbill | 8                                             | 8                                                  |                                                                              | High                                                 |
| Bullfinch        | 0                                             | 3                                                  |                                                                              | Medium                                               |
| Reed Bunting     | 5                                             | 5                                                  |                                                                              | Medium                                               |

### Effects of Construction Disturbance on NS Key Species

7.6.20. The following section assesses the construction disturbance effects on each of the NS (SNH 2018) key species that were found within the potential disturbance zone within the breeding season (Table 7.13) and at other times of year (Table 7.14).

#### Curlew

7.6.21. Three pairs of curlew were found within 500 m of the site and hence would be at risk of disturbance during construction (Figure 7.3). This species is a red-listed Scottish BAP species, so has been classed as medium value. The NHZ population is 1,400 pairs (Wilson *et al.* 2015), so the numbers within the potential disturbance zone would only be considered locally important.

7.6.22. This species has been shown to be affected by disturbance, particularly during construction (Pearce-Higgins *et al.* 2012), so some displacement of breeding birds during the construction phase would be expected. The effect in the worst case scenario, assuming complete displacement from this zone, would be of



negligible magnitude on a medium value receptor, which would be of negligible significance and not significant.

### Lapwing

- 7.6.23. Three pairs of lapwing were found within 500 m of the site (Figure 7.3) and hence would be at risk of disturbance during construction. This species is a red-listed Scottish BAP species, so it has been classed as medium value. No NHZ population estimate is available (Wilson *et al.* 2015) but the numbers within the potential disturbance zone would be locally important. Some disturbance of these birds is likely during construction, though probably not the complete displacement assumed in this worst-case assessment. Even in that worst case, a complete displacement of three pairs would be of negligible magnitude on a medium value receptor resulting in an effect of negligible significance, which would not be significant.

### Greylag Goose

- 7.6.24. One pair of greylag geese were found within 500 m of the site and hence would be at risk of disturbance during construction (Figure 7.3). This species is an amber-listed species of conservation concern, so it has been classed as low value. No NHZ population estimate is available (Wilson *et al.* 2015) but the numbers within the potential disturbance zone would be considered locally important. Some disturbance of these birds is likely during construction, though probably not the complete displacement assumed in this worst-case assessment. Even in that worst case, displacement of one pair would be only of negligible magnitude on a low value receptor resulting in an effect of negligible significance, which would not be significant.

### Goshawk

- 7.6.25. A pair of goshawks was likely breeding within the potential construction disturbance zone in 2022 (see Confidential Appendix 7.9 for further details). This species is specially protected from disturbance under Schedule 1 of the Wildlife and Countryside Act, so mitigation measures will be put in place to avoid a significant impact during construction.

### Red Kite

- 7.6.26. A pair of red kites nested within the wider survey area in both 2022 and 2023 but at different locations (see Confidential Appendix 7.9 for further details). A single pair would be regionally important. Whilst these locations were both outside the potential construction disturbance zone, there would be some disturbance of foraging kites, and it is possible that they could nest closer to the site in future years. This species is specially protected from disturbance under Schedule 1 of the Wildlife and Countryside Act, so mitigation measures will be put in place to avoid a significant impact during construction.



## Barn Owl

- 7.6.27. A pair of barn owls bred within the survey area in 2022 (see Confidential Appendix 7.9 for further details). A single pair would be regionally important. Whilst their location was outside the potential construction disturbance zone, there would be some disturbance of foraging owls, and it is possible that they could nest closer to the site in future years. This species is specially protected from disturbance under Schedule 1 of the Wildlife and Countryside Act, so mitigation measures will be put in place to avoid a significant impact during construction.

## Other scarce raptor species

- 7.6.28. Several other high value raptor species were observed flying over the site during the baseline surveys, including golden eagle, osprey, hen harrier, merlin, peregrine and short-eared owl. All were, however, only seen infrequently, with no evidence of breeding within the survey area or that it was important for foraging for any of them. Whilst some displacement may occur during construction, this would be an effect of negligible magnitude and significance on all these species, and not significant.

## Potential Operational Effects

### Operational Displacement

#### Nature of Impact

- 7.6.29. The presence and operation of wind turbines could potentially displace birds from breeding and foraging areas. Birds may avoid the operational wind turbines and the surrounding area due to the visual appearance of large vertical structures in the landscape, the mechanical noises and wind noises of the blades, or the presence of periodic maintenance vehicles and personnel. Displacement due to operational wind turbines could force birds into less suitable habitat, and this might reduce their ability to survive and reproduce. If not displaced, birds may experience reduced foraging success or reduced productivity. Displacement effects can vary over time as birds habituate to the presence of operating wind turbines or site-faithful birds are lost from the population.

