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11 ORNITHOLOGY

11.1 Introduction

- 11.1.1 This Chapter of the Environmental Impact Assessment Report (EIA Report) evaluates the potential effects of the Torrance Wind Farm Extension II (the Proposed Development) on Important Ornithological Features (IOFs). The assessment was undertaken by Matt Rea, Senior Ornithologist at Arcus Consultancy Services Limited (Arcus), part of the ERM Group. The Chapter has been technically reviewed by Liz Coiffait, Principal Ornithologist.
- 11.1.2 This Chapter is supported by the following figures provided in Volume 2 Figures:
- **Figure 11.1:** Site Boundary and Infrastructure;
 - **Figure 11.2:** Vantage Points and Viewsheds;
 - **Figure 11.3:** Ornithology Survey Areas; and
 - **Figure 11.4:** IOF Breeding Bird Territories.
- 11.1.3 This Chapter is supported by the following Technical Appendix documents provided in Volume 4 Appendices:
- **Appendix 11.1:** Baseline Ornithology Report 2020-21;
 - **Appendix 11.2:** Baseline Ornithology Report 2020-21: Confidential Annex; and
 - **Appendix 11.3:** Collision Risk Modelling Report.
- 11.1.4 This Chapter is structured as follows:
- Legislation, Policy and Guidance;
 - Scoping Responses and Consultation;
 - Assessment Methodology and Significance Criteria;
 - Baseline Conditions;
 - Assessment of Potential Effects;
 - Assessment of Cumulative Effects;
 - Mitigation Measures and Monitoring;
 - Residual Effects;
 - Potential Effects on Statutory sites; and
 - Statement of Significance.
- 11.1.5 English (British) vernacular and scientific names of bird species referred to in this report follow the British List maintained by the British Ornithologists' Union (BOU)¹.

¹ British Ornithologists' Union. (2017) The British List: A Checklist of Birds of Britain (9th edition). *Ibis* 160, 190-240.

11.2 Legislation, Policy and Guidance

11.2.1 The following legislation, policy and guidance have been considered in carrying out this assessment.

Legislation

- European Union (Withdrawal) Act 2018²;
- Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive)³;
- Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (Habitats Directive)⁴;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations)⁵;
- The Wildlife and Natural Environment (Scotland) Act 2011⁶;
- The Wildlife and Countryside Act 1981 (as amended)⁷;
- The Nature Conservation (Scotland) Act 2004 (as amended)⁸;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012⁹;
- The Conservation of Habitats and Species (Amendment) Regulations 2017¹⁰, relating to reserved matters in Scotland;
- Environmental Impact Assessment Directive 2014/52/EU¹¹; and
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017¹².

Policy

- UK Post-2010 Biodiversity Framework¹³;
- Scottish Biodiversity Strategy: It's in Your Hands¹⁴;
- 2020 Challenge for Scotland's Biodiversity¹⁵;

² UK Government (2018) European Union (Withdrawal) Act 2018 [Online] Available at: <http://www.legislation.gov.uk/ukpga/2018/16/contents> (Accessed 07/11/22)

³ European Parliament (2009) Directive 2009/147/EC [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147&from=EN> (Accessed 07/11/22)

⁴ European Parliament (1992) Directive 92/43/EEC [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31992L0043&from=EN> (Accessed 07/11/22)

⁵ European Parliament (1994) the Conservation (Natural Habitats, &c.) Regulations 1994 [Online] Available at: <http://www.legislation.gov.uk/uksi/1994/2716/contents/made> (Accessed 07/11/22)

⁶ Scottish Government (2011) Wildlife and Natural Environment (Scotland) Act 2011 [Online] Available at: <http://www.legislation.gov.uk/asp/2011/6/contents/enacted> (Accessed 07/11/22)

⁷ UK Government (1981) The Wildlife and Countryside Act 1981 (as amended) [Online] Available at: <http://www.legislation.gov.uk/ukpga/1981/69> (Accessed 07/11/22)

⁸ UK Government (2004) Nature Conservation (Scotland) Act 2004 [Online] Available at: <http://www.legislation.gov.uk/asp/2004/6/contents> (Accessed 07/11/22)

⁹ Scottish Government (2012) the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012 [Online] Available at: <https://www.legislation.gov.uk/ssi/2012/228/contents/made> (Accessed 07/11/22)

¹⁰ UK Government (2017) The Conservation of Habitats and Species Regulations 2017 [Online] Available at: <http://www.legislation.gov.uk/uksi/2017/1012/contents/made> (Accessed 07/11/22)

¹¹ European Parliament (2014) Directive 2014/52/EU [Online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052> (Accessed 07/11/22)

¹² Scottish Government (2017) the Town and Country Planning (EIA) (Scotland) Regulations [Online] Available at: <http://www.legislation.gov.uk/ssi/2017/102/contents/made> (Accessed 07/11/22)

¹³ Four Countries' Biodiversity Group (2010) UK Post-2010 Biodiversity Framework [Online] Available at: <http://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf> (Accessed 07/11/22)

¹⁴ Scottish Executive (2004) Scotland's Biodiversity It's in your Hands [Online] Available at: <https://www.webarchive.org.uk/wayback/archive/20180515152802/http://www.gov.scot/Publications/2004/05/19366/37250> (Accessed 07/11/22)

¹⁵ Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity [Online] Available at: <https://www.gov.scot/publications/2020-challenge-scotlands-biodiversity-strategy-conservation-enhancement-biodiversity-scotland/> <https://www2.gov.scot/Resource/0042/00425276.pdf> (Accessed 07/11/22)

- PAN 60: Planning for Natural Heritage¹⁶; and
- Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0¹⁷.

Guidance and Information

- Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms¹⁸;
- Scottish Raptor Monitoring Scheme Report 2020¹⁹;
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine²⁰;
- Birds of Conservation Concern (BoCC) 5: The Population Status of Birds in the United Kingdom, Channel Islands and Isle of Man²¹;
- Wind Energy Developments and Natura 2000²²;
- The Birds of Scotland²³;
- Bird Monitoring Methods²⁴;
- Raptors: A Field Guide to Survey and Monitoring, 3rd edition²⁵;
- Disturbance Distances Review: An Updated Literature Review of Disturbance Distances of Selected Bird Species²⁶;
- The Scottish Biodiversity List (SBL)²⁷;
- Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoidance Action²⁸;
- Assessing Connectivity with Special Protection Areas (SPAs)²⁹;
- Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees³⁰;
- Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms³¹;

¹⁶ Scottish Government (2000) PAN 60: Planning for Natural Heritage [Online] Available at: [Planning Advice Note 60 \(webarhive.org.uk\)](https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/) (Accessed 07/11/22)

¹⁷ Scottish Government (2013) PAN 1/2013: EIA [Online] Available at: <https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/> (Accessed 07/11/22)

¹⁸ Band, W., Madders, M. & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms*. In de Lucas, M., Janss, G. & Ferrer, M. (eds.) *Birds and Wind Power*. Quercus, Madrid.

¹⁹ Challis, A., Wilson, M.W., Eaton, Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I (2022). *Scottish Raptor Monitoring Scheme Annual Report 2020*. BTO Scotland, Stirling.

²⁰ CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester.

²¹ 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.

²² European Commission (2011). Natura 2000 Guidance Document 'Wind Energy Developments and Natura 2000'. European Commission, Brussels.

²³ Forrester, R.W., Andrews, I.J., McInerney, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C., & Grundy, D.S. (eds) (2007) *The Birds of Scotland*. The Scottish Ornithologists Club, Aberlady.

²⁴ Gilbert, G., Gibbons, D.W. & Evans, J. 1998. *Bird monitoring methods*. RSPB, Sandy.

²⁵ Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh

²⁶ Goodship, N.M. and Furness, R.W. (MacArthur Green) (2022) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

²⁷ Scottish Biodiversity List (2020) <https://www.nature.scot/doc/scottish-biodiversity-list> [Accessed 15/11/22]

²⁸ NatureScot (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action. SNH Guidance Note.

²⁹ NatureScot (2016a). *Assessing connectivity with Special Protection Areas (SPAs)*, Version 3.

³⁰ NatureScot (2016b). *Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees*, Version 2.

³¹ NatureScot (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*, Version 2.

- Assessing Significance of Impacts from Onshore Wind Farms on Birds Outwith Designated Areas³²;
- Assessing the Cumulative Impacts of Onshore Wind Farms on Birds³³;
- Environmental Impact Assessment Handbook³⁴;
- Natural Heritage Zone Bird Population Estimates³⁵;
- A Method for Censusing Upland Breeding Waders³⁶; and
- Common Birds Census Instructions³⁷.

11.2.2 Note that additional sources of information used only occasionally are referenced in the text where relevant.

11.3 Scoping Responses and Consultation

11.3.1 Consultation was undertaken with key stakeholders and consultees throughout the EIA process. Key comments from meetings and written consultation are summarised below, and in Table 11.1.

11.3.2 A Scoping Report was issued in November 2020 to allow consultees to comment on the proposed scope of ornithology surveys. Within the Scoping Report it was proposed that one year of ornithology surveys would be sufficient to inform the EcIA. It was stated that this would be confirmed in further consultation when the Year 1 surveys neared completion.

11.3.3 A further Consultation Letter was issued to NatureScot (NS) in August 2021 to request confirmation that the survey approach taken was sufficient to inform an impact assessment. A summary of Baseline Ornithology Survey results was provided, and Arcus stated that *"due to the low levels of bird activity recorded within the site and surrounding area, and the overall low ornithological value of the site, the risk the Proposed Development poses to local ornithological interests is low. It is anticipated that any potential impacts are likely to be able to be effectively mitigated through the implementation of good practices and standard mitigation. Arcus therefore considers that the one-year survey approach is sufficient to appropriately and robustly inform the EcIA required to be carried out for the Proposed Development"*.

11.3.4 In their response (as detailed in Table 11.1), NS confirmed that one year of surveys was sufficient to inform an impact assessment.

