



Chapter 8

Ornithology

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Chapter 8

8 Ornithology

8.1 Introduction

1. This chapter of the Environmental Impact Assessment Report (EIAR) evaluates the effects of the Proposed Development on Important Ornithological Features (IOFs).
2. This chapter of the EIAR is supported by the following technical appendices:
 - **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1);**
 - **Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex;**
 - **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2);**
 - **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex;**
 - **Appendix 8.5 Ornithology Collision Risk Modelling;** and
 - **Appendix 8.6 Osprey Protection Area Confidential Annex**
3. The description of other elements of infrastructure of the Proposed Development assessed in this chapter can be found on **Figure 4.1 Site Layout** and **Chapter 4: Development Description**. The ornithological aspects of the Site selection and design are described in full in **Chapter 3: Site Selection and Design**. **Appendix 4.1 Offsite Access Appraisal** considers the potential ornithological effects of the proposed offsite access route to the Site, concluding that there would be no potential significant effects likely to occur as a result of the offsite access route upgrade works and as a result, this has not been assessed further within this chapter.

8.2 Legislation, Policy and Guidance

8.2.1 Legislation

- European Union (Withdrawal) Act 2018 (UK Government, 2018);
- Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive') (European Parliament, 2009);
- Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) ('Habitats Directive') (European Parliament, 1992);
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (The Habitats Regulations);
- The Wildlife and Countryside Act 1981 (as amended) (UK Government, 1981);
- The Nature Conservation (Scotland) Act 2004 (as amended) (UK, Government, 2004);
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012 (Scottish Government, 2012);
- The Conservation of Habitats and Species (Amendment) Regulations 2017, relating to reserved matters in Scotland (UK Government, 2017a);
- Environmental Impact Assessment (EIA) Directive 2014/52/EU (European Parliament, 2014); and
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (Scottish Government, 2017).

¹ SNH now rebranded as NatureScot in August 2020. Although during baseline surveys the organisation was known as SNH, for consistency within this chapter NatureScot has been used throughout, other than for documents published as SNH.

8.2.2 Policy

- UK Post-2010 Biodiversity Framework (Joint Nature Conservation Committee (JNCC) and Defra, 2012);
- Scottish Biodiversity Strategy: It's in Your Hands (Scottish Executive, 2004);
- 2020 Challenge for Scotland's Biodiversity (Scottish Government, 2013a);
- PAN 60: Planning for Natural Heritage (Scottish Government, 2000);
- Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0 (Scottish Government, 2017b); and
- South Ayrshire Local Development Plan (South Ayrshire Council, 2014).

8.2.3 Guidance

- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al.*, 2007);
 - Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018);
 - Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man (Eaton *et al.*, 2015);
 - The Birds of Scotland (Forrester *et al.*, 2007);
 - Bird Monitoring Methods (Gilbert *et al.*, 1998); and
 - Raptors: a field guide to survey and monitoring, 3rd edition (Hardey *et al.*, 2013);
4. Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action (Scottish Natural Heritage (SNH)¹, 2000);
 - Assessing connectivity with Special Protection Areas (SPAs) (SNH, 2016a);
 - Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees (SNH, 2016b);
 - Recommended bird survey methods to inform impact assessment of onshore wind farms (SNH, 2017);
 - Assessing significance of impacts from onshore wind farms on birds outwith designated areas (SNH, 2018a);
 - Assessing the cumulative impacts of onshore wind farms on birds (SNH, 2018b);
 - EIA Handbook (SNH, 2018c);
 - SiteLink (NatureScot², 2021);
 - A Review of Disturbance Distances in Selected Bird Species (Ruddock and Whitfield, 2007);
 - The Scottish Biodiversity List (SBL) (Scottish Government, 2013b); and
 - Natural Heritage Zone (NHZ) Bird Population Estimates (Wilson *et al.*, 2015).
 5. Note that additional sources of information used only occasionally are referenced in the text where relevant.

8.3 Consultation

6. A consultation letter was sent by Arcus to NatureScot on 04 February 2019, in part to discuss ornithological sensitivities within and around the Site, and the proposed survey scope. In their response to this letter, NatureScot confirmed (via email dated 22 February 2019) that the proposed survey methods appeared appropriate, and provided additional comments relating to the ornithology surveys, to which Arcus responded (via email dated 28 June 2019). Further clarifications were provided by NatureScot via email dated 23 July 2019.
7. A second consultation letter, detailing the results of the Year 1 (2018-19) Ornithology Field Surveys, was sent by Arcus to NatureScot on 14 January 2020, requesting further feedback. NatureScot noted that their previous ornithology advice had been taken onboard and would provide further advice when formally consulted on the application by the Energy Consents Unit (ECU) and/or South Ayrshire Council.

² Formerly SNH.

8. A Scoping Report, including details of the proposed approach to the assessment of potential effects on ornithology, was submitted to the Scottish Government (ECU) in May 2020.
9. Further consultation with NatureScot and the Royal Society for the Protection of Birds (RSPB), relating to a breeding Schedule 1 species, took place between July and September 2020; due to the confidential nature of the information discussed, further details are included in **Appendix 8.6. Osprey Protection Area Confidential Annex**
10. Further consultation with RSPB, relating to a breeding Schedule 1 species, took place between May & August 2021; due to the confidential nature of the information discussed, further details are included in **Appendix 8.6. Osprey Protection Area Confidential Annex**.
11. A summary of the non-confidential ornithology consultation is provided in **Table 8.1** below.

Consultee	Response	Action
NatureScot – email response (dated 22 February 2019) to consultation letter; and further advice (received on 23 July 2019) in response to email correspondence	Highlighted nightjar (<i>Caprimulgus europaeus</i>), stating that “We are also inclined to specifically mention nightjar. We do not know if they are present within the site itself but they are believed to be spreading slowly within other forests to the south which are going through felling operations.” Advised that targeted surveys should be undertaken in 2020 following the method in Gilbert <i>et al.</i> (1998), with at least two survey visits completed between June and mid-July.	As advised, a targeted Nightjar Survey was completed in 2020 with two survey visits completed between June and July. No nightjars were seen or heard during any of the survey visits.
	Queried the height used for Vantage Point (VP) viewshed analysis and whether the presence of trees had been taken into account and visible areas within the viewsheds.	The viewshed analysis was initially based on coverage of the airspace 30 metres (m) above ground level (which is much lower than the Rotor Swept Height (RSH) of the candidate wind turbine model) and the VP locations afford good coverage of the areas within the viewsheds. The VP viewshed analysis was subsequently re-run to take into account the RSH of the candidate wind turbine model (30-200m) which was then ‘ground-truthed’ by the VP surveyor.
	Queried whether the Breeding Bird Survey method would be adapted to account for the mixed habitats (plantation and open ground) within the Study Area.	A modified version of the Brown and Shepherd (1993) survey method was used to survey areas of open ground. With the exception of raptors and black grouse (<i>Lyrurus tetrrix</i>), for which targeted surveys were completed, it was considered that the plantation would be of limited interest for breeding bird species other than passerines. As stated in SNH