## Ornithological Receptor Value

- 7.6.30. Table 7.13 shows the peak breeding bird populations that were found within 500 m of the proposed wind turbine locations during the baseline surveys, where this distance has been used to identify the potential operational distance zone (though also giving consideration to particularly sensitive species in a wider area around that).
- 7.6.31. Table 7.14 shows the peak wintering bird populations that were found within 500 m of the proposed wind turbine locations during the baseline surveys,



where this distance has been used to identify the potential distance zone (though also giving consideration to particularly sensitive species in a wider area around that).

### Effects of Operational Disturbance on NatureScot Key Species

- 7.6.32. The following section assesses the operational disturbance effects on each of the NS key species found within the potential disturbance zone within the breeding season (Table 7.13) and at other times of year (Table 7.14).

#### Curlew

- 7.6.33. Three pairs of curlew were found within 500 m of the wind turbines and hence would be at risk of disturbance during operation (Figure 7.3). This species is a red-listed Scottish BAP species, so has been classed as medium value. The NHZ population is 1,400 pairs (Wilson *et al.* 2015), so the numbers within the potential disturbance zone would be considered to be of only local importance.
- 7.6.34. This species has been shown to be affected by disturbance, particularly during construction (Pearce-Higgins *et al.* 2012). Some displacement of breeding birds during the operational phase would be expected. The effect in a worst case, assuming complete displacement from this zone, would be of negligible magnitude on a medium value receptor, which would be of negligible significance and not significant.

#### Lapwing

- 7.6.35. Three pairs of lapwing were found within 500 m of the wind turbines (Figure 7.3) and hence would be at risk of disturbance during operation. This species is a red-listed Scottish BAP species, so has been classed as medium value. No NHZ population estimate is available (Wilson *et al.* 2015) but the numbers within the potential disturbance zone would be considered to be of local importance. Some disturbance of these birds is likely during operation, though probably not the complete displacement assumed in this worst-case assessment. Even in that worst case, this would be only of negligible magnitude on a medium sensitivity receptor resulting in an effect of negligible significance, which would not be significant.

#### Greylag Goose

- 7.6.36. One pair of greylag geese was found breeding within 500 m of the wind turbines (Figure 7.3) and hence would be at risk of disturbance during operation. This species is an amber-listed species of conservation concern, so has been classed as low value. No NHZ population estimate is available (Wilson *et al.* 2015) but the numbers within the potential disturbance zone would be considered to be of local importance. Some disturbance of these birds is likely during operation, though probably not the complete displacement assumed in this worst-case assessment. Even in that worst case, this would only be a



negligible magnitude on a low sensitivity receptor, resulting in an effect of negligible significance, which would not be significant.

### **Goshawk**

- 7.6.37. A pair of goshawks was likely breeding within the potential construction disturbance zone in 2022 (see Confidential Appendix 7.9 for further details). This species is specially protected from disturbance under Schedule 1 of the Wildlife and Countryside Act. Some small-scale displacement is possible, but this would be an effect of low magnitude on a high value species, which would be of minor significance and not significant.

### **Red Kite**

- 7.6.38. A pair of red kites nested within the wider survey area in both 2022 and 2023 but at different locations (see Confidential Appendix 7.9 for further details). A single pair would be regionally important. Whilst these locations were both outside the potential operational disturbance zone, there could be some disturbance of foraging kites. Some small-scale displacement is possible, but this would be an effect of low magnitude on a high value species, which would be of minor significance and not significant.

### **Barn Owl**

- 7.6.39. A pair of barn owls bred within the survey area in 2022 (see Confidential Appendix 7.9 for further details). A single pair would be regionally important. Whilst their location was outside the potential operational disturbance zone, there could be some disturbance of foraging owls. Some small-scale operational displacement is possible, but this would be an effect of low magnitude on a high value species, which would be of minor significance and not significant.

### **Other scarce raptor species**

- 7.6.40. Several other high value raptor species were observed flying over the site during the baseline surveys, including golden eagle, osprey, hen harrier, merlin, peregrine and short-eared owl. All were, however, only seen infrequently, with no evidence of breeding within the survey area or that it was important for foraging for any of them. Whilst some displacement may occur during operation, this would be an effect of negligible magnitude and significance on all these species, and not significant.

### **Direct Effects: Collision Mortality**

- 7.6.41. There have been a number of wind farms that have caused significant bird mortalities through collision, but their characteristics are very different to those at the Proposed Development. Most notably, at Altamont Pass in California and



Tarifa in southern Spain, large numbers of raptors have been killed<sup>39,40,41</sup> through collision with wind turbines. Such problems have occurred where large numbers of sensitive species occur in close proximity to very large numbers (hundreds/thousands) of wind turbines, and usually where the wind farm area provides a particularly attractive feeding resource. For onshore wind farm sites in the UK, with similar bird densities to the site, collision rates have generally been very low and not considered to be significant<sup>42,43,44,45,46</sup>.