³² NatureScot (2018a). *Assessing significance of impacts from onshore wind farms on birds outwith designated areas*, Version 2.

³³ NatureScot (2018b). *Assessing the cumulative impacts of onshore wind farms on birds*. SNH Guidance Note.

³⁴ NatureScot (2018c). *Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*.

³⁵ Wilson, M.W., Austin, G.E., Gillings S. & Wernham, C.V. (2015) *Natural Heritage Zone Bird Population Estimates*. SWBSG Commissioned report number SWBSG_1504.

³⁶ Brown, A.F. and Shepherd, K.B. (1993) A method for censusing upland breeding waders. *Bird Study* 40, 189-195.

³⁷ Marchant, J. (1983) *Common Birds Census Instructions*. British Trust for Ornithology, Thetford.

Table 11.1: Key Consultation Responses

Consultee	Details	Summary of consultation response	Arcus response	Where addressed in EIA Report
NatureScot	Response to Scoping Report, dated 17/12/20	<p><i>"At this stage in our understanding of the proposal, we do not consider that this wind farm is likely to have an impact on any sites designated for their nature conservation interest".</i></p> <p><i>"We note the approach to the evaluation of the ornithological interest of the site and surrounding areas and to the assessment of potential impacts on birds throughout the construction and operational phases of the Proposed Development. As suggested, a discussion on preliminary survey results would be welcome, so we can determine as soon as possible whether a second year is required".</i></p>	<p>A Consultation Letter was sent to NS on 24/08/21 which detailed the surveys undertaken and a summary of results up to the date of issue.</p> <p>Based on the low levels of activity within the Survey Area and few sensitive species recorded, Arcus stated that they considered a single year of ornithology surveys sufficient to appropriately and robustly inform an EcIA.</p>	N/A
	Response to Consultation Letter, via email dated 10/09/21	<p><i>"The Proposed Development is about 16 km from the Firth of Forth SPA, so there is potential connectivity with the site's wintering pink-footed geese. Although only 8 non-breeding season flights were recorded, the vast majority above collision height, it would have been useful to see the flight lines and/or details of how many flights of each species were near collision risk height and the vantage point viewsheds.</i></p> <p><i>Given the potential connection to the SPA, we ask that a collision risk calculation for pink-footed geese is done, if the number of flights at potential collision risk allows. Other than that, we see no need for another year of survey findings".</i></p>	<p>Noted. Collision Risk Modelling (CRM) has been completed for pink-footed goose (<i>Anser brachyrhynchus</i>) as requested.</p>	<p>Vantage Point viewsheds are shown in Figure 11.2. CRM was completed for pink-footed goose, as outlined in Section 11.4 – Collision Risk Modelling Methodology.</p>

11.4 Assessment Methodology and Significance Criteria

Scope of Assessment

11.4.1 The key issues for the assessment of potential ornithological effects relating to the Proposed Development (as shown in **Figure 11.1**) are:

- Direct loss of breeding, foraging and/or roosting habitat through construction of the Proposed Development;
- Habitat modification due to change in land cover and consequent effects on bird populations and activity;
- Displacement of birds as a result of disturbance pressures associated with construction or decommissioning activity, turbine operation and maintenance, or visitor disturbance. This also includes barrier effects;
- Death or injury through collision with turbine blades or other types of infrastructure associated with the Proposed Development; and
- Cumulative effects on SPA and/or Natural Heritage Zone (NHZ) populations³⁵, resulting from construction, operation and decommissioning of the Proposed Development in conjunction with other developments that may also impact on the same populations.

Elements Scoped Out of Assessment

11.4.2 The following have been scoped out of the assessment:

- Impacts on Slamannan Plateau SPA/SSSI have been scoped out based on their distance from the site, and results of baseline surveys; and
- All statutory sites designated for ornithological interests that are located further than 20 km from the site were scoped out of the assessment as there is not considered to be any connectivity between bird populations from these statutory sites and the site.

Desk Study Methodology

11.4.3 A desk study was undertaken to provide information on the ornithological interest of the site and its surrounds, including the locations of any relevant statutory protected sites.

11.4.4 A search was made for all national statutory protected nature conservation sites within 10 km of the site designated for ornithological features, and for SPAs and Ramsar sites within 20 km. In addition, the following sources of information were consulted for the Desk Study exercise:

- NatureScot siteLink website³⁸ for statutory designated site information;
- Records of nesting/roosting eagle species within 6 km of the site, and other protected raptor species within 2 km, were obtained from the Central Raptor Study Group (CRSG) in November 2021 and an update provided during November 2022;
- Records of protected species (including avian records) within 5 km of the site were obtained from North Lanarkshire Council (NLC) in November 2021;
- A data request was made to the Royal Society for the Protection of Birds (RSPB) in November 2021 for the following records of bird species recorded within the last ten years: all records of protected species and

³⁸ <https://sitelink.nature.scot/home> [Accessed 03/11/22]

- species of conservation concern within 2 km of the site; and records of nesting/roosting eagle species within 6 km of the site; and
- Records of rare, notable and protected bird species within 5 km of the site were obtained from The Wildlife Information Centre (TWIC) in October 2021.

Baseline Survey Methodology

- 11.4.5 Baseline Ornithology surveys were completed for a one-year period between September 2020 and August 2021. Surveys were undertaken in line with prevailing NS guidance³¹; however, only one year of surveys were required as detailed in Table 11.1.
- 11.4.6 The Survey Areas used were based on a previous site Boundary, which was larger than the current site Boundary. The previous site Boundary used to define the Survey Areas are shown on **Figure 11.1.4** within **Appendix 11.1**.
- 11.4.7 The Baseline Ornithology Survey programme comprised the following:
- Flight Activity Surveys (FAS): September 2020 to August 2021;
 - Breeding Bird Surveys: April to July 2021; and
 - Breeding Raptor Surveys: March to August 2021.
- 11.4.8 For each survey, behavioural observations of the relevant species and other evidence of species presence were recorded in the field on large scale maps. Survey timings and weather conditions were also recorded for each survey visit; full details are presented in Appendices 11.1: Baseline Ornithology Report 2020-21 and 11.2: Baseline Ornithology Report 2020-21 – Confidential Annex.
- 11.4.9 The following were scoped-out of the Baseline Ornithology Surveys:
- Wintering goose and swan surveys were scoped-out as the site is not within a known pink-footed goose foraging area³⁹, and therefore surveys were not required³¹. Additionally, although Slamannan Plateau SPA/site of Special Scientific Interest (SSSI) (designated for taiga bean goose [*Anser fabalis fabalis*]) is within 10 km of the site, the site is outwith the mapped distribution of taiga bean geese, which are faithful to Slamannan Plateau and a small surrounding area; and
 - Two years of baseline surveys were scoped out in consultation with NS (see Table 11.1), based on the location of the site, and results of surveys which showed low levels of activity by key species.

Flight Activity Surveys

- 11.4.10 FAS were completed between September 2020 and August 2021 (inclusive) to record target species flight activity over the site and a surrounding 500 m buffer. Full details of methods used for FAS are outlined in Appendix 11.1.
- 11.4.11 FAS involved a series of watches from two Vantage Points (VPs) which afforded good views over the site and a surrounding 500 m buffer, in line with NatureScot guidance³¹. VPs and viewsheds are shown on **Figure 11.2**. In accordance with this guidance, flight lines of all target species that passed through the VP viewsheds were mapped in the field. Each recorded flight line

³⁹ Mitchell, C. 2012. *Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland*. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

was numbered and cross-referenced to the following flight information, which was recorded on standardised survey forms:

- Species, age and sex (where identification of age/sex is possible);
- Number of birds;
- Time (when first seen);
- Duration of flight; and
- Flight height on detection and at 15 second intervals, recorded in a series of height bands. The height bands were as follows:
 1. 0-20 m;
 2. 20-40 m;
 3. 40-150 m; and
 4. >150 m.

11.4.12 In addition to recording target species flight activity, in accordance with NS guidance, activity of secondary species was summarised during surveys.

11.4.13 FAS covered all times of day including dawn and dusk periods. Each watch lasted three hours with a minimum 30-minute break in between watches.

Target and Secondary Species

11.4.14 Target species included the following:

- All wild swan, goose (except Canada goose (*Branta canadensis*)) and duck (except mallard (*Anas platyrhynchos*)) species;
- All raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)⁷ and/or Annex I of the Birds Directive³; and
- All wader species.

11.4.15 Secondary species included the following: Canada goose, mallard, grey heron (*Ardea cinerea*), cormorant (*Phalacrocorax carbo*), sparrowhawk (*Accipiter nisus*), buzzard (*Buteo buteo*), kestrel (*Falco tinnunculus*) and raven (*Corvus corax*).

Survey Effort

11.4.16 In line with NS guidance³¹, 72 hours of survey effort was completed at each VP, with 36 hours per VP completed during the breeding season (March to August inclusive) and 36 hours during the non-breeding season (September to February inclusive).

11.4.17 Full details of survey dates, times and weather conditions are presented in Tables A3.1 and A3.2, **Appendix 11.1**.

Breeding Bird Survey

11.4.18 A Breeding Bird Survey was completed between April and June 2021 (inclusive) to identify breeding wader territories in areas of open ground. The Survey Area aimed to cover all potentially suitable habitat within the site Boundary and a surrounding 500 m buffer area (access permitting) as shown in **Figure 11.3**. In line with NS guidance³¹, surveys followed a modified version of the Brown and Shepherd (1993) method³⁶.

11.4.19 Four survey visits were completed, at least seven days apart and in suitable weather conditions, between April and July. All bird species seen or heard were recorded on large scale maps using standard British Trust for Ornithology

(BTO) species codes, and Common Birds Census (CBC)³⁷ symbology to denote behaviour.