Consultee	Response	Action
		(2017) guidance, surveys for woodland passerines, especially in commercial conifer forest, is generally not required.
	Noted that, hen harrier (<i>Circus cyaneus</i>) flight activity indicated that a winter roost may be present and further survey work to clarify this should be considered. Further noted that it would also be beneficial to contact the local Raptor Study Group (RSG).	Winter Walkover Surveys were completed in both survey years to identify any hen harrier roosts within 500m of the Study Area. The local RSG was also contacted to obtain records of protected raptor species within 10 kilometres (km) of the Site.
	Stated that they do not hold any up-to-date bird records for the area but noted that the Site and surrounding area is used by a range of breeding, foraging and migrating birds and particular consideration should be given to breeding Schedule 1 species and migrating whooper swan (<i>Cygnus cygnus</i>). Further noted that additional species known to use the area include black grouse. Recommended that, in addition to the local RSG, information should be sought from the Ayrshire bird recorder.	Targeted surveys were completed for breeding birds, including Schedule 1 species. As noted above, the local RSG was contacted to obtain records of protected raptor species. The Ayrshire bird recorder and RSPB were also contacted to request relevant bird records.
	Advised that a cumulative impact assessment would be required.	The cumulative assessment is detailed in Section 8.9
NatureScot - Scoping Opinion	Acknowledged that Covid-19 restrictions will have affected the Year 2 ornithology surveys. Any deviations from published guidance during the course of survey work should be fully explained and justified in the EIAR.	See Section 8.4.3 .
	Recommend the inclusion of good practice measure to reduce impacts from ground or vegetation clearance works should be undertaken outwith the bird nesting season.	See Section 8.6.2)
NatureScot – email response (dated 18 June 2020) to second consultation letter	Noted that their advice had been taken on board and would provide further advice when formally consulted on the application by the Energy Consents Unit and/or South Ayrshire Council.	Arcus issued a further email (dated 15 th July 2020) regarding the assessment of impacts on breeding Schedule 1 species. Due to the confidential nature of the information discussed, further details are included in Appendix

Consultee	Response	Action
		8.6. Osprey Protection Area Confidential Annex.
Crosshill, Straiton and Kirkmichael Community Council (CSKCC)	Noted that, where Schedule 1 species were recorded, but breeding either did not take place or was unsuccessful, that this does not mean that successful breeding will not take place in the future.	Updated records of local Schedule 1 raptor species have been provided by the South Scotland RSG and have informed this assessment. Data is presented in Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex.
	Did not agree with scoping out species not listed in Section 7.3 of the Scoping Report, namely geese, ducks and summer migratory birds.	All species recorded via surveys and desk study/data requests, have been appropriately considered within the EIAR in accordance with CIEEM guidelines for Ecological Impact Assessment (CIEEM, 2018), as well as relevant statutory guidance and advice.
Dailly Community Council (DCC)	Requested that there must be rigorous field surveys as well as desk study for Ornithology	See Section 8.4.2 and Section 8.4.3.
	The Galloway and Southern Ayrshire UNESCO Biosphere Natural Heritage Management Plan specifically highlights black grouse and golden eagle (<i>Aquila chrysaetos</i>) as priority species all of which should be considered as part of an EIA.	Black grouse were recorded and have been included within the assessment presented in the chapter (see Section 8.6). There was no evidence of site use by golden eagle and it is considered highly unlikely that the species will make regular use of the Site in the future. Golden eagle has therefore been scoped out of the assessment.
RSPB – Scoping Opinion (dated 02 June 2020)	Confirmed their agreement with the scope of assessment, survey methodology and target species.	N/A
	Noted that Forestry and Land Scotland (FLS) were listed in the Scoping Report as data providers to the Desk Study and further recommended that relevant records, with particular reference to black grouse and nightjar, be obtained from RSPB Scotland.	In addition to obtaining data from FLS, records of all protected and sensitive bird species within at least 2km of the Site were requested as part of the Desk Study.
	Noted that the Proposed Development is located within Galloway Forest Park, which is designated as an Important Bird Area (IBA) and includes black grouse under category B2 of the European IBA criteria. Further noted that the IBA data sheet	Targeted black grouse surveys were undertaken during both survey years and records of this species were also requested as part of the Desk Study. Although IBAs are not statutory sites, potential impacts on IBA “trigger species” (BirdLife International,

Consultee	Response	Action
	(BirdLife International, 2020) identifies renewable energy development as a potential threat to the IBA.	2020) have been considered as part of the assessment.
RSPB - email response (dated 17 August 2020) to consultation letter	Noted the use of UK satellite tracking studies to justify a likely approach to the osprey territory from the south, but queried the scale of data used and advised that more detailed examination of data may be required. Further advised that studies have shown that, although there is some convergence on flight paths, flight path fidelity is low. Stated that more detailed satellite tracking data would be required to advise on the likely approach from the south and proposed mitigation measures.	Osprey flight activity was a key consideration in the final design of the Proposed Development. However, detailed satellite data was not available for the assessment.
	Noted the possibility that migrating osprey could use Linfern Loch to forage during migration, but acknowledged that, as there is evidence to suggest osprey use a ‘fly and forage’ migration strategy, assessing potential effects on migrating osprey would require intensive survey effort. Further advised that careful design required to protect the resident breeding pair could also mitigate potential effects on migrating osprey.	Two years of Flight Activity Surveys were completed to record flights by target species such as osprey, including during migration periods; further details are provided in Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1) and Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2) . Mitigation by design to minimise collision risk to osprey is detailed in Section 8.6.2 below.
	Stated that collision risk may be of greatest concern to fledgling ospreys, which are less capable of flight than adults and have been shown to range 0.3-5.6km from the nest and may remain in the area for up to a month.	All flight behaviour, which included fledgling flights and other local osprey flights were incorporated into the Collision Risk Modelling (CRM); further details are provided in Appendix 8.5 Ornithology Collision Risk Modelling.
	Further noted that, as osprey are gregarious, younger non-breeding birds will often visit established breeding pairs.	Operational monitoring has been recommended, as detailed in the EIAR and Section 8.7.3 below.
	Noted that implementation of a 750m buffer left around the osprey nest is the upper limit described in Ruddock and Whitfield (2007), but advised that this is based on the expert survey which involves the disturbance distance for a single	While it is acknowledged that the level of disturbance associated with a single pedestrian approaching a nest is likely to be very different to that associated with a windfarm, this is likely to be at least partly due to perception of threat rather than

Consultee	Response	Action
	<p>approaching pedestrian, which is lower than the level of disturbance associated with a windfarm.</p> <p>Therefore advised that a buffer distance greater than 750m may be required, particularly as the pair breeding on Site is new to an area that would seem to be relatively undisturbed.</p>	<p>purely the level of activity (e.g., the amount of noise). A nesting bird may perceive an approaching pedestrian as a potential predator, whereas some birds may become habituated to ongoing background construction noise, particularly where this commences prior to nesting.</p> <p>Indeed, the review by Ruddock and Whitfield (2007) states that ospreys show a wide range in their tolerance of human disturbance, and predictable disturbance, or disturbance concurrent with nesting initiation, is better tolerated than sporadic disturbance or new sources of disturbance initiated during the incubation and young chick stages of the breeding cycle. They further report that many osprey pairs (for example, in eastern USA,) nest successfully very close to high levels of human activity.</p>
	<p>Noted that ospreys may occasionally make foraging trips east of the Site and advised that this potential link should be explored further, noting that data from the local Raptor Study Group (RSG) and County Bird Recorder may be useful in this regard. Further noted that the fluctuation of fish stocks could also play a role in which of the lochs is used by the osprey, and this variation should be explored further.</p>	<p>Flight activity observed occasional eastward flights. All relevant flight data were included in the CRM; further details are provided in Appendix 8.5 Ornithology Collision Risk Modelling.</p> <p>County Bird Recorder and RSG data (summarised in Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex) were obtained as part of the Desk Study and informed the assessment.</p> <p>Assessment of prey availability in lochs included in Section 8.6.4.2.1</p> <p>Due to the confidential nature of the information discussed, further details are included in Appendix 8.6. Osprey Protection Area Confidential Annex</p>
RSPB Meeting - Ornithology Assessment (Dated 5th May 2021)	Meeting provided an overview of the ornithological baseline, and approach to design mitigation and assessment.	Arcus provided RSPB with summary of CRM undertaken at the time and requested feedback on