7.6.42. The Proposed Development's collision risk zone was taken as the wind turbines plus a 200 m buffer (following NS guidance). Full details of the collision risk calculations are given in Technical Appendix 7.6.

7.6.43. Reference NHZ population sizes were derived from Wilson *et al.* (2015).

### Nature of Impact

7.6.44. Birds that collide with a wind turbine blade are likely to be killed or fatally injured. Increased mortality rates from collision with wind turbines could potentially affect the maintenance of bird populations, particularly for species that are otherwise experiencing poor reproductive or survival levels due to other factors, e.g. food availability. The frequency of collisions with wind turbines is assumed to be dependent on the amount of flight activity across the site and the ability of birds to detect the rotating blades and take avoidance action.

7.6.45. Operational displacement and collision with wind turbines are spatially mutually exclusive (if a bird is displaced from the wind farm, it is not at risk of collision). However, displacement effects may change through time, as birds that were at first displaced from an area may habituate to the presence of the operating wind turbines after a period of time and become exposed to the risk of collision.

<sup>39</sup> Orloff, S. and Flannery, A. 1992. Wind turbine effects on Avian activity, habitat use, and mortality in Altamont Pass and Solano County Wind Resource Areas 1989-1991. Biosystems Analysis Inc. California Energy Commission: 160pp.

<sup>40</sup> Janss, G. 1998. Bird behavior in and near a wind farm at Tarifa, Spain: management considerations. NWCC National Avian - Wind Power Planning Meeting III: 110-114pp.

<sup>41</sup> Thelander, C. G., Smallwood, K. S. and Rugge, L. 2003. Bird risk behaviours and fatalities at the Altamont Pass Wind Resource Area: Period of performance: March 1998-December 2000. National Renewable Energy Laboratory Report: 92pp.

<sup>42</sup> Meek, E. R., Ribbands, J. B., Christer, W. B., Davy, P. R. and Higginson, I. 1993. The effects of aero-generators on moorland bird populations in the Orkney Islands, Scotland. Bird Study, 40: 140-143pp.

<sup>43</sup> Tyler, S. J. 1995. Bird strike study at Bryn Tytli windfarm, Rhayader. RSPB Report to National Wind Power: 2pp.

<sup>44</sup> Bioscan (UK) Ltd. 2001. Novar Windfarm Ltd Ornithological Monitoring Studies - Breeding bird and birdstrike monitoring 2001 results and 5-year review. Report to National Wind Power Ltd.

<sup>45</sup> Percival, S. M., Percival, T., Hoit, M. and Langdon, K. 2009. Red House Farm Wind Cluster, Lincolnshire: Post-construction breeding bird, marsh harrier surveys and collision monitoring 2008. Report to Fenland Wind Farms Ltd.

<sup>46</sup> Percival, S. M., Percival, T. and Piner, S. 2013. Kelburn Wind Farm: Post-construction Phase Breeding Bird Surveys 2013. Report to RES UK & Ireland Ltd.



- 7.6.46. Table 7.15 summarises the collision risk analysis for each key species. Data are presented separately for each of the two baseline survey years (2021-22 and 2022-23). For further details, see Technical Appendix 7.6: Collision Risk Modelling Calculations.
- 7.6.47. Table 7.15 gives the number of collisions predicted per year based on the precautionary NS avoidance rate of 99% for red kites, 99.5% for swans, 99.8% for the two goose species and 98% for all other species, the percentage increase that this would represent over the baseline mortality and an assessment of the magnitude of these effects.

**Table 7.15: Collision Risk Modelling Predictions**

| Species           | Precautionary Predicted Number of Collisions per Year (NS avoidance rate) |         | Percentage Increase in Baseline Mortality |         | Magnitude      |
|-------------------|---------------------------------------------------------------------------|---------|-------------------------------------------|---------|----------------|
|                   | 2021-22                                                                   | 2022-23 | 2021-22                                   | 2022-23 |                |
| Whooper Swan      | 0.04                                                                      | 0.11    | 0.02%                                     | 0.05%   | Negligible     |
| Pink-footed Goose | 0.18                                                                      | 0.38    | 0.01%                                     | 0.02%   | Negligible     |
| Greylag Goose     | 0.002                                                                     | 0.01    | <0.01%                                    | <0.01%  | Negligible     |
| Osprey            | 0.001                                                                     | 0       | 0.02%                                     | 0%      | Negligible     |
| Goshawk           | 0.01                                                                      | 0.03    | 0.19%                                     | 0.44%   | Negligible     |
| Red Kite          | 1.44                                                                      | 0.34    | -                                         | -       | Low/negligible |
| Golden Plover     | 0.25                                                                      | 0.03    | 0.02%                                     | <0.01%  | Negligible     |
| Lapwing           | 0.01                                                                      | 0.31    | <0.01%                                    | 0.02%   | Negligible     |
| Curlew            | 0.05                                                                      | 0.01    | <0.01%                                    | <0.01%  | Negligible     |
| Peregrine         | 0.003                                                                     | 0.04    | 0.02%                                     | 0.20%   | Negligible     |
| Short-eared Owl   | 0.01                                                                      | 0       | 0.03%                                     | 0%      | Negligible     |