- 11.4.20 Following all four survey visits, territory analysis was completed to map territories of non-passerine species of conservation concern²¹ and Schedule 1⁷ passerines. The method was based on that described by Bibby (2000)⁴⁰, with an element of professional judgement.
- 11.4.21 A precautionary approach was followed with a bird deemed to be holding a territory if breeding behaviour was observed or pairs of birds were observed in suitable habitat during just one of the four BBS visits, or if a single bird was observed in the same area of suitable breeding habitat during multiple survey visits. Full details are contained within **Appendix 11.1**.
- 11.4.22 Details of survey dates, times and weather conditions are presented in Table A3.3, **Appendix 11.1**.

Breeding Raptor Surveys

- 11.4.23 In line with NS guidance³¹ and best practice²⁵, walkover surveys and ad-hoc short VP watches of suitable areas of breeding habitat were undertaken between April and July 2021 (inclusive) to detect target raptor species (all Schedule 1 and Annex I raptor species, including owls).
- 11.4.24 Six survey visits were completed, at least seven days apart and in suitable weather conditions, between March and August 2021. The Survey Area comprised suitable habitat within the site and a surrounding 2 km buffer (1 km for goshawk and barn owl) in line with NS guidance³¹.
- 11.4.25 Details of survey dates, times and weather conditions are presented in Table A3.4, **Appendix 11.1**.

Collision Risk Modelling Methodology

- 11.4.26 The Collision Risk Model (CRM) methods were based on Band *et al.* (2007)¹⁸. Data collected during the FAS were used to predict the number of individuals per species expected to collide with the turbine rotors.
- 11.4.27 Height bands 2 (20-40 m), 3 (40-150 m) and 4 (>150 m) all overlapped either wholly or partially with the Rotor Swept Height (RSH) of the Proposed Development (30-200 m).
- 11.4.28 Therefore, a 'worst-case scenario' approach was adopted and all target species flights recorded within height bands 2, 3 and 4 that passed within the Collision Risk Zone (CRZ) were considered to be at potential risk of collision and included in the CRM (where sufficient flight activity was recorded).
- 11.4.29 CRM was completed for the following two target species:
- Pink-footed goose; and
 - Peregrine (*Falco peregrinus*).
- 11.4.30 All other target species listed in the NS guidance³² as 'Priority Species for Assessment' or as qualifying species of statutory designated species identified in Section 11.5 were scoped out based on their low levels of flight activity

⁴⁰ Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). *Bird Census Techniques*, 2nd edition. Academic Press, London.

(fewer than three flights recorded during a season, and/or fewer than ten birds recorded during a season), or lack thereof, within the CRZ. Full details of the CRM methodology are presented in **Appendix 11.3** – Collision Risk Modelling.

- 11.4.31 CRM was completed separately for particular seasons (breeding and non-breeding), with the estimate based on the observed occupancy rate and the number of potentially active minutes in that period. Seasons were defined in accordance with NS guidance on species-specific breeding seasons⁴¹.
- 11.4.32 In addition, as flight activity by wildfowl is likely to include some nocturnal flights, for these species, 25% of nocturnal hours was added to the available daylight hours. This increased the total time period when birds could potentially be flying, thus allowing a precautionary approach for the CRM calculations

Methodology for the Assessment of Effects

- 11.4.33 The approach used for the Ecological Impact Assessment (EcIA) process is in line with guidance produced by the Chartered Institute of Ecology and Environmental Management (CIEEM)²⁰ and NS, and comprises the following stages:
- Evaluation of the importance of ornithological features through Desk Study and Baseline Ornithology Surveys – those considered to be of regional or higher importance are classed as IOFs are scoped into the assessment, while species considered to be of local importance are scoped out.
 - Identification and characterisation of potential effects on IOFs.
 - Assessment of potential effects on IOFs, both from the Proposed Development alone and in combination with other developments in the surrounding area (cumulative effects).
 - Identification of any measures required to avoid and mitigate (reduce) these effects.
 - Assessment of the significance of any residual effects after mitigation and implementation of HMP measures.
- 11.4.34 Further details relating to the methods used for evaluating the importance of ornithological features, characterising potential impacts, and assessing the significance of residual effects are provided below.

Sensitivity of Receptors

- 11.4.35 Ornithological features can be important for a variety of reasons, which may relate, for example, to statutory designations (for protected sites), or (for species) to rarity, the extent to which they are threatened throughout their range, or to their rate of decline.
- 11.4.36 The importance of ornithological features relevant to the site, as identified during the Desk Study and Baseline Ornithology Surveys, has been determined using the criteria defined in Table 11.2. These criteria have been determined with reference to CIEEM guidance²⁰. For protected sites, this includes a consideration of statutory designations and relevant legislation, as well as potential connectivity to the site. For species, this includes a consideration of relevant legislation, conservation status, population size and distribution, level and type of site use and, where not a designated feature of an SPA or Ramsar

⁴¹ NatureScot (2009) *Bird Breeding Season Dates in Scotland* <https://www.nature.scot/doc/bird-breeding-season-dates-scotland> [Accessed 03/11/22]

site (with potential connectivity to the site), whether the species is identified in NS guidance³² as a priority for assessment when considering the Proposed Development of onshore wind farms in Scotland.

11.4.37 Note that, in some cases, information relating to the size (and distribution) of local and regional populations can be limited or unavailable. Where this is the case and it is not clear whether a population is present in locally versus regionally (or regionally versus nationally) important numbers, a precautionary approach is used and the population is assessed as being of the higher level of importance.

11.4.38 In addition to the importance of each bird species in terms of relevant legislation and conservation listings, the evaluation of species' importance also considers the value of the site and immediate surroundings for that species, in terms of the number of individuals using it and the nature and level of use. For example, if one or more pairs of birds listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) was found to be breeding within the site, the species would likely be assigned a regional or higher importance level (depending on population status and trends). However, if 1–2 Schedule 1 birds flew across the site very occasionally, and the species was not considered to be using it regularly, it would likely be assessed as being of low importance. Similarly, for protected sites, in addition to the statutory designations, the potential for connectivity with the site is taken into account when determining its importance in the context of the assessment. Thus, a statutory site identified during the Desk Study and designated as being of national or higher importance, but with no potential connectivity to the site, would likely be evaluated as being of no more than local importance in the context of the assessment, because there is no pathway for the Proposed Development to have an effect.

Table 11.2: Framework for Determining Importance of Ornithological Features

Importance level	Examples
International	<ul style="list-style-type: none"> • Statutory sites of international ornithological importance (SPAs and Ramsar sites) with potential connectivity to the site. • The regular presence⁴² within or around the site of a qualifying feature of an existing or proposed statutory site of international ornithological importance, i.e., SPA or Ramsar site, with potential connectivity to the site. Numbers of birds making use of the site and/or surrounding area are also taken into account. • The regular presence⁴² within or around the site of other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site (such as part of an assemblage where this is a qualifying feature), where there is potential connectivity with the site. Numbers of birds making use of the site and/or surrounding area are also taken into account.

⁴² Regular presence is based on professional judgement but is broadly defined as breeding, or more than occasional commuting, foraging or roosting activity.

Importance level	Examples
National (Scotland)	<ul style="list-style-type: none"> • Statutory sites of national ornithological importance (SSSIs and NNRs) with potential connectivity to the site. • The regular presence⁴² within or around the site of a designated feature of an existing or proposed statutory site of national ornithological importance, i.e., SSSI or National Nature Reserve (NNR), with potential connectivity to the site. Numbers of birds making use of the site and/or surrounding area are also taken into account. • The regular presence⁴² within or around the site of a species listed on Annex I of the Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), where the species is not a cited interest of a statutory site of international ornithological importance, but is present in nationally important numbers. • The regular presence⁴² within or around the site of nationally important numbers of a species of conservation concern⁴³, where this is identified in NS guidance³² as a priority for assessment. • The regular presence⁴² within or around the site of nationally important numbers of a migratory species which is either rare or vulnerable, or warrants special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas to a proposed development, and which is identified in NS guidance³² as a priority for assessment.
Regional (NHZ 17)	<ul style="list-style-type: none"> • A cited interest of an existing or proposed SPA or Ramsar site, with potential connectivity to the site, which is present within or around the site infrequently or in relatively low numbers, but could use the site more regularly post-construction. • Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to the site, which is present within or around the site infrequently or in low numbers, but could use the site more regularly post-construction. • Other species listed on Annex I of the Birds Directive, or breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that are present within or around the site infrequently or in low numbers (regionally or locally important numbers), but could use the site more regularly post-construction. • A regionally (i.e. at the NHZ scale) important population/assemblage of a species of conservation concern⁴³ that regularly occurs within or around the site, where this is identified in NS guidance³² as a priority for assessment.

⁴³ An SBL priority species or Red/Amber-listed BoCC

Importance level	Examples
Local	<ul style="list-style-type: none"> • Statutory sites of international or national ornithological importance (SPAs, Ramsar sites, SSSIs and NNRs) with no potential connectivity to the site. • sites of local ornithological importance (e.g., Local Nature Reserves (LNRs)). • A species present within or around the site infrequently or in low numbers that is not expected to show a significant increase in site use post-construction and which falls into one or more of the following categories: <ul style="list-style-type: none"> ▪ A species present within or around the site infrequently or in low numbers, and site use is not expected to increase significantly post-construction. ▪ A cited interest of an existing or proposed SPA or Ramsar site, with potential connectivity to the site; ▪ Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to the site, but which are present within or around the site infrequently or in low numbers, and site use is not expected to increase significantly post-construction. ▪ Other species listed on Annex I of the Birds Directive, or breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), that are present within or around the site infrequently or in low numbers, and site use is not expected to increase significantly post-construction ▪ Other species identified in NS guidance³² as a priority for assessment, but which are present within or around the site infrequently or in low numbers, and site use is not expected to increase significantly post-construction. ▪ A locally important population/assemblage of a species of conservation concern⁴³ that regularly occurs within or around the site, but is not identified in NS guidance³² as a priority for assessment and is unlikely to be at significant risk of impact from the Proposed Development.
Less than Local	<ul style="list-style-type: none"> • All other species that are widespread and common and of low conservation concern (e.g. included on the UK BoCC Green list²¹) and which are not present in locally important (or greater) numbers.