Consultee	Response	Action
		<p>approaches discussed in meeting (via email dated 14th May 2021).</p> <p>Due to the confidential nature of the information discussed, further details are included in Appendix 8.6. Osprey Protection Area Confidential Annex</p>
RSPB – Post meeting Email (dated 14th May 2021).	<p>RSPB agreed that collision risk is not high enough to be of significant concern.</p> <p>RSPB stated that clearly osprey is primarily focusing foraging activity around one area, however, this is likely dependent on fish populations. Therefore, flights within the east of the Site where wind turbines are located may represent a secondary foraging area.</p> <p>Queried whether there was any evidence that flight activity over the wind farm footprint varied between years.</p> <p>Suggested that if available tracking data is available, it could shed light on the site fidelity of foraging locations.</p> <p>Queried what mitigation has been considered, aside design.</p>	<p>Arcus provided response to queries (via email dated 13th July 2021) confirming that flights east were recorded in both years and were assumed to be foraging flights and modelled as such.</p> <p>Email also confirmed that potential prey availability limitations at will be addressed in the EIAR chapter, but noted that the resource became unviable, that we expect the pair to move nest closer to the location, and that numerous alternative lochs existed in foraging distance from the existing nest.</p> <p>Assessment of prey availability in lochs included in Section 8.6.4.2.1</p> <p>Confirmed that proposals for Operational Osprey Monitoring, which will comprise of annual osprey Nest Monitoring Surveys and Vantage Point Flight Activity Surveys and carcass surveillance monitoring, in the EIAR chapter.</p>

Table 8.1 Consultation Responses

8.4 Assessment Methodology and Significance Criteria

8.4.1 Study Area

12. For the Ornithology Field Surveys, the Study Area comprised of the area within the Site Boundary at the time of Surveys and the following Buffer Areas around this area:

- 500m for the Breeding Bird, Winter Walkover and Breeding Nightjar Surveys;
- 1.5km for the Black Grouse Surveys; and
- 1-2km for the Breeding Raptor Surveys (1km for barn owl (*Tyto alba*) and 2km for all other raptor species).

13. Please note that the Site Boundary at the time of survey was considerably larger in area than the final Site Boundary (the red line boundary), as presented in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)**, Figure 1 and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**, Figure 1. As a result, the Study Area was considerably greater than the minimum recommended in statutory guidelines.
14. The 'Site Boundary at the time of survey', is presented as a green line boundary in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)**, Figure 1 and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**, Figure 1.
15. For the Desk Study, the Study Area comprised the land within the Site Boundary and the following Search Areas around this:
- 20km for statutory sites designated for ornithological features³;
 - 2km for records of protected and sensitive bird species requested from the Ayrshire Bird Recorder and RSPB;
 - 6km for additional records of certain Schedule 1 breeding species requested from the Ayrshire Bird Recorder and RSPB; and
 - 10km for records of protected and sensitive raptor species requested from the local RSG.
16. CRM was based on flights at Potential Collision Height (PCH)⁴ within the Collision Risk Zone (CRZ), which was defined as follows:
- target species following random (irregular) flight paths: the visible area within the VP Viewsheds. and
 - for osprey flights, the CRZ was adapted, with two CRZs defined due to two distinct, direct (regular) flight patterns. Further details are provided in **Appendix 8.6: Osprey Protection Area Confidential Annex**.

8.4.2 Desk Study

17. A Desk Study was undertaken to provide information on the ornithological interest of the Site and its surrounds.
18. This included a search for the following statutory protected nature conservation sites designated for ornithological features:
- sites of international importance (SPAs and Ramsar sites) within 20km of the Site; and
 - sites of national importance (Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs) within 10km of the Site³.
19. In addition, relevant information was obtained from the following sources:
- NatureScot SiteLink website for statutory designated site information;
 - records of protected and sensitive species recorded on Site was obtained from FLS in 2020;
 - records of protected raptor species within 10km of the Site were requested from the local RSG in 2020;
 - a request for records of sensitive species within 2km of the Site, and additional records of sensitive species within 10km of the Site, during the last ten years, was made to the Ayrshire Bird Recorder in 2020; and
 - a request for records of sensitive species within 2km of the Site, and additional records of sensitive species within 10km of the Site, during the last ten years, was made to the RSPB in 2020.

8.4.3 Field Surveys

20. Ornithology Field Surveys were completed over a two-year period between September 2018 and August 2020 (inclusive). A summary of the survey programme is presented in **Table 8.2**.
21. All field survey areas were based on the Site Boundary at the time of survey, as presented in Figure 1, of **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)** and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**.

³ A search for non-statutory sites designated for ecological features, including birds, was also completed as part of the Ecology Desk Study, details of which are provided in **Chapter 7: Ecology and Biodiversity**.

Survey Type	Survey Period	Annual Survey Effort/Frequency	Year 1 (2018-19)	Year 2 (2019-20)
Non-breeding Season Flight Activity Surveys	September to February	36 hours	x	x
Breeding Season Flight Activity Surveys	March to August	36 hours	x	x
Black Grouse Surveys	Year 1: mid-April to mid-May; Year 2: early May*	2 survey visits	x	x
Breeding Bird Survey	Year 1: April to July; Year 2: May to July*	4 survey visits	x	x
Breeding Raptor Surveys	Year 1: April to July; Year 2: May to July*	Monthly visits	x	x
Breeding Nightjar Surveys	June to July	Two survey visits	-	x
Winter Walkover Surveys	Year 1: November and January Year 2: December and January	Two survey visits	x	x

* Due to COVID-19 restrictions, no access to the Site at the time of survey was permitted between 15/03/2020 and 27/04/2020 and no surveys could be undertaken during this period. Therefore, commencement of some Year 2 surveys was delayed until May 2020 when survey effort was increased to compensate for the lack of surveys in late March and April.

Table 8.2 Summary of 2018-20 Ornithology Field Surveys

22. During each survey, signs and observations of the relevant species were recorded in the field on large scale maps. An overview of the methods followed for each survey is provided below; further details are included in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)** and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**. Details of all survey visits and weather conditions are provided in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)** and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**.

8.4.3.1 Flight Activity Surveys

23. Flight Activity Surveys were carried out between September 2018 and August 2020, using a series of watches from VPs overlooking the Study Area, to record flight activity of target bird species and allow collision risk to be estimated.
24. Target species included the following:
- all wild swan, goose and duck species (wildfowl, excluding mallard and Canada goose);
 - all raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or Annex I of the Birds Directive;
 - all wader species;
 - nightjar; and
 - black grouse.
25. In accordance with SNH guidance (2017), flight lines of all target species passing through the VP viewshed (visible area from each VP) were mapped in the field. Each recorded flight line was numbered and cross-referenced to flight information, such as species, number of birds, time first seen and flight height (on detection and at 15 second intervals thereafter), which was recorded on standardised survey forms. Flights were recorded in the following height bands:
- <30 m;
 - 30–175 m; and

⁴ All flights recorded within height bands within or overlapping the RSH of the candidate turbines (see **Section 8.4.3.1**).

- >175 m.
26. In addition to recording target species flights, the number and activity of 'secondary' species was summarised every five minutes during each survey. Secondary species included the following: cormorant (*Phalacrocorax carbo*), all other raptor species not listed on Schedule 1 or Annex I, all gull species and raven (*Corvus corax*). Recording of target species took priority over that of secondary species.
 27. During Year 1, five VPs were used. Due to a subsequent extension to the north-west of the Site Boundary at the time of survey, an additional VP was used during the Year 2 Flight Activity Surveys. Further details are provided in **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**. Note, however that no wind turbines are located in the extended area.
 28. The VP viewshed (visible area from each VP) analysis was re-run to take into account the RSH of the candidate wind turbines. The VP locations, together with the revised VP viewsheds, are shown in **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**.
 29. Surveys were stratified to cover all times of day including dawn and dusk periods. Each watch lasted three hours with a 30-minute break in between watches. Full details of survey times and hourly weather conditions are included in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)** and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)**.

8.4.3.2 Black Grouse Surveys

30. Black Grouse Surveys were completed between mid-April and mid-May in 2019, and in early May 2020⁵, based on methods detailed in Gilbert *et al.* (1998). Surveys covered all potentially suitable lekking habitat within the Site Boundary at the time of survey and a surrounding 1.5km Buffer Area (known hereafter as the 'Black Grouse Study Area').