- 7.6.48. The following section assesses the operational collision risk to each of the NS key species that were found within the collision risk zone (Table 7.15).

### Whooper Swan

- 7.6.49. A total of 11 whooper swan flocks (of 1-10 birds) were seen flying through the collision risk zone during the baseline surveys (Figure 7.4). Whooper swan is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Overall collision risk was estimated at 0.07 collisions per year, an effect of negligible magnitude that would not be significant.
- 7.6.50. There would clearly be no threat to the regional or national population of this species, so no significant adverse effect would occur, following the SNH 2018a guidance.



### Pink-footed Goose

- 7.6.51. Pink-footed goose was classed as very high value as a qualifying feature of the Castle Loch, Lochmaben SPA. Pink-footed geese were regularly recorded overflying the site, mainly during their autumn migration (Figure 7.5). Collision risk was predicted as 0.18 in the first of the two baseline years and 0.38 in the second. This is equivalent to less than a 0.1% increase over the baseline mortality, an effect of negligible magnitude that would not be significant in both the context of the NHZ population and the SPA populations.

### Greylag Goose

- 7.6.52. Greylag goose flight activity occurred year-round but in low numbers. Flights through the collision risk zone are shown in Figure 7.6. The predicted collision risk of 0.002 in 2021-22 and 0.01 in 2022-23 (less than a 0.1% increase over the baseline mortality), would be an effect of negligible magnitude and significance, which would not be significant.

### Osprey

- 7.6.53. Osprey is listed on Schedule 1 of the Wildlife and Countryside Act, so is of high value. Two osprey flights (both of single birds) were recorded at rotor height through the collision risk zone in 2021-22 (Figure 7.7), with resulting collision risks predicted at 0.001 per year, equivalent to a 0.02% increase over the baseline mortality). No flights were observed through the collision risk zone in 2022-23. Collision risk to this species would be of negligible magnitude and would not be significant.

### Goshawk

- 7.6.54. Goshawk is listed on Schedule 1 of the Wildlife and Countryside Act, so is of high value. A low number of goshawk flights were recorded at rotor height through the collision risk zone in 2021-22 and 2022-23 (Confidential Figure 7.9.1), with resulting collision risks predicted at 0.01 and 0.03 per year, respectively, equivalent to a 0.3% increase over the baseline mortality overall. Collision risk to this species would be of negligible magnitude (in the context of the small NHZ population of 13 pairs) and would not be significant.

### Red Kite

- 7.6.55. Red kite is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Though flight activity over the site during the breeding season was low, there was much higher activity during the winter, especially over land immediately to the west of the wind farm (Confidential Figure 7.9.2 and 7.9.3). Analysis of the VP data enabled this higher activity area to be defined and avoided in the site design, reducing both collision risk and the potential effect of disturbance.



- 7.6.56. The resulting collision risk was predicted at 1.44 per year using the 2021-22 data and 0.34 per year using the 2022-23 data. It is not possible to express this quantitatively as a percentage of the NHZ baseline mortality as the published NHZ red kite population is zero (Wilson *et al.* 2015), reflecting this species' recent colonisation of this area.
- 7.6.57. Collision risk to red kites has been shown to be higher when they are nesting within 1 km of turbines (Hotker *et al.* 2017<sup>47</sup>, Schaub 2012<sup>48</sup>). This distance is often applied in Germany as a buffer to reduce impacts on red kites. Both nest locations used by the red kites at the Proposed Development site exceed this distance. Hotker *et al.* (2017) suggest that the site lies outside the likely 1 km red kite core range (from both nest sites), and the VP data support that conclusion, with only low use of the site during the breeding season. Overall, 93% of the risk was outside the breeding season (i.e. between September and March).
- 7.6.58. Whilst some studies (e.g. Bellebaum *et al.* 2013<sup>49</sup>) identified the potential for wind turbine mortality to have population-scale impacts on red kites, recent population viability analysis modelling by the BTO on the Welsh red kite population (Hereward *et al.* 2024<sup>50</sup>) has shown that wind turbine collision mortality would be very unlikely in that case to adversely affect population levels. Though the population in Scotland is different, it has recently shown a similar increasing trajectory (where not being persecuted, Smart *et al.* 2010), and this species is now green listed (Stanbury *et al.* 2021). It has been estimated that the Scottish red kite population is doubling every 4-6 years<sup>51</sup>. A similar lack of vulnerability to wind farm collision would therefore be expected for the Scottish population as found in the Welsh study.
- 7.6.59. Overall, collision risk to this species would be of, at most, low magnitude and not significant, but mitigation measures will be implemented to reduce this risk further (see below).