Characterisation of Potential Effects

11.4.39 In line with the CIEEM EcIA guidance²⁰ where possible, consideration is given to the following characteristics when identifying potential effects of the Proposed Development on ornithological features:

- **Nature of effect:** whether it is positive (beneficial) to ornithological features, e.g. by increasing species diversity or extending habitat, or negative (detrimental), e.g. by loss of, or displacement from, suitable habitat;
- **Extent:** the spatial or geographical area over which the effect may occur;
- **Magnitude:** the size, amount, intensity, and volume of the effect;
- **Duration:** the duration of an effect as defined in relation to ornithological characteristics (such as a species' life cycle) as well as human timeframes. It should also be noted that the duration of an activity may differ from the duration of the resulting effect; e.g. if short-term construction activities cause disturbance to breeding birds,

there may be long-term implications from failure to reproduce that season;

- **Frequency:** the number of times an activity occurs may influence the resulting effect; and
- **Timing:** this may result in an impact on an ecological feature if it coincides with critical life stages or seasons (e.g. the breeding season).

11.4.40 The criteria for assessing the magnitude of a potential effect are defined as follows:

- **High:** A fundamental change to the baseline condition of the IOF, leading to total loss or major alteration of the relevant population;
- **Medium:** A material change to the baseline condition of the IOF, leading to partial loss or alteration of the relevant population;
- **Low:** A slight, detectable, alteration of the baseline condition of the IOF; and
- **Negligible:** A barely distinguishable change from baseline conditions.

Significance of Effects

11.4.41 The latest CIEEM EcIA guidance²⁰ avoids and discourages use of the matrix approach to determining significance, and describes only two categories: 'significant' or 'not significant'.

11.4.42 According to the CIEEM guidance, for the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general.

11.4.43 NS guidance (2018a)³² refers to maintaining the favourable conservation status of a bird species (or not affecting its recovery) when assessing the significance of any wind farm impact. Conservation status is defined in this guidance as *"the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest (which for the purposes of the Birds Directive is the EU)"*.

11.4.44 Conservation status is considered to be "favourable" under the following circumstances:

- *"population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;*
- *the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and*
- *there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis"*.

11.4.45 Effects can be considered significant at a wide range of scales from international to local. NS recommends that "the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status". Thus, "An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland."

11.4.46 The site is located within NHZ 17, West Central Belt³⁵. For wintering or migratory species that are not designated features of statutory sites, there is limited information on NHZ populations; in this situation effects on the

conservation status of the Scottish population have been considered when determining whether potential effects are likely to be significant. In this assessment, any effect that could threaten the integrity of a statutory site designated for ornithological features or the favourable conservation status of a population is considered to be significant. Where this is not the case, effects are considered to be not significant.

Assessment Limitations

11.4.47 There were no limitations which impacted the assessment; minor survey limitations are noted in **Appendix 11.1**.

11.5 Baseline Conditions

Desk Study Results

Statutory Designated sites

11.5.1 Three statutory sites, two of international importance (with multiple designations) and one of national importance, were identified within 20 km of the site; details are provided in Table 11.3 below.

Table 11.3: Summary of Statutory sites Designated for Ornithological Interest within 20 km of the site, Listed in Order of Proximity

site name	Designation	Proximity to/ direction from the site Boundary*	Qualifying ornithological interests
Slamannan Plateau	SPA ⁴⁴ and SSSI ⁴⁵	9.5 km north-west	Non-breeding taiga bean goose.
Firth of Forth	SPA ⁴⁶ , SSSI ⁴⁷ and Ramsar site ⁴⁸	16.1 km north-east	<p>Non-breeding season</p> <ul style="list-style-type: none"> • Bar-tailed godwit (<i>Limosa lapponica</i>); • Common scoter (<i>Melanitta nigra</i>); • Cormorant (<i>Phalacrocorax carbo</i>); • Curlew (<i>Numenius arquata</i>); • Dunlin (<i>Calidris alpina</i>); • Eider (<i>Somateria mollissima</i>); • Golden plover (<i>Pluvialis apricaria</i>); • Goldeneye (<i>Bucephala clangula</i>); • Great crested grebe (<i>Podiceps cristatus</i>); • Grey plover (<i>Pluvialis squatarola</i>); • Knot (<i>Calidris canutus</i>); • Lapwing (<i>Vanellus vanellus</i>); • Long-tailed duck (<i>Clangula hyemalis</i>); • Mallard;

⁴⁴ Slamannan Plateau SPA. Available from: <https://sitelink.nature.scot/site/9184> (Accessed: May 2022)

⁴⁵ Slamannan Plateau SSSI. Available from: <https://sitelink.nature.scot/site/9171> (Accessed: May 2022)

⁴⁶ Firth of Forth SPA. Available from: <https://sitelink.nature.scot/site/8499> (Accessed: May 2022)

⁴⁷ Firth of Forth SSSI. Available from: <https://sitelink.nature.scot/site/8163> (Accessed: May 2022)

⁴⁸ Firth of Forth Ramsar Site. Available from: <https://sitelink.nature.scot/site/8424> (Accessed: May 2022)

site name	Designation	Proximity to/ direction from the site Boundary*	Qualifying ornithological interests
			<ul style="list-style-type: none"> • Oystercatcher (<i>Haematopus ostralegus</i>); • Pink-footed goose; • Red-breasted merganser (<i>Mergus serrator</i>); • Red-throated diver (<i>Gavia stellata</i>); • Redshank (<i>Tringa totanus</i>); • Ringed plover (<i>Charadrius hiaticula</i>); • Scaup (<i>Aythya marila</i>); • Shelduck (<i>Tadorna tadorna</i>); • Slavonian grebe (<i>Podiceps auritus</i>); • Turnstone (<i>Arenaria interpres</i>); • Velvet scoter (<i>Melanitta fusca</i>); • Waterfowl assemblage; and • Wigeon (<i>Mareca penelope</i>). <p>Passage</p> <ul style="list-style-type: none"> • Sandwich tern (<i>Thalasseus sandvicensis</i>).
*At the closest point.			

Existing Records of Protected Species

Central Raptor Study Group

11.5.2 The CRSG returned records of breeding peregrine within 2 km of the site. Further details are presented in **Appendix 11.2**.

North Lanarkshire Council Records

11.5.3 NLC returned a single record of barn owl within 2 km of the site. Further details are presented in **Appendix 11.2**.

RSPB Records

11.5.4 The RSPB were consulted for records within 2 km of the site, but stated that they held no relevant records.

The Wildlife Information Centre Records

11.5.5 TWIC were consulted for records within 5 km of the site recorded within the last ten years (2010 onwards). It should be noted that the majority of records were only provided as two-figure grid references, and therefore precise locations are unknown. For this reason, records have not been mapped. It is possible that some of these species have bred within 2 km of the site in the past ten years however the majority of records did not include information on breeding status.

- 11.5.6 Records included the following notable species: quail (*Coturnix coturnix*), oystercatcher, lapwing, curlew, common sandpiper (*Actitis hypoleucos*), redshank, barn owl and kingfisher (*Alcedo atthis*).

Baseline Surveys

- 11.5.7 A summary of key results recorded during the Baseline Ornithology Surveys is provided below. Additional details are presented in Appendices 11.1 and 11.2.

Flight Activity Surveys

- 11.5.8 A total of 38 flights by seven target species was recorded during FAS. Pink-footed goose was the species recorded most frequently with a total of 12 flights, followed by curlew and peregrine (eight flights of each species). All other target species, greylag goose (*Anser anser*), teal (*Anas crecca*), lapwing (*Vanellus vanellus*, golden plover and merlin (*Falco columbarius*), were recorded in very low numbers with fewer than eight flights of each species recorded across the survey period.

- 11.5.9 A summary of all target species flights recorded during FAS, broken down by species, is provided in Table 11.4. Full details of each target species flight are presented in Appendices 11.1 and 11.2.

Table 11.4: Summary of Target Species Flights Recorded During the 2020-2021 FAS

Species*	Conservation listings**	Number of flights			No. of birds per flight
		Breeding season (Mar-Aug 2021)	Non-breeding season (Sept 2020-Feb 2021)	Total	
Greylag goose	Amber	2	1	3	2-28
Pink-footed goose	Amber	4	8	12	2-110
Teal	Amber	-	1	1	5
Lapwing	Red, SBL	1	1	2	4-6
Golden plover	Ann I; SBL	2	1	3	18-31
Curlew	Red, SBL	7	1	8	1-4
Merlin	Sch 1; Ann I Red, SBL	-	1	1	1
Peregrine	Sch1, Ann I, SBL	8	0	8	1
Total no. of flights		24	14	38	
<p>*Species names and order follow the British List maintained by the BOU¹ **Ann I = species listed on Annex I of the Birds Directive³; Sch 1 = species listed on Schedule 1 of the Wildlife and Countryside Act (as amended)⁷; Red = UK Birds of Conservation Concern (BoCC) Red list species²¹; Amber = UK BoCC Amber list species²¹; SBL = species included as priority species on the Scottish Biodiversity List²⁷</p>					

Breeding Bird Surveys

- 11.5.10 Six non-passerine species (including one listed on Schedule 1, namely peregrine) and a single Schedule-1 passerine species (crossbill (*Loxia curvirostra*) showed evidence of breeding or holding territory within the Study Area. Of these, the only territory identified within the site Boundary was that of tawny owl (*Strix aluco*). The other four breeding species identified within the 500 m of the site Boundary were mallard, curlew, black-headed gull (*Chroicocephalus ridibundus*) and kestrel (*Falco tinnunculus*).
- 11.5.11 As peregrine and crossbill are listed on Schedule 1, full details of breeding territories are provided in **Appendix 11.2**. Territory numbers of the other four breeding species are summarised in Table 11.5, with approximate breeding territory locations within the Study Area shown in **Figure 11.4**. Territory locations are shown as the approximate mid-point of observations that were used to identify the territory.