8.4.3.3 Breeding Bird Surveys

31. In both 2019 and 2020, a Breeding Bird Survey was undertaken between April/May⁶ and July, to map breeding territories of breeding waders and other upland species of conservation concern. In line with SNH guidance (2017), in both years the survey followed an adapted Brown and Shepherd (1993) method, with four survey visits completed, at least seven days apart. The Study Area covered the Site Boundary at the time of survey and a surrounding 500m Buffer Area (known hereafter as the 'Breeding Bird Study Area').

8.4.3.4 Breeding Raptor Surveys

32. In both 2019 and 2020, monthly Breeding Raptor Surveys were undertaken between April/May⁶ and July, with reference to the methods detailed in Hardey *et al.* (2013). This involved completing a combination of watches from VPs overlooking areas of suitable breeding habitat to identify any evidence of breeding and walkovers of suitable habitat to search for nests and other signs of raptor presence.
33. Target raptor species included those associated with the habitats present within the Study Area, such as osprey (*Pandion haliaetus*), goshawk (*Accipiter gentilis*), hen harrier, short-eared owl (*Asio flammeus*) and merlin (*Falco columbarius*), as well as other species listed on Schedule 1 of the Wildlife and Countryside Act) 1981 (as amended) and/or Annex I of the Birds Directive). Surveys covered all areas of suitable habitat within Site Boundary at the time of survey and a surrounding Buffer Area (1km for barn owl and 2km for other species) (known hereafter as the Breeding Raptor Study Area').

8.4.3.5 Breeding Nightjar Survey

34. Breeding Nightjar Surveys were completed in Year 2 (2020), with two survey visits completed in June and July, around the hours of dusk. Surveys were based on methods detailed in Gilbert *et al.* (1998) and covered all

potentially suitable breeding habitat within the Site Boundary at the time of survey and a surrounding 500m Buffer Area (known hereafter as the Breeding Nightjar Study Area').

8.4.3.6 Winter Walkover Surveys

35. A Winter Walkover Survey was completed during both survey years, with two survey visits carried out between November/December and January, to establish the bird interest within the Site Boundary at the time of survey during the non-breeding season. The surveys involved the surveyor walking the Study Area, which is defined as all land within the Site Boundary at the time of survey and a surrounding 500m Buffer Area, stopping regularly to scan visually for birds using binoculars (known hereafter as the 'Winter Walkover Study Area').

8.4.4 Collision Risk Modelling Methodology

36. Where sufficient target species flight activity⁷ was recorded during the 2018-20 Flight Activity Surveys, CRM was completed to predict the number of individuals per species expected to collide with the wind turbine rotors. The CRM methods were based on the Band *et al.* (2007) Collision Risk Model. Flight Activity Survey height bands 2 (30-175m) and 3 (>175m) overlap the RSH of the candidate wind turbine model. All relevant flights within the CRZ recorded in these height bands were therefore included in the CRM. As some flights may have been above the RSH, predicted collision risk may be overestimated and is therefore considered to represent a 'worst-case scenario'. CRM was completed separately for particular seasons (breeding and non-breeding), with the estimate based on the observed occupancy rate and the number of minutes within the relevant season that birds could potentially be active. Seasons were defined in accordance with SNH (2009a) guidance on species-breeding seasons. CRM was completed for three species: osprey, goshawk and peregrine (*Falco peregrinus*). Full details of the CRM methods are presented in **Appendix 8.5 Ornithology Collision Risk Modelling**.

8.4.5 Assessment Methodology

- the significance of the potential effects of the Proposed Development has been classified by professional consideration of the sensitivity of the receptor and the magnitude of the potential effect;
 - The approach used for the Ecological Impact Assessment (EclA) process is in line with guidance produced by CIEEM and NatureScot, and comprises the following stages;
 - evaluation of the importance of ornithological features through Desk Study and Ornithology Field Surveys - those considered to be 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; and
 - assessment of the significance of any residual effects after mitigation.
37. 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.

8.4.5.1 Sensitivity of Receptors

38. Ornithological features can be important for a variety of reasons, and 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.
39. The level of importance of ornithological features identified during the Desk Study and Ornithology Field Surveys has been determined using the criteria defined in **Table 8.3**. These criteria have been determined with

⁵ Surveys in 2020 could not be completed earlier in the season due to site access restrictions associated with COVID-19; however, surveys were completed within the recommended period (late March to mid-May; Gilbert *et al.*, 1998)

⁶ Due to COVID-19 restrictions, no access to the Site was permitted between 15/03/2020 and 27/04/2020 and no surveys could be undertaken during this period. Therefore, commencement of some Year 2 surveys was delayed until May 2020 when survey effort was increased to compensate for the lack of surveys earlier in the breeding season.

⁷ Defined as at least three flights or ten individuals within the CRZ at PCH.

reference to CIEEM (2018) guidance. For protected sites, this includes a consideration of statutory designations and relevant legislation, as well as potential connectivity to the Site.

40. For species, this includes relevant legislation, conservation status, population size and distribution, level and type of site use, numbers of birds and, where not a designated feature of an SPA or Ramsar site (with potential connectivity to the Site), whether the species is identified in SNH (2018a) guidance as a priority for assessment when considering the impacts of onshore windfarm developments in Scotland.
41. 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.
42. In addition to the importance of each bird species in terms of relevant legislation and conservation listings, the evaluation of species importance levels 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.

Importance level	Examples
International	<p>Statutory sites of international ornithological importance (SPAs and Ramsar sites) with potential connectivity to a development site.</p> <p>Regular presence⁸ within or around a development site of a designated feature of an existing or proposed statutory site of international ornithological importance, i.e. SPA or Ramsar site, with potential connectivity to a development site. Numbers of birds making use of the development site and/or surrounding area are also taken into account.</p> <p>Regular presence⁸ within or around a development 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 designated feature), where there is potential connectivity with a development site. Numbers of birds making use of the development site and/or surrounding area are also taken into account.</p>
National (Scotland)	<p>Statutory sites of national ornithological importance (SSSIs and NNRs) with potential connectivity to a development site.</p> <p>Regular presence within or around a development site of a designated feature of an existing or proposed statutory site of national ornithological importance, i.e. SSSI or NNR, with potential connectivity to the development site. Numbers of birds making use of the development site and/or surrounding area is also taken into account.</p>

⁸ Regular presence is based on professional judgement but is broadly defined as breeding, or more than occasional commuting, foraging or roosting

Importance level	Examples
	<p>Regular presence within or around a development site of a species listed on Annex I of the Birds Directive, where the species is not a designated feature of a statutory site of international ornithological importance but is present in nationally important numbers.</p> <p>Regular presence within or around a development site of a breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), where the species is not a designated feature of a statutory site of international ornithological importance but is present in nationally important numbers.</p> <p>The regular presence⁸ within or around a development site of nationally important numbers of a species of conservation concern, where this is identified in SNH guidance as a priority for assessment.</p> <p>The regular presence⁸ within or around a development 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 in relation to a proposed development, and which is identified in SNH (2018a) guidance as a priority for assessment.</p>
Regional (NHZ)	<p>A designated feature of an existing or proposed SPA or Ramsar site, with potential connectivity to a development site, which is present within or around a development site infrequently or in relatively low numbers, but could use the area more regularly post-construction.</p> <p>Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to a development site, which is present within or around the development site infrequently or in low numbers, but could use the area more regularly post-construction.</p> <p>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 a development site infrequently or in low numbers (regionally or locally important numbers), but could use the area more regularly post-construction.</p> <p>A regionally (i.e. at the NHZ scale) important population/assemblage of a species of conservation concern⁹ that regularly occurs within or around a development site, where this is identified in SNH (2018a) guidance as a priority for assessment.</p>
Local	<p>Statutory sites of international or national ornithological importance (SPAs, Ramsar sites, SSSIs and NNRs) with no potential connectivity to a development site.</p> <p>Statutory sites of local ornithological importance.</p> <p>A designated feature of an existing or proposed SPA or Ramsar site, with potential connectivity to a development site, but which is present within or around the development site infrequently or in low numbers, and use of the area is not expected to increase significantly post-construction.</p> <p>Other bird species that contribute to the integrity of an existing or proposed SPA or Ramsar site, with potential connectivity to a development site, but which are present within or around the development site infrequently or in low numbers, and use of the area is not expected to increase significantly post-construction.</p>