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<sup>47</sup> Hötter, H., Mammen, K., Mammen, U. and Rasran, L. 2017. Red Kites and Wind Farms—Telemetry Data from the Core Breeding Range. In: Wind Energy and Wildlife Interactions: Presentations from the CWW2015 Conference (J. Köppel, ed), pp. 3–15. Springer International Publishing, Cham.

<sup>48</sup> Schaub, M. 2012. Spatial distribution of wind turbines is crucial for the survival of red kite populations. *Biological Conservation* 155: 111–118.

<sup>49</sup> Bellebaum, J., Korner-Nievergelt, F., Dürr, T. and Mammen, U. 2013. Wind turbine fatalities approach a level of concern in a raptor population. *Journal for Nature Conservation* 21: 394–400.

<sup>50</sup> Hereward, H.F.R., Macgregor, C.J., Gabb, O., Connell, A., Thomas, R.J., Cross, A.V. and Taylor, R.C. 2024. Modelling population-level impacts of wind farm collision risk on Welsh Red Kites. BTO Research Report 766 to RenewablesUK Cymru.

<sup>51</sup> <https://www.scottishraptorstudygroup.org/raptors/red-kite/>



### Golden Plover

- 7.6.60. Golden plover were seen occasionally flying through the collision risk zone during both the breeding and winter periods (Figure 7.8). Collision risk to golden plover (a high-value receptor) was predicted to be 0.25 per year using the 2021-22 baseline data and 0.03 from the 2022-23 data. This would represent a 0.02% increase over the baseline mortality for this NHZ population for 2021-22, and a <0.1% increase for 2022-23, so it would be an effect of negligible magnitude and not significant.

### Lapwing

- 7.6.61. Lapwing were seen regularly flying through the collision risk zone in low numbers, during both the breeding and winter periods (Figure 7.9). Collision risk to lapwing (a medium value receptor) was predicted to be 0.01 per year using the 2021-22 baseline data and 0.31 from the 2022-23 data. This would represent less than a 0.01% increase over the baseline mortality for this NHZ population for 2021-22, and a 0.02% increase for 2022-23, so it would be an effect of negligible magnitude and not significant.

### Curlew

- 7.6.62. Curlew were frequently observed flying through the collision risk zone in low numbers (Figure 7.10). Collision risk to curlew (a medium value receptor) was predicted to be 0.05 per year using the 2021-22 baseline data and 0.01 from the 2022-23 data. This would represent less than a 0.01% increase over the baseline mortality for this NHZ population in both years, so it would be an effect of negligible magnitude and not significant.

### Peregrine

- 7.6.63. Peregrine is listed on Schedule 1 of the Wildlife and Countryside Act and Annex 1 of the EU Birds Directive, so is of high value. Only a low number of peregrine flights were recorded at rotor height through the collision risk zone, with resulting collision risks predicted at 0.003 per year using the 2021-22 data and 0.04 per year using the 2022-23 data, equivalent to a 0.02% and 0.20% increase over the baseline mortality, respectively. Collision risk to this species would be of negligible magnitude and not significant.

### Short-eared Owl

- 7.6.64. The short-eared owl is listed in Annex 1 of the EU Birds Directive, so it is of high value. Only five short-eared owl flights were recorded at rotor height through the collision risk zone, with resulting collision risks predicted at 0.01 per year using the 2021-22 data and zero per year using the 2022-23 data, equivalent to a 0.01% increase over the baseline mortality overall). Collision risk to this species would be of negligible magnitude and not significant.



### Indirect Effects: Barrier Effect

- 7.6.65. A further potential operational disturbance effect could be disruption to important flight lines (barrier effect). Birds may see the Proposed Development and change their route to fly around it, rather than through it. This would reduce the risk of collision but could possibly have other effects, for example potentially making important feeding areas less attractive, by acting as a barrier to the birds reaching them, and, if diversions were of a sufficient scale, resulting in increased energy consumption. The distance needed to divert around the Proposed Development would be relatively small and would not be expected to act as a major barrier to movements and no important regularly used flight routes across the site have been identified. Accordingly, the ecological consequences of any such changes in flight lines would be of negligible magnitude and not significant.