Table 11.5: Total Numbers of Non-confidential Confirmed and Potential Breeding Bird Territories recorded during the 2021 BBS

Species*	Conservation listings**	Number of Territories	
		Within site Boundary only	Within 500 m Buffer only
Mallard	Amber	-	1
Curlew	Red, SBL	-	2
Black-headed gull	Amber, SBL	-	4
Tawny owl	Amber	1	-
Kestrel	Amber, SBL	-	1

*Species names and order follow the British List maintained by the BOU¹
**Red = UK BoCC Red list²¹; Amber = UK BoCC Amber list²¹; SBL = species included as priority species on the Scottish Biodiversity List²⁷

Breeding Raptor Surveys

- 11.5.12 One Schedule 1⁷ target raptor species, peregrine, was recorded during the 2021 Breeding Raptor Surveys, with evidence of breeding behaviour observed. Further details are provided in **Appendix 11.2**.
- 11.5.13 Secondary raptor species recorded included sparrowhawk (*Accipiter nisus*), buzzard (*Buteo buteo*), and kestrel all of which were either confirmed or suspected to be breeding within the Survey Area.

Collision Risk Modelling Results

- 11.5.14 For each species for which CRM was completed, the annual/seasonal risks of collision and number of years per collision, (a) assuming no avoidance and (b) using species-specific avoidance rates recommended by NS⁴⁹, are presented in Table 11.6.

⁴⁹ NatureScot (2018) Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model [Online] Available at: <https://www.nature.scot/wind-farm-impacts-birds-use-avoidance-rates-snh-wind-farm-collision-risk-model> [Accessed 03/11/22]

Table 11.6: Estimated Seasonal Collision Risk and Number of Years per Collision for Species for Which CRM Was Completed

Species	Period	Annual collision risk (no. of birds killed)		No. of years per collision	
		Assuming no avoidance	Using species-specific avoidance rates*	Assuming no avoidance	Using species-specific avoidance rates*
Pink-footed goose	2020-21 non-breeding season**	155.285	0.311	0.006	3.220
Peregrine	2021 breeding season**	0.746	0.015	1.340	67.020

*As per NS guidance⁴⁹, this was 99.8% for pink-footed goose and 98% for peregrine.
**Both species were recorded during FAS in a single season only, and therefore these values also represent the predicted annual collisions for each species.

Future Baseline

11.5.15 As construction is currently proposed to start in 2025, approximately two years from submission, it is necessary to consider possible changes to baseline conditions during the intervening period. No substantial habitat modifications or changes that could influence ornithological interest are foreseen, and therefore it is considered unlikely that the future baseline will change from that assessed within this Chapter.

Embedded Mitigation

11.5.16 Ornithological features have been considered at all stages of the Proposed Development design, from initial feasibility to final layout.

11.5.17 Standard good practice measures⁵⁰ will also be implemented during construction to ensure compliance with relevant legislation protecting all breeding wild birds. This will also help to reduce impacts on IOFs and other ornithological features.

11.5.18 Under the Wildlife and Countryside Act 1981 (as amended)⁵ it is an offence to intentionally or recklessly kill or injure any bird, or to damage or destroy active nests and eggs. Breeding species listed on Schedule 1 of the Act are afforded additional protection from disturbance. As such, a Bird Protection Plan (BPP) will be produced prior to construction, to safeguard birds and ensure legislative compliance during all stages of the Proposed Development, a summary of which is provided below.

Bird Protection Plan

11.5.19 Construction Phase mitigation measures include, but are not limited to:

- Ecological Clerk of Works (ECoW): To ensure that mitigation measures are reactive to changing conditions on site and compliance with legislation protecting breeding birds, it is recommended that a suitably experienced and qualified ECoW attends site regularly during the

⁵⁰ NatureScot (2016) *Dealing with Construction and Birds*. Guidance.

breeding season to make observations of birds present in and around areas where works are planned, and identify any potential constraints to Development works.

- Toolbox talk: A 'toolbox talk' will be delivered by a suitably experienced ECoW to ensure that all contractors working on the Proposed Development are aware of ornithological sensitivities and relevant legislation.
- Timing of works: Given the anticipated construction period, construction work will take place during the peak breeding season (March to August). However, no works will start during the breeding season without first establishing the status of breeding birds, notably Schedule 1-listed species, within likely disturbance distances of the proposed works.
- Vegetation removal: Where possible, any removal of vegetation, including grassland and moorland habitats, will take place outside of the breeding season. Any vegetation removal during the breeding season will be subject to additional safeguards and nesting bird checks by the ECoW, with appropriate exclusion areas instated if any nests are located.
- Pre-construction survey for breeding crossbill species: Crossbill has a protracted breeding season and NS have defined the breeding season for this species as January to mid-December⁵¹. If any felling is required, precautions must be taken to avoid potential disturbance to nesting birds or destruction of active nests. A pre-construction survey of areas of suitable habitat for nesting crossbill species within 150 m of works will be completed ahead of any operations, regardless of the time of year, by a suitably experienced and qualified ECoW (with a license to survey Schedule 1 birds), to check for evidence of breeding or active nests.
- Pre-construction survey for other breeding birds (including barn owl): Where construction works are required during the breeding bird season, areas of suitable nesting habitat within 100 m of works should be surveyed ahead of any operations (extending to 200 m where suitable habitat for breeding curlew is present), by a suitably experienced and qualified ECoW, to check for active nests of all bird species (excluding crossbill species, which are covered above). Where there is suitable habitat for nesting Schedule 1 species, the survey area will be extended to the maximum buffer distance for the relevant species recommended by NS²⁶.
- Protection of other nesting birds: It is an offence to intentionally or recklessly kill or injure any bird, or to damage or destroy active nests and eggs. If any active nests are identified during pre-construction surveys which could be damaged or destroyed, an exclusion zone around the nest/breeding territory will be established. No works will be permitted within the exclusion zone and no personnel or vehicles will be allowed to enter or pass through until the ECoW has confirmed that the nesting attempt has reached a natural conclusion. Where this is not feasible, NS will be contacted and further mitigation measures agreed to ensure that nesting birds are not disturbed.
- Minimising disturbance from site vehicles: Where construction works are required during the breeding bird season, mitigation measures to limit the impact of vehicular disturbance will be implemented. This will include measures such as no idling of vehicles, appropriate speed restrictions and dust suppression measures on site.

⁵¹ NatureScot (2009) *Bird Breeding Season Dates* <https://www.nature.scot/doc/bird-breeding-season-dates-scotland> [Accessed 07/11/22]

- 11.5.20 Routine maintenance required during operation is expected to be minimal, limited to small areas and of temporary duration. However, should significant operational works (for example widespread track upgrades or turbine replacement) be required during the breeding bird season, it is recommended that the mitigation measures outlined above for the construction phase are implemented to protect breeding birds and ensure compliance with the relevant legislation, in consultation with NS if necessary.
- 11.5.21 As decommissioning works are likely to be of a similar nature and duration as construction activities, the mitigation outlined above for construction works should also be implemented during the decommissioning phase, in order to protect breeding birds.

11.6 Assessment of Potential Effects

Potential Effects on Birds

- 11.6.1 The main ways in which a wind farm may affect IOFs are via:
- Habitat loss due to land-take;
 - Habitat modification;
 - Disturbance/displacement;
 - Barrier effects; and
 - Collision with turbines.
- 11.6.2 Each of these potential effects during each phase of the Proposed Development life cycle (construction, operation and decommissioning) is discussed in turn below.
- 11.6.3 In addition, as noted previously, cumulative effects may arise as a result of the combined effects of multiple wind farms affecting the same bird population. Cumulative effects are considered in Section 11.7.

Effects during Construction

Habitat Loss

- 11.6.4 Construction of turbine bases and associated infrastructure will lead to direct habitat loss. The severity of potential effects resulting from habitat loss is dependent on the extent of land-take, the type of habitat affected and the species using the site and surrounding area.
- 11.6.5 In total, an estimated 12.3 ha of habitats will be lost, equating to 11.6 % of the site. The majority of habitat loss (65%) will consist of coniferous plantation woodland, which comprises non-native species and is of low-value to IOF species, and birds in general. Further detail on habitat loss is presented in Chapter 7 - Ecology.

Habitat Modification

- 11.6.6 As part of the land-take, it is expected that a small amount (estimated 8 Ha) of coniferous woodland (plantation) will be felled. Coniferous plantation has negligible value for IOFs (and bird species in general) and there will be no loss of nesting/foraging habitat for IOF species. There will also be loss of small areas of grassland (unimproved acid grassland, unimproved/semi-improved neutral grassland, improved grassland and marshy grassland) totalling 3.40 ha. There will also be losses of small areas (0.5 ha or less) of broadleaved

plantation, mixed plantation, scrub, wet modified bog, flush/spring and bare ground. Full details can be found within Chapter 11 – Ecology.

- 11.6.7 Furthermore, as outlined in Chapter 11 – Ecology, Appendix 10.5, habitat management will be undertaken which will be beneficial for bird species, including IOFs.

Disturbance and Displacement

- 11.6.8 During the construction phase of the Proposed Development, there will be increased levels of activity by site personnel, vehicles, and machinery, resulting in increased levels of noise and visual disturbance. This could lead to the temporary displacement or disruption of breeding, foraging and/or roosting birds. The severity of potential effects depends on the following:

- The timing of works, with potential effects likely to be greatest during the breeding season.
- The magnitude of the disturbance (e.g. a vehicle driving slowly along the access track without stopping is likely to result in a relatively low or even negligible magnitude of disturbance, whereas a period of prolonged and noisy machinery operation involving numerous site personnel is likely to be of high magnitude).
- The extent of displacement (both spatially and temporally);
- The availability of suitable habitats in the surrounding area for displaced birds to occupy.
- The behavioural sensitivity of birds using the site (which is likely to vary between species).