⁹ An SBL priority species or Red/Amber-listed UK BoCC

Importance level	Examples
	<p>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 a development site infrequently or in low numbers, and use of the area is not expected to increase significantly post-construction</p> <p>Other species identified in SNH (2018a) guidance as a priority for assessment, but which are present within or around a development site infrequently or in low numbers, and use of the area is not expected to increase significantly post-construction.</p> <p>A locally important population/assemblage of a species of conservation concern⁹ that regularly occurs within or around a development site, but is not identified in SNH (2018a) guidance as a priority for assessment and is unlikely to be at significant risk of impact from the development.</p>
Less than Local	All other species that are widespread and common and of low conservation concern (e.g. included on the UK BoCC Green-list) and which are not present in locally important (or greater) numbers.

Table 8.3 Criteria for Evaluation of IOFs

8.4.6 Characterisation of Potential Effects

43. In line with the CIEEM (2018) EclA guidance where possible, consideration is given to the following characteristics when identifying potential effects of the Proposed Development on IOFs:

- nature of effect: whether it is positive (beneficial) to the IOF, 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 IOF 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;
- timing: this may result in an impact on an IOF if it coincides with critical life stages or seasons (e.g. the breeding season); and
- reversibility: a reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation (within a reasonable timescale).

44. The criteria for assessing the magnitude of a potential effect are presented in **Table 8.4**.

Magnitude of Effects	Definition
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.
Negligible	A barely distinguishable change from baseline conditions.

Table 8.4 Framework for Determining Magnitude of Potential Effects

8.4.7 Significance Criteria

45. The latest CIEEM EclA guidance (CIEEM, 2018) avoids and discourages use of the matrix approach to determine significance and describes only two categories: "significant" or "not significant".

46. According to the CIEEM guidance, for the purpose of EclA, a "significant effect" is an effect that either supports or undermines biodiversity conservation objectives for important ecological features (which in this case would be IOFs) or for biodiversity in general.
47. SNH (2018a) guidance refers to maintaining the favourable conservation status of a bird species (or not affecting its recovery) when assessing the significance of any windfarm 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)". 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".
48. Effects can be considered significant at a wide range of scales from international to local. SNH (2018a) 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".
49. 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."
50. Where potential connectivity with an SPA or Ramsar site has been identified, significant effects on species are assessed in the context of potential effects on the conservation status of that particular SPA or Ramsar site population, as this is considered to be the most appropriate scale for assessment. In the case of species that are not designated features of statutory sites, the relevant scale for assessment of significant effects on conservation status of breeding populations is considered to be the appropriate NHZ.
51. The Site is located at the border between NHZ 17 (West Central Belt) and NHZ 19 (Western Southern Uplands & Inner Solway). For some species that are not designated features of statutory sites (including breeding crossbill (*Loxia curvirostra*), and wintering or migratory species), 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.
52. 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.

8.4.8 Limitations to Assessment

53. Minor limitations to the Ornithology Field Surveys are detailed in Appendices **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)** and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)** but are not considered to have affected the robustness of the assessment.

8.5 Baseline Conditions

54. This section summarises the ornithological baseline within the Study Area, based on the results of the Desk Study and 2018-20 Ornithology Field Surveys.
55. As stated above, the Study Area applied to both the Desk Study and Field Surveys was based on considerably greater Site Boundary. As such the baseline condition is likely to represent an over estimate.

8.5.1 Desk Study

8.5.1.1 Sites of Ornithological Importance

56. Two statutory designated sites for ornithological features were identified within 20km of the Site, both of which are Sites of Special Scientific Interest (SSSIs); details are summarised in **Table 8.5**. No Special Protection Areas (SPAs) or Ramsar sites were identified within the 20km search area.

Site Name	Designation	Approximate Distance and Direction from the Site*	Qualifying Ornithological Interests	Description of Qualifying Ornithological Interests
Merrick Kells	SSSI	6.7km to south-east	Breeding bird assemblage	There is a diversity of breeding birds, including raptors and other upland species, but all are present at low densities (SNH, 2010).
Bogton Loch	SSSI	9.1 km to north-east	Breeding bird assemblage	The breeding bird community present within the site includes song thrush (<i>Turdus philomelos</i>), grasshopper warbler (<i>Locustella naevia</i>), spotted flycatcher (<i>Muscicapa striata</i>), willow tit (<i>Poecile montana</i>), reed bunting (<i>Emberiza schoeniclus</i>) and, sporadically, a small colony of black-headed gulls (<i>Chroicocephalus ridibundus</i>) (SNH, 2008).

*From closest point.

Table 8.5 Summary of Statutory Sites Designated for Ornithological Interest Within 20km of The Site

57. As highlighted in **Table 8.1**, the Site is located within the Galloway Forest Park IBA, which is described in the factsheet (BirdLife International, 2020) as “A very large area of forest, including lochs, rivers and moorland, that stretches from Newton Stewart in Dumfries and Galloway into the Strathclyde region. The IBA supports a range of breeding waders and waterbirds, in addition to species of forest and moorland.” The factsheet also lists three “trigger species”, namely black grouse, peregrine and short-eared owl (BirdLife International, 2020). Although IBAs are considered to be sites of international significance for bird conservation, they are not statutory sites.

58. In addition, as detailed in **Chapter 7: Ecology and Biodiversity**, River Stinchar (Milton to Black Hill) Provisional Wildlife Site (WS), which is located in the south west of the Site Boundary at the time of survey, is notified for its breeding bird interest.

8.5.1.1.1 Existing Records of Sensitive Species

59. The following records of sensitive bird species were received:

- the local RSG returned records of three breeding Schedule 1 raptor species within 10km of the Site Boundary at the time of survey (two of which were also recorded during the Breeding Raptor Surveys);
- the Ayrshire Bird Recorder provided numerous records of breeding crossbill within 10km of the Site Boundary at the time of survey, as well as records of two additional Schedule 1 breeding species in the wider area (details of which are restricted to **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**); and
- FLS and the RSPB provided multiple records of black grouse recorded within 2km of the Site Boundary at the time of survey during the last ten years. These included records of lekking males in four distinct clusters¹⁰ within the Black Grouse Study Area.

¹⁰ As the records provided were at varying resolutions (from 1m to 1km), it was not possible to determine the exact number of lek sites

60. Further details of each of these species are provided in **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**.

8.5.2 Field Surveys

61. Key Ornithology Field Survey results are summarised below; further details are presented in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)**, **Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex**, **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)** and **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**.

8.5.2.1 Flight Activity Surveys

62. A total of 84 flights by ten target species were recorded during the Year 1 (2018-19) Flight Activity Surveys. Similar levels of flight activity were recorded in Year 2 (2019-20), with a total of 82 flights by 10 target species. Across both survey years combined, a total of 166 flights by 13 target species were recorded. Numbers of flights are summarised in **Table 8.6**.

63. Further details are presented in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)**, **Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex**, **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)** and **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**.