### Assessment of Effects on Other High Value Species

- 7.6.66. One additional high value species was recorded in the study area during the baseline surveys: common crossbill. It is specially protected from disturbance during breeding under Schedule 1 of the Wildlife and Countryside Act, so it has been classed as high value.

#### Common Crossbill

- 7.6.67. This species was breeding in the coniferous plantation (with up to eight pairs in coniferous plantations in the survey area) around the site and was also present there outside the breeding season (Confidential Figure 7.9.4). Though these numbers are only locally important, this species is classed as high value because it is specially protected from disturbance during the breeding season under Schedule 1 of the 1981 Wildlife and Countryside Act. This species could be affected by forest felling for construction, so mitigation measures will be put in place to avoid a significant impact during construction.

### Assessment of Effects on Other Medium Value Species

- 7.6.68. Thirteen other medium value species were recorded breeding within the potential impact zone: snipe, cuckoo, skylark, tree pipit, dunnoek, song thrush, spotted flycatcher, starling, house sparrow, linnet, lesser redpoll, bullfinch and reed bunting. None would be likely to be affected by the Proposed Development, given experience from other wind farms (Meek *et al.* 1993, Phillips 1994, Thomas 1999, Percival 2005, Devereux *et al.* 2008, op. cit.) and their large UK and Scottish population sizes. Effects would be of low/negligible magnitude and not significant.

### Assessment of Effects on Other Low Value Species

- 7.6.69. The low value species are of lesser concern, as a higher magnitude impact would be necessary in order for a significant effect to occur. As these species



are generally at low density within the survey area, such a magnitude of effect would be very unlikely, and it can be safely concluded that there would not be any significant effect on any of these species.

## Effects on Protected Sites

### European Protected Sites

- 7.6.70. The potential ornithological effects of the Proposed Development on European Protected Sites are assessed in Technical Appendix 7.8. Possible effects on the Castle Loch, Lochmaben SPA, pink-footed goose population constituted the only possible Likely Significant Effect (LSE) of the Proposed Development (either alone or in combination) in the context of the Habitats Regulations.
- 7.6.71. The Proposed Development is (at its closest point) 7.6 km from Castle Loch, Lochmaben SPA/Ramsar. It is designated for its internationally important wintering population of pink-footed geese and lies within the 15-20 km foraging range of this species (SNH 2016).
- 7.6.72. There would be a collision risk to the Castle Loch, Lochmaben SPA/Ramsar pink-footed goose population, but this would be only a negligible magnitude effect on the SPA population. The conservation objective *“to maintain the population of the species as a viable component of the SPA”* would not be undermined. This level of additional mortality would not represent an adverse effect on the integrity of the SPA.
- 7.6.73. Neither cumulative disturbance nor cumulative collision risk would represent an adverse effect on the integrity of the SPA.

### Other Protected Sites

- 7.6.74. No significant effects would be likely to occur on the ornithological interest features of any other statutory protected sites, with no other SSSIs with any ornithological interest features within 5 km.

## 7.7. Mitigation

- 7.7.1. The Proposed Development is not likely to result in any significant ornithological effects, but nonetheless, the best practice measures described below would be followed throughout all Proposed Development, and to ensure compliance with the nature conservation legislation. Furthermore, measures to benefit biodiversity will need to be delivered as part of the project to satisfy NPF4 (as set out in the OBHMP in Technical Appendix 8.5).

### Mitigation of the Construction Phase

- 7.7.2. The applicant has committed to the production of a CEMP to the satisfaction of NS and other relevant stakeholders, before construction commences, and would follow Windfarm Good Construction Guidance, Scottish Renewables et



*a/* (2019). An Environmental Clerk of Works (ECoW) will be appointed to monitor the implementation of the CEMP, the Breeding Bird Protection Plan (BBPP – see Technical Appendix 7.7) and the Outline Biodiversity and Habitat Management Plan (OBHMP – see Technical Appendix 8.5).

- 7.7.3. A BBPP will be required to ensure compliance with the Wildlife and Countryside Act to (a) avoid any disturbance to species specially protected under Schedule 1 of that Act and (b) avoid any damage to active nests. A draft BBPP is included within Technical Appendix 7.7.
- 7.7.4. Several species specially protected from disturbance during breeding under Schedule 1 of the Wildlife and Countryside Act were recorded during the surveys, including red kite, goshawk, barn owl and common crossbill. It will be essential to ensure that no Schedule 1 species are disturbed during the breeding season, particularly during the construction phase, therefore, a BBPP will be developed and implemented. Further surveys for red kite, goshawk, barn owl and common crossbill and any other Schedule 1 species will be undertaken to inform the BBPP at fortnightly intervals through the breeding season (March-August) during the construction period. If any nesting Schedule 1 birds are found then potentially disturbing activities would be suspended for the breeding season within an appropriate zone (dependent on the location of the birds and the species involved, to be agreed with NS and the local planning authority, following Goodship and Furness 2022). The BBPP will also include measures to ensure the protection of all other nesting birds.
- 7.7.5. Where works affecting habitats that could be used by nesting birds take place between March and August (inclusive), they will only be carried out following an on-site check for nesting birds by an experienced ecologist. If this indicates that no nesting birds are likely to be harmed by the works, then the works will proceed. If nesting birds are found to be present, work will not take place in that area until the adult birds and young have left the nest. A protection zone will be clearly marked around the nest site to prevent accidental disturbance or damage.