Effects during Operation

Disturbance and Displacement

- 11.6.9 The operation of turbines and increased human activity associated with maintenance of the Proposed Development has the potential to cause disturbance and displace birds from the site. However, disturbance effects during the operational phase may be of a lower magnitude than during construction, as species may become habituated to turbines, and the level of human activity and associated disturbance on site will be considerably reduced compared to the construction phase.

Barrier Effects

- 11.6.10 Individual turbines, or a wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. Based on the location and size of the Proposed Development, presence of other wind farms in the wider area, habitats within the site and wider area, and target species flight activity, it is considered possible that there may be barrier effects for some IOFs.

Collision with Turbines

- 11.6.11 The frequency and likelihood of a collision occurring depends on a number of factors. These include aspects of the size and behaviour of the bird (including their use of the site), the nature of the surrounding environment and the structure and layout of the turbines. Birds that tend to fly above or below RSH are likely to collide less frequently than species that regularly fly at RSH. Collision risk is also likely to be higher for birds that spend much of the time in the air, such as foraging raptors and species that regularly commute between feeding and breeding or roosting grounds (e.g. geese and whooper swans),

where this involves frequent flights through an area. The risk of bird collisions at wind farms is also higher in areas where large concentrations of birds are present (e.g. on major migration routes or close to roost sites used by large numbers of birds).

- 11.6.12 It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense, i.e. a bird that avoids a wind farm due to disturbance cannot be at risk of collision with the turbine rotors at the same time. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid a wind farm but habituate to it, and could then be at risk of collision¹⁸.

Effects during Decommissioning

- 11.6.13 Turbine removal may cause disturbance to birds breeding, foraging or roosting on site. The level of impact will depend on the bird species present at the time of decommissioning and cannot be reliably predicted at this stage. However, as decommissioning activities are generally of a similar type and intensity as construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction, with the exception that habitat is likely to be restored and any displaced birds will be able to return to abandoned territories.

Evaluation of Ornithological Features

- 11.6.14 An evaluation of the importance of each species recorded is provided in Table 11.7. Species evaluated as being of Regional or higher importance are considered to be IOFs, while those of Local or lower importance are not considered to be IOFs and have been scoped out of the assessment in the following sections. Embedded mitigation outlined in Section 11.5 is considered sufficient to mitigate any potential adverse effects on these species.

Table 11.7: Evaluation of Ornithological Features Identified During the Desk Study and/or Baseline Ornithology Surveys

Importance level	Ornithological feature	Justification
International	Firth of Forth SPA/Ramsar site	<p>The Firth of Forth SPA⁴⁶/Ramsar site⁴⁸ is designated for non-breeding and breeding birds. The SSSI is located approximately 16.1 km to the north of the site at its closest point, and based on this, there is potential for connectivity²⁹ between the site and pink-footed geese which are a qualifying feature of the SSSI.</p> <p>Based on the distance between the SPA and the site, and the species recorded during baseline surveys, it is considered there is no connectivity between the site and any other qualifying features of the SPA.</p>
	Pink-footed goose	<p>Non-breeding birds are a cited interest of the Firth of Forth SPA⁴⁶/Ramsar site⁴⁸/ SSSI⁴⁷, and occasional pink-footed goose flights were recorded during FAS. Based on the known feeding distribution of birds associated with the SPA, it is considered unlikely that the site is situated between a key foraging area and the designated sites; however, as the Firth of Forth designations are within 20 km of the site (within the core foraging range for this species²⁹) there is the potential for connectivity.</p> <p>Pink-footed goose is also an Amber-listed BoCC identified in NS guidance³² as a priority species for assessment. Low to moderate levels of flight activity were recorded, with a total of twelve flights during FAS. Use of the site is unlikely to increase following construction.</p>
National	Peregrine	<p>Peregrine is a Schedule 1⁷ listed breeding bird, however is a relatively widespread breeding species in Scotland. The NHZ 17 population is estimated at 41 breeding pairs and the population has increased in recent decades. Peregrine is identified in NS guidance³² as a priority species for assessment.</p> <p>During FAS, eight flights were recorded, all of which were during the breeding season, while a single breeding territory was recorded during the Breeding Raptor Survey. Records of four territories which were active during 2022 were also provided by the local RSG during the desk study (of which two were further than 2 km from the site), one of which was the territory recorded during baseline surveys. Information relating to confirmed or potential breeding territories is provided in Appendix 11.2.</p>

Importance level	Ornithological feature	Justification
	Firth of Forth SSSI	<p>The Firth of Forth SSSI⁴⁷ is designated in part for non-breeding and breeding birds. The SSSI is located approximately 16.1 km to the north of the site at its closest point, and based on this, there is potential for connectivity²⁹ between the site and pink-footed geese which are a qualifying feature of the SSSI.</p> <p>Based on the distance of the SSSI and the species recorded during baseline surveys, it is considered there is no connectivity between the site and any other qualifying avian features of the SSSI.</p>
Regional	Curlew	<p>Curlew is not a designated feature of any SPAs with potential connectivity to the site, however it is a Red-listed UK BoCC²¹ identified in NS guidance³² as priority species for assessment.</p> <p>Curlew is a common and widespread breeding bird in Scotland, with an estimated population of 58,000 breeding pairs²³. However, data from the national Breeding Bird Survey organised by the BTO found that numbers of breeding curlew in Scotland declined by 61% between 1995 and 2017⁵². The NHZ 17 breeding curlew population is estimated at 2,303 pairs.</p> <p>Low levels of flight activity were recorded during FAS, with eight flights recorded, of which seven were during the breeding season. Curlew was also recorded breeding during the BBS, with two territories recorded within 500 m of the site Boundary. Due to the massive population declines which this species has suffered, as a precaution it has been assigned regional importance.</p>
	Barn owl	<p>Barn owl is not a designated feature of any SPAs with potential connectivity to the site; however it is listed on Schedule 1⁷ and the SBL. Barn owl is a widespread breeding bird in Scotland, with an estimated 500-1,000 breeding pairs²³.</p> <p>There were no records of barn owl during baseline ornithology surveys, however records of potentially breeding barn owl within the past ten years were provided during the desk study by TWIC and NLC (further details are provided in Appendix 11.2).</p>
Local	<ul style="list-style-type: none"> Slamannan Plateau SPA and SSSI 	<p>Based on the distance between these designated sites and the site (see Table 11.3), combined with the habitats present on site and the suite of species recorded during baseline surveys, it is considered there is no likely connectivity between the site and these designated sites. Therefore, although the statutory sites themselves are of international (SPA and Ramsar sites) or national (SSSIs) importance, in the context of the Proposed Development, they are considered to be of no more than Local importance.</p>

⁵² Harris, S.J., Massimino, D., Eaton, M.A., Gillings, S., Noble, D.G., Balmer, D.E., Pearce-Higgins, J.W. & Woodcock, P. (2019). *The Breeding Bird Survey 2018*. BTO Research Report 717. British Trust for Ornithology, Thetford.

Importance level	Ornithological feature	Justification
		There were no records of taiga bean goose during any surveys, therefore there is unlikely to be any connectivity between non-breeding taiga bean goose and the Proposed Development.
	<ul style="list-style-type: none"> • Greylag goose • Golden plover • Lapwing 	<p>Greylag goose and lapwing are listed as BoCC Amber and Red species respectively, while all three are identified in NS guidance³² as priority species for assessment.</p> <p>Low levels of flight activity were recorded for all species, and there were no records of any breeding territories. Use of the site is unlikely to increase following construction.</p>
	Merlin	Merlin is not a designated feature of any SPAs or Ramsar sites with potential connectivity to the site, however it is listed on Schedule 1 of the Wildlife and Countryside Act 1981 ⁷ (as amended). A single flight was recorded during FAS, and use of the site is unlikely to increase post-construction.
	<ul style="list-style-type: none"> • Tawny owl • Kestrel • Teal • Mallard • Black-headed gull 	Species of low to moderate conservation concern which are not designated features of any SPAs with potential connectivity to the site, or identified in NS guidance ³² as a priority species for assessment. These species were generally recorded in low numbers and it is considered unlikely that the Proposed Development would have a significant impact on local populations.
Less than local	All species not covered above (e.g. grey heron and other species listed on the UK BoCC Green list ²¹)	Species that are generally common and widespread and of low conservation concern and which are considered as being at low risk from wind farm developments.
*Note that good practice will be implemented during construction to protect all nesting birds (see Section 11.5: Embedded Mitigation), including species scoped out of the assessment		

Assessment of IOFs

- 11.6.15 Potential effects of the Proposed Development on each IOF are assessed below, with IOFs considered in BOU taxonomic order³. The assessment considers the significance of potential impacts following implementation of the embedded mitigation proposed in Section 11.5: Embedded Mitigation.

Features of International Importance

Firth of Forth SPA/Ramsar

- 11.6.16 Impacts on this feature are discussed in Section 11.10.

Pink-footed goose

- 11.6.17 Potential Construction Effects: Pink-footed goose was recorded occasionally during FAS; however, there were no records of any foraging birds and the site and immediate surrounds are outwith the key foraging areas used by birds associated with the Firth of Forth SPA³⁹. As such, no potential construction phase effects on pink-footed goose are predicted.
- 11.6.18 Potential Operational Effects: As noted above, pink-footed goose was recorded occasionally during FAS. Based on the 2020-21 FAS data, the CRM predicted an annual collision risk of 0.311⁵³ pink-footed geese or one collision every 3.220 years, and therefore there is the potential for 9-10 collisions during the 30-year lifespan of the Proposed Development. A total annual collision risk of 0.311 birds would represent <0.001% of the Firth of Forth SPA population (10,852 birds⁴⁶) and <0.001% of the NHZ population (16,237 birds³⁵).
- 11.6.19 It should be noted that the predicted collision rates are likely to be an overestimate. As height band 4 during FAS included any flights above 150 m, as a precaution, all flights within this band were considered to be at RSH within the CRM. However, it is likely that some of these flights were above 200m (RSH) and therefore were not at collision risk height.
- 11.6.20 There is the potential for barrier effects to arise if pink-footed goose commuting routes are altered by the Proposed Development. However, flights were only recorded occasionally during FA and although they broadly followed a north-north-west to south axis, there was no consistent commuting corridor apparent. Additionally, the small size of the site limits the potential for barrier effects.
- 11.6.21 Any changes to commuting routes are likely to be minor in comparison to the distance between the SPA and the site, it is considered that any barrier effects would be negligible.
- 11.6.22 As such, potential operational phase effects on pink-footed goose, are assessed as being of low magnitude and not significant.