Species English vernacular name	Scientific name	Year	Number of flights			No. of birds per flight
			Breeding season (Mar- Aug)	Non-breeding season (Sep- Feb)	Total	
Black grouse	<i>Lyrurus tetrix</i>	2018-19	0	2	2	4-5
		2019-20	-	-	-	-
Greylag goose	<i>Anser anser</i>	2018-19	-	-	-	-
		2019-20	0	1	1	7
Pink-footed goose	<i>Anser brachyrhynchus</i>	2018-19	5	0	5	65-360
		2019-20	0	4	4	36-180
		2019-20	-	-	-	-
Curlew	<i>Numenius arquata</i>	2018-19	-	-	-	-
		2019-20	1	0	1	1
Woodcock	<i>Scolopax rusticola</i>	2018-19	0	2	2	1-2
		2019-20	1	1	2	1
Snipe	<i>Gallinago gallinago</i>	2018-19	0	1	1	1
		2019-20	-	-	-	-
Grey heron	<i>Ardea cinerea</i>	2018-19	0	1	1	1
		2019-20	-	-	-	-
Osprey	<i>Pandion haliaetus</i>	2018-19	48	0	48	1-2
		2019-20	44	0	44	1-2
Goshawk	<i>Accipiter gentilis</i>	2018-19	4	4	8	1
		2019-20	4	0	4	1
Marsh harrier	<i>Circus aeruginosus</i>	2018-19	-	-	-	-
		2019-20	1	0	1	1
Hen harrier	<i>Circus cyaneus</i>	2018-19	0	11	11	1

Species English vernacular name	Scientific name	Year	Number of flights			No. of birds per flight
			Breeding season (Mar- Aug)	Non-breeding season (Sep- Feb)	Total	
		2019-20	0	4	4	1
Merlin	<i>Falco columbarius</i>	2018-19	1	1	2	1
		2019-20	3	2	5	1
Peregrine	<i>Falco peregrinus</i>	2018-19	4	0	4	1
		2019-20	12	4	16	1

Table 8.6 Summary of Target Species Flights Recorded During 2018-20 Flight Activity Surveys

8.5.2.2 Black Grouse Surveys

64. There were no observations of black grouse during targeted surveys for this species in Year 1 (2019) and Year 2 (2020). However, two black grouse flights were recorded during the non-breeding Flight Activity Surveys in Year 1. There were also three additional records of black grouse during the Year 1 (2018-19) Ornithology Field Surveys, with a single male observed at Black Row close to the south western section of the Study Area in June 2019, and two registrations in the north of the Study Area during the non-breeding season (four males in the north west in November 2019 and two males just to the south of the previous observation in January 2020). There were no registrations of black grouse during any of the Year 2 (2019-20) Ornithology Field Surveys.

65. As summarised in **Section 8.5.1.1.1**, FLS and the RSPB provided multiple records of black grouse recorded within 2km of the Site Boundary at the time of survey during the last ten years, including nine records of lekking males (numbering 1-5 males) grouped in four distinct clusters within the Black Grouse Study Area between 2014 and 2019 (inclusive)¹⁰. Further details are provided in **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**.

8.5.2.3 Breeding Bird Surveys

66. Over both survey years, a total of 54 species were recorded. This included four breeding wader species: oystercatcher (a single territory in 2020 only), woodcock (a single territory in 2020 only), snipe (two territories in 2019 and four in 2020) and common sandpiper (a single territory during each survey year). Two breeding wildfowl species were also recorded: mallard (*Anas platyrhynchos*; three territories during each survey year) and teal (two territories in 2019 and one in 2020): Other notable breeding species included small numbers of crossbill, which is a Schedule 1 species, during both survey years (note, however, that the Breeding Bird Surveys were not designed to record woodland species such as crossbill and numbers of breeding territories are likely to be underestimates). Further details of all breeding species, including territory locations, are presented in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1)**, **Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex**, **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2)** and **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**.

8.5.2.4 Breeding Raptor Surveys

8.5.2.4.1 Target Raptor Species

67. Single territories of three breeding Schedule 1 raptor species were recorded within the Breeding Raptor Study Area during one or both survey years. Multiple records of the same three species were also returned by the local RSG, including some records outwith the Breeding Raptor Study Area. Further details of all three species are provided in **Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex** and **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**.

68. Merlin was also recorded occasionally during both survey years and there was a single registration of marsh harrier. However, there was no evidence that these species were breeding within the Breeding Raptor Study Area during 2019 or 2020 and the local RSG did not hold any breeding records of either species within 10km of the Site Boundary at the time of survey.

8.5.2.4.2 Secondary Species

69. Three secondary species were observed in both survey years: sparrowhawk (*Accipiter nisus*), buzzard (*Buteo buteo*), and kestrel (*Falco tinnunculus*). All three species were considered to be breeding within the Breeding Raptor Study Area during both survey years.

8.5.2.5 Breeding Nightjar Survey

70. There were no observations of nightjar during targeted surveys for this species, or any other Ornithology Field Surveys.

8.5.2.6 Winter Walkover Surveys

71. Over both survey years, a total of 57 species were recorded. This included a single registration of a female hen harrier hunting within the Winter Walkover Study Area in Year 1, and a single registration of a male hen harrier hunting within the Winter Walkover Study Area in Year 2, small numbers of goldeneye (*Bucephala clangula*) on Linfern Loch during both survey years and numerous flocks of crossbill during the Year 2 surveys only. In addition, as noted in **Section 8.5.2.2**, there were two registrations of black grouse in the north of the Study Area during the Year 1 (2018-19) Winter Walkover Surveys.

8.5.3 Predicted Collision Risk

72. For each species for which CRM was completed, the mean annual predicted collision risk and number of years per collision, based on species-specific avoidance rates recommended by SNH (2018d), are presented in **Table 8.7**. Further details of the CRM results (including predicted collision risk assuming no avoidance) are presented in **Appendix 8.5 Ornithology Collision Risk Modelling**.

Species	Predicted annual collision risk (no. of birds killed)*	Predicted no. of years per collision*
Osprey	0.101	9.9
Goshawk	0.004	283.4
Peregrine	0.006	177.7

* Based on species-specific avoidance rates (SNH, 2018d)

Table 8.7 Summary of Predicted Mean Annual Collision Risk and Number of Years Per Collision

8.6 Potential Effects

73. The following sections include an evaluation of the importance of ornithological features to allow IOFs to be identified, details of mitigation by design and embedded mitigation, and an assessment of the potential effects of the Proposed Development on IOFs during the construction and operational phases of the Proposed Development life cycle.

74. Although wind turbine removal during decommissioning may cause disturbance to breeding, foraging or roosting birds, the level of impact would depend on the bird species present at the time of decommissioning and cannot be reliably predicted at this stage. Therefore, potential effects on IOFs during the decommissioning phase of the Proposed Development are not assessed. However, as decommissioning activities are generally of a similar type and intensity as construction activities, it is considered that the potential effects of decommissioning would be similar in nature to the potential effects of construction, with the exception that habitat would likely be restored and any displaced birds would be able to return to abandoned territories.

75. In addition, cumulative effects may arise as a result of the combined effects of multiple windfarms affecting the same bird population. Cumulative effects are considered in **Section 8.9**.

76. As stated above, an assessment of the potential effects of the proposed offsite access route is presented in **Appendix 4.1 Offsite Access Appraisal**. **No significant effects** were determined, and as such, this assessment will be discussed no further within this chapter.

8.6.1 Identification of IOFs

77. An evaluation of the importance of ornithological features identified during the Desk Study or recorded during Ornithology Field Surveys is provided in **Table 8.8**. Statutory sites and 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.
78. Any reference to the ‘Site’ within this section, refers to the red line boundary, as presented as the Site Boundary in **Appendix 8.1 Baseline Ornithology Report 2018-19 (Year 1), Figure 1** and **Appendix 8.3 Baseline Ornithology Report 2019-20 (Year 2), Figure 1**.