### **Mitigation of the Operational Phase**

- 7.7.6. No mitigation for the operational phase of the Proposed Development will be required. However, in order to reduce the collision risk to red kites (the only non-negligible impact identified during the assessment), a programme of carcass removal will be implemented to reduce collision risk to this species and other scavenging raptors.
- 7.7.7. Additionally, the measures that will be delivered through the OBHMP (Technical Appendix 8.5) will also deliver a benefit to the local bird populations. This will include:
- restoration of marshy grassland and implementation of a sustainable grazing regime;



- peatland restoration of 2.8 ha. degraded blanket bog.

## 7.8. Assessment of Residual Effects

- 7.8.1. The residual ornithological effects of the Proposed Development will be a non-significant loss of a small amount of upland moorland habitat to the Proposed Development, and a non-significant risk of disturbance and collision.
- 7.8.2. Using evidence from existing wind farms, it is considered unlikely that there will be any long-term impact on the integrity of the study area's ornithological features, or the conservation status of the species found here.

## 7.9. Assessment of Cumulative Effects

- 7.9.1. The potential for cumulative ornithological effects was considered following the SNH 2018b guidance on 'Assessing the Cumulative Impacts of Onshore Wind Farms on Birds', considering impacts on the favourable conservation status of key species within the relevant NHZ (in this case NHZ 20 'The Border Hills'). The cumulative assessment has focussed on developments within 20 km of the site boundary, as only sites within this distance are likely to have any ornithological connectivity with the Proposed Development. This includes operational and consented developments, as well as those in the planning process (though not those in scoping as insufficient information was available to assess those). Details of the developments within this range are given in Table 7.16.

Table 7.16: Cumulative Ornithological Assessment: other wind farm sites within 20 km buffer

| Site               | Blade Tip Height | Number of Turbines | Distance and Direction |
|--------------------|------------------|--------------------|------------------------|
| <b>Operational</b> |                  |                    |                        |
| Crossdykes         | 176.5m           | 10                 | 8km east               |
| Minsca             | 120m             | 16                 | 8km south-east         |
| Ewe Hill           | 111.5m           | 22                 | 9km east               |
| Solway Bank        | 127m             | 15                 | 13km south-east        |
| Craig              | 99.5m – 140m     | 6                  | 15km east              |
| Minnygap           | 125m             | 10                 | 15km north-west        |
| Harestanes         | 125m             | 68                 | 15km north-west        |
| <b>Consented</b>   |                  |                    |                        |
| Little Hartfell    | 160m             | 12                 | 5km east               |
| Hopsrig            | 140m             | 12                 | 10km east              |
| Loganhead          | 200m             | 8                  | 11km east              |
| <b>In Planning</b> |                  |                    |                        |
| Scoop Hill         | 180m – 250m      | 60                 | 7km north              |



|                   |             |    |                 |
|-------------------|-------------|----|-----------------|
| Hopsrig (revised) | 200m        | 12 | 10km east       |
| Callisterhall     | 200m        | 7  | 11km south-east |
| Bloch             | 180m – 230m | 21 | 15km south-east |

7.9.2. All potential effects of wind farms (direct habitat loss and disturbance during construction; and collision risk and disturbance during operation) have the potential to contribute to the cumulative ornithological impacts, therefore have been considered in the cumulative assessment. Consideration of the cumulative collision risk was carried out to determine whether the Proposed Development could materially contribute to a potentially significant cumulative collision risk.

7.9.3. This cumulative assessment has scoped in all species with potential ecological linkage to SPAs, and all other key NS target species with non-negligible residual impacts predicted. This included:

- cumulative collision risk to red kite

7.9.4. This is considered below, using the information available from other developments that could contribute to the cumulative impacts, but given that full information from all developments is not available, a precautionary approach has been adopted to this cumulative assessment.

7.9.5. For all other species, the predicted residual effects of the Proposed Development, with regard to habitat loss, disturbance and collision risk are so low (negligible magnitude) that it was considered that these would not make any material contribution to any potentially significant cumulative impact at the NHZ level.