⁵³ It is acknowledged that a collision of <1 of a bird is not possible; therefore, such values are interpreted as a single bird likely to be killed in some years but not others (hence the reporting of collision frequency).

Features of National Importance

Firth of Forth SSSI

- 11.6.23 As the Firth of Forth SSSI is located 16.1 km to the north of the site, there is potential connectivity to the site, but this is limited to the SSSI pink-footed goose population. As stated previously, there is the potential for impacts on pink-footed goose during the operational phase only, with the potential for collision and barrier effects. As no SSSI species were recorded within the site, there is no potential for habitat loss which would impact qualifying species, and there is no potential for direct impacts on the designated site.
- 11.6.24 Based on the 2020-21 FAS data, the CRM predicted an annual collision risk of 0.311⁵³ pink-footed geese or one collision every 3.220 years, and therefore there is the potential for 12-13 collisions during the 40-year lifespan of the Proposed Development. A total annual collision risk of 0.311 birds would represent <0.001% of the Firth of Forth SPA population (10,852 birds⁴⁶, no population was provided within the SSSI citation, but it is assumed to be the same as for the SPA since the boundaries of both designations are largely contiguous).
- 11.6.25 As stated previously, the predicted collisions are likely an overestimate, and it is possible that only some of the flights recorded were of birds associated with the SSSI. As stated previously, the potential for barrier effects is negligible.
- 11.6.26 As such, potential operational phase effects on the SSSI, are assessed as being of low magnitude and not significant.

Peregrine

- 11.6.27 Potential Construction Effects: Peregrine was recorded occasionally during FAS, with eight flights recorded, all during the breeding season. A single breeding territory was recorded during Breeding Raptor Surveys (See **Appendix 11.1** for details), with the nest located more than 750 m from proposed turbine locations and associated infrastructure.
- 11.6.28 In addition, the local RSG provided records of four historic peregrine territories, of which one was the breeding location recorded during baseline surveys. All other records provided were further than 750 m from proposed turbine locations and associated infrastructure (See **Appendix 11.2** for details).
- 11.6.29 As all known peregrine breeding locations are beyond the recommended disturbance distance of 750 m²⁶, if peregrine was to breed at these locations during the construction phase there is unlikely to be any risk of disturbance or displacement, and the embedded mitigation outlined in Section 11.5 will also be implemented to protect all breeding birds, including peregrine. There will be no loss of suitable nesting habitat associated with construction of the Proposed Development, and it is likely that habitat for prey species will be enhanced following implementation of HMP measures.
- 11.6.30 As such, potential construction phase effects on peregrine, are assessed as being of negligible magnitude and not significant.
- 11.6.31 Potential Operational Effects: As noted above, peregrine was recorded occasionally during FAS. Additionally, a single pair was recorded breeding

further than 750 m from proposed turbine locations and associated infrastructure.

- 11.6.32 Due to the distance of the nest from proposed turbine locations and associated infrastructure, which is beyond the recommended disturbance distance for this species²⁶, it is unlikely there would be any disturbance or displacement of breeding peregrine during the operational phase. There is not considered to be any potential for barrier effects.
- 11.6.33 Based on the 2020-21 FAS data, the CRM predicted an annual collision risk of 0.015⁵³ peregrine or one collision every 67.020 years, and therefore it is unlikely that there would be a collision during the 40-year lifespan of the Proposed Development. A total annual collision risk of 0.015 birds would represent <0.001% of the NHZ 17 population (41 pairs³⁵).
- 11.6.34 As such, potential operational phase effects on peregrine, are assessed as being of negligible magnitude and not significant.

Features of Regional Importance

Curlew

- 11.6.35 Potential Construction Effects: Curlew was recorded occasionally during FAS, with eight flights recorded, seven of which were during the breeding season. Two breeding territories were recorded during Breeding Bird Surveys (as shown on **Figure 11.4**), located more than 500 m from infrastructure.
- 11.6.36 As both breeding territories were located beyond the recommended disturbance distance of 300 m²⁶, there is unlikely to be any risk of disturbance or displacement to breeding curlew during the construction phase, and the embedded mitigation outlined in Section 11.5 will also be implemented to protect all breeding birds, including curlew. There will be minimal loss of suitable nesting habitat associated with construction of the Proposed Development, and it is likely that breeding habitat will be enhanced following implementation of HMP measures.
- 11.6.37 As such, potential construction phase effects on curlew, are assessed as being of negligible magnitude and not significant.
- 11.6.38 Potential Operational Effects: As noted above, curlew was recorded occasionally during FAS. Additionally, two pairs were recorded breeding during Breeding Bird Surveys, outwith the maximum stated disturbance distance for curlew²⁶.
- 11.6.39 Results of a study by Pearce-Higgins et al. (2009)⁵⁴ indicated that breeding curlew could be displaced from 800 m around operational turbines. In contrast, a long-term monitoring study by Whitfield *et al.* (2010)⁵⁵ found no evidence that curlew were displaced due to wind farm infrastructure. The closest curlew territory to the site (located to the north) was located approximately 830 m from the nearest turbine. Therefore, it is considered unlikely that there would be any disturbance or displacement of breeding curlew during the operational phase. Additionally, the other curlew territory (to the north-east of the site) is

⁵⁴ Pearce-Higgins, J.W. Stephen, L. Langston, R.H.W. Bainbridge, I.P. & Bullman, R. (2009) The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology* 46, 1323-1331.

⁵⁵ Whitfield, D.P. Green, M. & Fielding, A.H. (2010). Are *breeding Eurasian curlew* *Numenius arquata* displaced by wind energy developments? Natural Research Projects Ltd, Banchory, Scotland.

situated approximately 290 m from an existing wind turbine, closer than any of the proposed turbine locations. This suggests that the pair breeding here may be habituated to the presence of operational turbines (or tolerant to operational disturbance 290 m away) and are unlikely to be disturbed by the presence of additional operational turbines further away.

- 11.6.40 FAS data was analysed and CRM for curlew during both the breeding and non-breeding season was scoped-out. No CRM was completed for curlew during the non-breeding season, as only a single flight was recorded. Although curlew was recorded in flight occasionally during the breeding season FAS, all seven flights were within open ground to the north of proposed turbine locations, indicating that flight behaviour was associated with the breeding territories, rather than being randomly distributed across the VP viewsheds. All five flights recorded at RSH were further than 500 m from the nearest turbine, and therefore there is very low risk of collision. No barrier effects are anticipated.
- 11.6.41 As such, potential operational phase effects on curlew, are assessed as being of negligible magnitude and not significant.

Barn Owl

- 11.6.42 Potential Construction Effects: Barn owl was not recorded during any Baseline Ornithology Surveys, however desk study records for this species were provided by NLC and TWIC. These included a record of barn owl present within a nest box during 2012 (provided by NLC); however, no information relating to breeding and/or roosting status was provided. Records provided by TWIC did not provide any details of breeding status, or precise locations. Further details relating to the NLC record can be found within **Appendix 11.2**.
- 11.6.43 The NLC record is located more than 500 m from the nearest proposed turbine and associated infrastructure, beyond the stated disturbance distance of 100 m²⁶. Therefore, there is unlikely to be any risk of disturbance or displacement if barn owl was to breed at this location during the construction phase. There will be no loss of suitable nesting habitat associated with construction of the Proposed Development.
- 11.6.44 As such, potential construction phase effects on barn owl, are assessed as being of negligible magnitude and not significant.
- 11.6.45 Potential Operational Effects: As stated previously, there was no record of breeding barn owl during Baseline Ornithology Surveys; however, NLC did provide a record of barn owl present in a nest box. Based on the distance of this record (further than 500 m from the nearest turbine, beyond the maximum disturbance distance of 100 m²⁶), no disturbance or displacement is predicted during the operational phase.
- 11.6.46 No barn owl flights were recorded during FAS, and therefore no CRM for this species was completed. Based on this species behaviour (whereby flight activity is close to the ground and likely below RSH) and the distance from the desk study record to the nearest turbine, it is considered that collision risk for this species is negligible.
- 11.6.47 Although the HMP measures may enhance suitability of foraging habitat compared with pre-construction, more optimal foraging habitat (such as grassland) is present in the wider area and site use by barn owl is not expected increase significantly post-construction. There is not considered to be any potential for barrier effects to barn owl.

- 11.6.48 As such, potential operational phase effects on barn owl, are assessed as being of negligible magnitude and not significant.

11.7 Assessment of Cumulative Effects

- 11.7.1 Potential cumulative effects can include direct habitat loss, disturbance, barrier effects and collision risk. The potential for the Proposed Development to make a material contribution to cumulative effects on IOFs is assessed below following NS guidance³³. The potential for each of these potential effects is considered in turn below.

There are a number of operational and proposed onshore wind farms within the NHZ which could result in cumulative impacts on IOFs, including the operational Torrance Wind Farm and Torrance Wind Farm Extension I which are immediately adjacent to the site.

Cumulative Habitat Loss

- 11.7.2 Habitat loss as a result of construction is relatively low at 12.65 ha, with the majority of habitat loss comprising coniferous plantation. Given that most of the habitat loss is of low value to key ornithological species and that implementation of HMP measures will result in benefits for IOF species.