Importance Level	Ornithological Feature	Summary and Justification
International	No IOFs of International importance were identified.	
National	No IOFs of National importance were identified	
Regional	<ul style="list-style-type: none"> Galloway Forest Park IBA 	<p>The Site is located within the Galloway Forest Park IBA. Although IBAs are considered to be sites of international significance for bird conservation, they are not statutory sites. Furthermore, the Proposed Development represents a very small proportion of the IBA (which covers an area of 58,295ha).</p> <p>Two IBA “trigger species” namely black grouse and peregrine, were recorded in low numbers; potential effects on these species in the context of the IBA populations are considered, although it should be noted that population estimates for these species are from 1995 (BirdLife International, 2020), and may no longer be accurate.</p> <p>However, as a precautionary approach, the IBA is assessed as being of Regional importance in the context of the Proposed Development.</p>
Regional	<ul style="list-style-type: none"> Osprey 	<p>Osprey is included on Schedule 1, Annex and the SBL. Although it also included on the UK BoCC Amber List (Eaton <i>et al.</i>, 2015), the numbers and range of the Scottish osprey population have steadily increased since the 1950s (Balmer <i>et al.</i>, 2013) and in 2016 it was estimated at 224 breeding pairs (Holling <i>et al.</i>, 2018). In 2013 osprey populations in NHZs 17 and 19 were estimated at five and six pairs respectively (Wilson <i>et al.</i>, 2015). More recently, in 2018, Scottish raptor workers reported two pairs occupying territories in South Strathclyde (both in Ayrshire) and a further 14 pairs occupying territories in Dumfries and Galloway (Challis <i>et al.</i>, 2019). This suggests that the regional population may be increasing.</p> <p>High levels of osprey flight activity were recorded during Flight Activity Surveys and one confirmed breeding territory was identified within 10km of the Site, details of which are provided in Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex and Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex.</p>
Regional	<ul style="list-style-type: none"> Goshawk 	<p>Goshawk is included on Schedule 1. Although it is a scarce breeding bird in Scotland, numbers and range are slowly expanding from population centres in north-east Scotland and the border with England (Forrester <i>et al.</i>, 2007) and the population was estimated at 174 pairs in 2016, although this is likely to be an underestimate (Holling <i>et al.</i>, 2018). In 2013 the minimum number of breeding goshawk pairs in NHZ 17 was estimated to be less than five pairs, while the number in NHZ 19 was estimated to be much higher at 31 pairs (Wilson <i>et al.</i>, 2015).</p>

Importance Level	Ornithological Feature	Summary and Justification
		<p>Low levels of goshawk flight activity were recorded during Flight Activity Surveys and three territories were identified within 1km of the Site, details of which are provided in Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex and Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex.</p>
Regional	<ul style="list-style-type: none"> Peregrine 	<p>Peregrine is included on Schedule 1, Annex and the SBL. The Scottish breeding population was estimated at 690 pairs in 2014, which represents an overall decline since 2002 (Wilson <i>et al.</i>, 2018). Based on data from the last national survey in 2014, breeding peregrine populations in NHZs 17 and 19 were estimated at 41 and 34 pairs respectively (Wilson <i>et al.</i>, 2015).</p> <p>Peregrine is also listed as a “trigger species” for the Galloway Forest Park IBA, within which the Site is located. The IBA population was estimated at 19 breeding pairs in 1995 (BirdLife International, 2020).</p> <p>Relatively low levels of peregrine flight activity were recorded during the Year 1 Flight Activity Surveys, with slightly higher levels recorded during Year 2. Two breeding territories were identified within 10km of the Site, details of which are provided in Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex and Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex.</p>
Regional	<ul style="list-style-type: none"> Black grouse 	<p>Black grouse is included on the UK BoCC Red List (Eaton <i>et al.</i>, 2015) and the SBL and is identified in SNH (2018a) guidance as priority a species for assessment when considering onshore windfarms in Scotland. It is also listed as a “trigger species” for the Galloway Forest Park IBA (BirdLife International, 2020), within which the Site is located. The Scottish black grouse population is estimated to comprise 3,550-5,750 lekking males and 7,500-19,000 birds during the winter (Forrester <i>et al.</i>, 2007) and the IBA population was estimated at 120 males in 1995 (BirdLife International, 2020).</p> <p>Small numbers of male black grouse (up to five birds) were recorded on five occasions during the Year 1 (2018-19) Ornithology Field Surveys, with the majority of registrations during the non-breeding season; a single male was the only registration of this species during the breeding season and no lekking birds were recorded within 1.5km of the Site during targeted surveys. The species was not recorded during any of the Year 2 (2019-20) Ornithology Field Surveys.</p> <p>A total of nine records of lekking birds in four distinct areas within the Black Grouse Study Area between 2014 and 2019 (inclusive) were also identified during the Desk Study, with a peak count of between two and five birds recorded in each area. Further details are provided in Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex.</p> <p>Although black grouse numbers recorded during the surveys were low and represent only a small proportion of the NHZ populations (78 males in NHZ 17 and 121 in NHZ 19; Wilson <i>et al.</i>, 2015), the Desk Study records included evidence of lekking birds at one location in the vicinity of the Study Area. Therefore, a precautionary approach was adopted and the species is assessed as being of Regional importance.</p>

Importance Level	Ornithological Feature	Summary and Justification
Regional	<ul style="list-style-type: none"> Crossbill 	Small numbers of breeding crossbill were recorded during both survey years. In line with SNH (2017) guidance, targeted surveys for this species were not completed and, based on the habitats present, crossbill is likely to be breeding across the Site. As it is a Schedule 1 breeding species, crossbill is assessed as being of regional importance, although the number of breeding birds is likely to represent a very small proportion of the Scottish population, which is estimated at 5,000-50,000 breeding pairs (Forrester <i>et al.</i> , 2007).
Local	<ul style="list-style-type: none"> Merrick Kells SSSI Bogton Loch SSSI 	Based on the distance of these SSSIs from the Site (see Table 8.5), combined with the habitats present on site and the suite of species recorded during Ornithology Field Surveys, it is considered highly unlikely that there is any connectivity between the Site and these SSSIs. Therefore, although the statutory sites themselves are of national importance, in the context of the Proposed Development, they are considered to be of no more than Local importance.
Local	<ul style="list-style-type: none"> River Stinchar (Milton to Black Hill) Provisional WS 	This non-statutory site is located south west of the Site and is designated for its breeding bird interest. This site is of Local importance.
Local	<ul style="list-style-type: none"> Additional Schedule 1 breeding species 	Records provided by the Ayrshire Bird Recorder included two additional Schedule 1 species that were breeding in the wider area, details of which are provided in Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex . Due to the separation distance between the Proposed Development and potential/confirmed breeding sites of these species, and the lack of any records of either species within relevant Study Areas, in the context of the Proposed Development, both species are considered to be of Local importance.
Local	<ul style="list-style-type: none"> Greylag goose Pink-footed goose 	With estimated populations of 110,000+ greylag geese and 200,000+ pink-footed geese (Forrester <i>et al.</i> , 2007), both species occur in Scotland in large numbers during the non-breeding season. However, both species are included on the UK BoCC Amber List (Eaton <i>et al.</i> , 2015); pink-footed goose is also identified in SNH (2018a) guidance as a priority species for assessment when considering onshore windfarms in Scotland. A single greylag goose flight (numbering seven birds) during the Year 2 Flight Activity Surveys was the only record of this species. Small numbers of pink footed goose flights were recorded during Flight Activity Surveys in both survey years (four in Year 1 and five in Year 2), with a peak count of 360 birds. Based on the low levels of activity recorded, which represent very low proportions of the non-breeding populations, both species are assessed as being of no more than Local importance.
Local	<ul style="list-style-type: none"> Oystercatcher Curlew Woodcock Snipe 	Five wader species were recorded during the Ornithology Field Surveys, all of which are included on the UK BoCC Red or Amber List (Eaton <i>et al.</i> , 2015). Both curlew and woodcock are included on the SBL. Curlew is also identified in SNH (2018a) guidance as a priority species for assessment when considering onshore windfarms in Scotland. Of the species recorded, only one was recorded breeding within the Study Area during one or both survey years (one pair of snipe recorded both