### Red Kite Cumulative Collision Risk

7.9.6. Red kite collision risk at the Proposed Development was predicted at 0.91 per year using the two baseline winters' data, an effect of low magnitude. Full quantitative assessments of collision risk to red kite were not available from all of the sites listed in Table 7.16 (largely because the risk at most was negligible). However, taking into account both the reported cumulative risks from other sites, the likely risks from schemes where collision risk has not been reported, and the increasing red kite population in the region<sup>52</sup>, it was concluded that the cumulative collision risk would be of at most low magnitude and would not contribute to any significant effects in both the context of the NHZ population and the SPA population.

<sup>52</sup> <https://raptormonitoring.org/wp-content/uploads/2023/01/Red-Kite-trends-2009-2018.pdf>



## 7.10. Summary

7.10.1. Table 7.17 provides a summary of the effects of the Proposed Development on features of ornithological interest detailed within this chapter.

7.10.2. Overall, there are not likely to be any significant impacts on ornithology as a result of the Proposed Development. In relation to the key NS wider countryside test, the Proposed Development would not affect the favourable conservation status of any bird species of conservation importance within the NHZ, either alone or in combination with other schemes. It would also not contribute to any Likely Significant Effect on any SPA qualifying interests. No effects would result in any breach of the Habitats Regulations.

**Table 7.17. Summary of the effects of the Proposed Development on features of ornithological interest.**

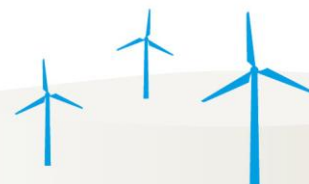
| Project Phase | Summary of Effect                                                                                 | Value          | Magnitude  | Nature of Effect  |                     |                         | Mitigation Measure                                                                                            | Residual Significance |
|---------------|---------------------------------------------------------------------------------------------------|----------------|------------|-------------------|---------------------|-------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------|
|               |                                                                                                   |                |            | Positive/negative | Permanent/temporary | Reversible/irreversible |                                                                                                               |                       |
| Construction  | Habitat loss: construction of infrastructure including wind turbine foundations and access tracks | Low/negligible | Negligible | Negative          | Temporary           | Reversible              | Avoidance of more sensitive habitats in design process                                                        | Not significant       |
|               | Disturbance to Schedule 1 and Annex 1 breeding species                                            | Up to high     | Negligible | Negative          | Temporary           | Reversible              | Development and implementation of OBHMP and BBPP, to include pre-construction survey checks; if present avoid | Not significant       |



| Project Phase | Summary of Effect                                      | Value        | Magnitude  | Nature of Effect  |                     |                         | Mitigation Measure                                                              | Residual Significance |
|---------------|--------------------------------------------------------|--------------|------------|-------------------|---------------------|-------------------------|---------------------------------------------------------------------------------|-----------------------|
|               |                                                        |              |            | Positive/negative | Permanent/temporary | Reversible/irreversible |                                                                                 |                       |
|               |                                                        |              |            |                   |                     |                         | disturbing activity in proximity with species-specific buffer zone implemented. |                       |
|               | Disturbance to other breeding species                  | Up to medium | Negligible | Negative          | Temporary           | Reversible              | Pre-construction survey and active nests avoided.                               | Not significant       |
|               | Disturbance to wintering birds                         | Up to high   | Negligible | Negative          | Temporary           | Reversible              | None required                                                                   | Not significant       |
| Operation     | Displacement of birds from zone around wind turbines   | Up to high   | Negligible | Negative          | Temporary           | Reversible              | OBHMP will offset potential losses                                              | Not significant       |
|               | Disturbance to Schedule 1 and Annex 1 breeding species | Up to high   | Negligible | Negative          | Temporary           | Reversible              | None required.                                                                  | Not significant       |
|               | Disturbance to other breeding species                  | Up to medium | Negligible | Negative          | Temporary           | Reversible              | None required                                                                   | Not significant       |



| Project Phase | Summary of Effect                                   | Value           | Magnitude      | Nature of Effect  |                     |                         | Mitigation Measure | Residual Significance |
|---------------|-----------------------------------------------------|-----------------|----------------|-------------------|---------------------|-------------------------|--------------------|-----------------------|
|               |                                                     |                 |                | Positive/negative | Permanent/temporary | Reversible/irreversible |                    |                       |
|               | Disturbance to wintering birds                      | Up to high      | Negligible     | Negative          | Temporary           | Reversible              | None required      | Not significant       |
|               | Mortality through bird collision with wind turbines | Up to very high | Low/negligible | Negative          | Temporary           | Reversible              | None required      | Not significant       |





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