Cumulative Disturbance and Displacement

- 11.7.3 As no disturbance or displacement is anticipated from the proposed Development, no cumulative assessment is required.

Cumulative Barrier Effects

- 11.7.4 Barrier effects are considered possible for pink-footed goose only and are predicted to be negligible. Pink-footed goose was recorded only occasionally during FAS, and the site and surrounding area is not within a key foraging area for the Firth of Forth SPA³⁹, therefore regular commuting flights are considered unlikely and that barrier effects are unlikely.
- 11.7.5 Additionally, as flights were recorded to the east of the site close to operational turbines, it is considered unlikely that there would be any barrier effects from the Proposed Development. As noted previously, as all flights recorded in height band 4 were considered to be at RSH as a precaution, and it is likely that some of these flights were actually above RSH. Even if pink-footed geese occasionally changed their flight path to avoid the Proposed Development, any additional energy expenditure is likely to be minimal in the context of pink-footed goose core foraging distances²⁹ and therefore have a negligible impact.
- 11.7.6 Consequently, it is considered that the magnitude of cumulative barrier effects is negligible and therefore not significant.

Cumulative Collision Risk

- 11.7.7 CRM was undertaken for pink-footed goose and peregrine only. Total pink-footed goose collisions were predicted to be 0.311 birds annually or one collision every 3.220 years, and therefore there is the potential for 12-13 collisions during the 40-year lifespan of the Proposed Development. As stated previously, due to the height bands used in FAS, the predicted collision risk is likely overestimated.

- 11.7.8 Due to the low number of collisions predicted, the high avoidance rate of geese (99.8% avoidance⁴⁹) and the size of the NHZ (16,237 individuals) and SPA (10,852) populations, it is considered that the collision risk posed by the Proposed Development is negligible.
- 11.7.9 An annual collision risk of 0.311 birds would equate to <0.001% of the NHZ and SPA populations, and therefore is unlikely to have any material impact upon the pink-footed goose population at a regional level. It is considered that the collision risk is so small in the context of the overall population and that a cumulative assessment of collision risk can be scoped out.
- 11.7.10 Similarly, CRM predicted very low collision risk for peregrine, with no collisions predicted during the operational lifespan of the wind farm. A total of 0.015 annual collisions was predicted, which equates to <0.001% of the NHZ population (41 pairs³⁵), and therefore is unlikely to have any material impact upon the peregrine population at a regional level. It is considered that the collision risk is so small in the context of the overall population and that a cumulative assessment of collision risk can be scoped out.

11.8 Mitigation Measures and Monitoring

- 11.8.1 As no significant effects are predicted on IOFs, no further mitigation measures are proposed.

Habitat Enhancement

- 11.8.2 Habitat enhancement is proposed within Chapter 10 – Ecology, Appendix 10.5 which will provide benefits for breeding birds, including IOF species. Native woodland coverage will be increased, which will provide habitat to woodland species, while creation of wader scrapes will provide foraging habitat for breeding waders and their chicks.

Monitoring

- 11.8.3 In order to validate the assessment and determine the effectiveness of habitat management (notably wader scrapes), ornithological monitoring should take place during and post-construction. Monitoring requirements have been determined in line with NS guidance⁵⁶. An Ornithological Monitoring Plan will be produced providing details of the methods and survey effort required, and will be agreed with consultees including NS and the RSPB. Annual surveys should include the following:
- 11.8.4 Raptor and Owl Monitoring – Breeding Raptor Surveys will be undertaken, with a minimum of four survey visits between March and August to identify any breeding raptor territories within 1 km of the turbine locations and associated infrastructure, following methods described in Hardey et al. (2013).
- 11.8.5 Breeding Wader Monitoring – A Breeding Wader Survey will be undertaken, with a minimum of four survey visits between mid-April and early July to identify any breeding wader territories within 500 m of the turbine locations and associated infrastructure, following the methods used during baseline surveys.
- 11.8.6 Scrape Condition Monitoring - the condition of scrapes and marginal habitats will be recorded one month prior to the commencement of the breeding wader

⁵⁶ NS (2009) *Monitoring the Impact of Onshore Wind Farms on Birds* – Guidance Note

season after the windfarm becomes operational, as well as during each visit of the proposed wader monitoring surveys. Further monitoring will be repeated, on the third and fifth years of operation. The information from monitoring surveys will be used to inform the need to modify or amend the HMP, or to carry out maintenance of the scrapes.

- 11.8.7 In line with NS guidance⁵⁷, the above monitoring is proposed to take place annually during construction, and after the Development becomes operational during years 1-3, 5, 10 and 15, with the requirement for further surveys to be determined based on previous survey results. Further details are provided within Chapter 10 – Ecology, Appendix 10.5.

11.9 Residual Effects

- 11.9.1 No significant effects were predicted on any IOFs, and therefore no specific mitigation measures have been proposed. Effects on all IOFs remain not significant.

11.10 Potential Effects on Statutory sites

Habitats Regulations Appraisal Screening

- 11.10.1 In accordance with the requirements of the Habitats Directive, where a project is likely to have a significant effect on an SPA (or any European site) not directly connected with or associated with the nature conservation management of the SPA, that project shall be subject to Habitat Regulations Appraisal (HRA). This identifies any implications for the SPA in respect of its conservation objectives.
- 11.10.2 As the Proposed Development is not associated with the management of any SPA with which there is potential connectivity, HRA screening is required. The intention of this screening is to assist the consenting authority in their assessment of the potential for likely significant effects on the integrity of the SPA. Additionally, the HRA screening constitutes an assessment of potential Development-related effects on SPAs and Ramsar sites in the context of EcIA. Should a likely significant effect be determined, an Appropriate Assessment (AA) must be completed by the relevant competent authority.
- 11.10.3 There is a single SPA with potential connectivity to the site, which is also designated as a Ramsar site, the Firth of Forth SPA/Ramsar site. There is no connectivity with the Slamannan Plateau SPA, and therefore will be no likely significant effects. As the site is within the stated core foraging range of pink-footed goose, which is a qualifying feature of the Firth of Forth SPA/Ramsar site, and occasional flights were recorded during FAS, there is the potential for likely significant effects on the integrity of the European site. As the site and immediate surrounds are not within a key foraging area associated with the SPA, likely significant effects are limited to collision risk. Accordingly, a shadow Appropriate Assessment has been completed.

Shadow Appropriate Assessment

- 11.10.4 Pink-footed goose was recorded during FAS only, with no records of any foraging birds. Consequently, there are no predicted effects during the construction phase.

⁵⁷ NS (2009) *Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms – Guidance Note* [Online] Available at: <https://www.nature.scot/doc/guidance-note-methods-monitoring-bird-populations-onshore-windfarms> (Accessed 15/03/22)

- 11.10.5 As pink-footed goose was recorded occasionally during FAS, there is the potential for collision impacts during the operational phase, and CRM has been undertaken for this species. As stated in Section 11.4, based on the 2020-21 FAS data, the CRM predicted an annual collision risk of 0.311⁵³ pink-footed geese or one collision every 3.220 years, and therefore there is the potential for 12-13 collisions during the 40-year lifespan of the Proposed Development. A total annual collision risk of 0.311 birds would represent <0.001% of the Firth of Forth SPA population (10,852 birds⁴⁶).
- 11.10.6 As discussed previously, it is likely that the collision risk has been overestimated as all flights recorded above 150 m were considered to be at RSH, and that some of the birds recorded may not be associated with the SPA/Ramsar site. Due to the very low collision risk, which would affect a very small proportion of the SPA and Ramsar site non-breeding populations, no adverse effects on the integrity of the SPA and Ramsar site due to collision risk are predicted, either in isolation or cumulatively.
- 11.10.7 As outlined in Section 11.6, barrier effects are considered to be negligible, and therefore no adverse effects on the integrity of the SPA and Ramsar site due to barrier effects are predicted.

11.11 Statement of Significance

- 11.11.1 An assessment has been made of the potential for significant effects of the Proposed Development on IOFs. By implementing the embedded measures detailed in Section 11.5 to ensure good practice is followed during construction, the magnitude of effects of the Proposed Development on IOFs both alone and in combination with other schemes are assessed as being of low to negligible magnitude, and thus non-significant in terms of the EIA Regulations.
- 11.11.2 Table 11.8 provides a summary of the effects on IOFs detailed within this chapter.

11.12 Summary of Effects on IOFs

Table 11.8: Summary of Effects on IOFs in Isolation and Cumulatively

IOF*	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
Firth of Forth SPA/Ramsar site	None	N/A	N/A	N/A
Pink footed goose	None	N/A	N/A	N/A
Firth of Forth SSSI	None	N/A	N/A	N/A
Peregrine	Disturbance/displacement	Not significant	N/A	Not significant
	Habitat loss	Not significant	N/A	Not significant
Curlew	Disturbance/displacement	Not significant	N/A	Not significant
	Habitat loss	Not significant	N/A	Not significant
Barn owl	Disturbance/displacement	Not significant	N/A	Not significant
	Habitat loss	Not significant	N/A	Not significant
Operational Phase				
Firth of Forth SPA/Ramsar site	Collision risk	Not significant	N/A	Not significant
	Barrier effects	Not significant	N/A	Not significant
Pink-footed goose	Collision risk	Not significant	N/A	Not significant
	Barrier effects	Not significant	N/A	Not significant
Firth of Forth SSSI	Collision risk	Not significant	N/A	Not significant
	Barrier effects	Not significant	N/A	Not significant
Peregrine	Disturbance/displacement	Not significant	N/A	Not significant
	Collision risk	Not significant	N/A	Not significant
Curlew	Disturbance/displacement	Not significant	N/A	Not significant

IOF*	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
	Collision risk	Not significant	N/A	Not significant
Barn owl	Disturbance/ displacement	Not significant	N/A	Not significant
	Collision risk	Not significant	N/A	Not significant
* Species names and order in which they are listed follow the British List maintained by the BOU ¹				