Importance Level	Ornithological Feature	Summary and Justification
		years)). Levels of wader flight activity recorded during the Flight Activity Surveys were very low, with just 1-5 flights per species (curlew, snipe and woodcock) recorded across two years of surveys. Based on the very low levels of activity, all wader species are assessed as being of no more than Local importance.
Local	<ul style="list-style-type: none"> Marsh harrier Hen harrier Merlin 	All three species are listed on Schedule 1, Annex I, the SBL and the UK BoCC Red or Amber List. However, there was no evidence that any of these species was breeding within 2km of the Site and levels of activity across the Site were very low. While it is possible that hen harrier and merlin could make use of the Site more frequently in future due to habitat modification, it is considered unlikely that changes in use of the Site would be sufficiently high to result in significant impacts on the NHZ populations of these species.
Local	<ul style="list-style-type: none"> Herring gull 	Herring gull is included on the UK BoCC Red list (Eaton <i>et al.</i> , 2015) and is identified in SNH (2018a) guidance as priority a species for assessment when considering onshore windfarms in Scotland. Herring gull was recorded as a secondary species. Numbers were generally low and the species was not breeding within 500m of the Site; use of the Site and surrounding area is unlikely to increase following construction. The species is therefore considered to be of no more than Local importance.
Local	<ul style="list-style-type: none"> Amber-listed wildfowl, raptor and gull species (where not listed above) 	Amber-listed species that are not designated features of any SPAs with potential connectivity to the Site and not identified in SNH (2018a) guidance as priority species for assessment when considering onshore windfarms in Scotland. These species are generally considered as being at low risk from windfarm developments and it is considered unlikely that the Proposed Development would have a significant impact on local populations.
Local	<ul style="list-style-type: none"> Passerine species listed on the UK BoCC Red or Amber lists (where not listed above) 	It is generally accepted that passerine species are not significantly impacted by windfarm developments (SNH, 2017) and it is considered unlikely that the Proposed Development would have a significant impact on local populations.
Less than Local	<ul style="list-style-type: none"> All species not covered above (e.g. Green-listed species of low conservation concern) 	Species that are generally common and widespread and of low conservation concern and which are considered as being at low risk from windfarm developments.

Table 8.8 Evaluation of Ornithological Features

8.6.2 Mitigation by Design and Embedded Mitigation

79. Ornithological sensitivities were a key consideration in the design of the Proposed Development, with the layout designed to minimise potential effects on one of the IOFs as far as possible. The design approach was informed by detailed consultation with statutory and non-statutory technical specialists. Further details are provided in **Table 8.1** and **Appendix 8.6 Osprey Protection Area Confidential Annex**.

80. The key embedded mitigation with relevance to ornithological features would be the implementation of a Bird Protection Plan (BPP), as outlined below, to protect breeding birds and any roosting hen harriers. Subsequent sections of this chapter assume that the embedded mitigation described below would be fully implemented.

8.6.2.1 Construction Phase

8.6.2.1.1 Bird Protection Plan

81. Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to kill or injure any bird, or to damage or destroy nests and eggs. Breeding species listed on Schedule 1 of the Act are afforded additional protection from disturbance. In addition, although no roosting raptors were recorded during the Ornithology Field Surveys, it is possible that hen harrier could roost on or near the Site in future, including during the non-breeding season. Hen harrier is listed on Schedule 1A of the Wildlife and Countryside Act, which protects it from harassment at all times (including the non-breeding season).
82. The good practice measures outlined below would be incorporated into a detailed BPP, devised in consultation with NatureScot, to ensure the safeguarding of all breeding birds during construction, as well as roosting hen harrier all year round, thus ensuring legislative compliance during all phases of the Proposed Development.
83. To ensure that mitigation measures are reactive to changing conditions on the Site and compliance with legislation protecting breeding birds, the BPP will be overseen by a suitably experienced and licensed Ecological Clerk of Works (ECoW), who will attend site regularly to make observations of birds present in and around areas where works are planned, and identify any potential constraints to works.
84. Add an introduction for this list of bullet points The BPP would include implementation of the measures outlined in **Table 8.8**. Note that these measures provide an outline of proposed mitigation only; full details would be included in the BPP itself.

Measure	Summary
Timing of works	Where practically possible, construction works (including felling) would take place outside the main breeding bird season (March to August inclusive).
Pre-construction survey for breeding crossbill	Crossbill has a protracted breeding season (Forrester <i>et al.</i> , 2007) and NatureScot have defined the breeding season for this species as January to mid-December (SNH, 2009a). Precautions must be taken prior to felling to avoid potential disturbance to nesting birds or destruction of active nests. A pre-construction survey of areas of suitable habitat for nesting crossbill within 150m of works ¹¹ would be completed ahead of any operations, regardless of the time of year, by a suitably experienced and qualified ECoW, to check for evidence of crossbill breeding or active nests.
Pre-construction survey for lekking black grouse	Where construction works are required during the key lekking period for black grouse (late March to mid-May; Gilbert <i>et al.</i> , 1998), pre-construction survey of areas of suitable lekking habitat within 750m ¹² of works would be completed by a suitably experienced and qualified ECoW, to check for the presence of black grouse leks.
Pre-construction survey for other breeding birds	Where construction works are required during the breeding bird season, the area within 500m of works should be surveyed ahead of any operations, 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 Study Area would be extended to the maximum buffer distance for the relevant species recommended in Ruddock and Whitfield (2007).
Toolbox talk	A 'toolbox talk' would be delivered by a suitably experienced ECoW to ensure that all contractors working on the Development are aware of ornithological sensitivities and relevant legislation.

¹¹ The maximum recommended species-specific disturbance buffer for breeding birds (Ruddock and Whitfield, 2007).

¹² The maximum recommended disturbance buffer for lekking black grouse (Ruddock and Whitfield, 2007).

Measure	Summary
Protection of nesting birds	<p>If any nests (or breeding territories of Schedule 1 species) are identified during pre-construction surveys, an exclusion zone around the nest (or territory) would be established (with the distance appropriate to the species and agreed through consultation with NatureScot). No works would be permitted within the exclusion zone until the ECoW has confirmed that the chicks have fledged or the breeding attempt has failed.</p> <p>Where this is not feasible, NatureScot would be contacted and further mitigation measures agreed to ensure that nesting birds are not disturbed. This could involve, for example, limiting the number of Site personnel accessing the relevant area to the minimum number required to complete the works, restricting working hours, and employment of an ECoW to undertake a watching brief.</p>
Minimising disturbance to black grouse	If any black grouse leks are identified within 750m of works during pre-construction surveys for this species during the key lekking period (late March to mid-May), a 750m exclusion zone around the lek site would be established, within which no works would take place around the hours of dawn or dusk (with permitted working times to be determined by the ECoW through monitoring of the leks).
Protection of roosting hen harrier	<p>Although it is unlikely that standard construction activities could be construed as intentional harassment, there is a possibility that, if any roosting hen harriers are identified within the Site or surrounding area (at any time of year) and no measures are taken to protect them from disturbance, this could be considered to constitute reckless harassment. As such, it is proposed that the toolbox talk (see above) should include roosting hen harrier.</p> <p>In the unlikely event that any roosting hen harriers are identified, a specific protection plan would be developed to avoid or minimise potential effects to this species. Specific mitigation measures would be agreed with NatureScot but would likely include avoiding any works around the hours of dusk and dawn (or overnight), implementing an appropriate exclusion zone around the roost site within which works are restricted whilst birds are using the roost and monitoring by a suitably experienced ECoW.</p>

Table 8.8 BPP Measures to be Implemented during the Construction Phase

8.6.2.1.2 Decommissioning Phase

85. 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 both nesting birds and roosting hen harrier.

8.6.3 Construction

86. The main ways in which a windfarm may affect IOFs during the construction phase are via:

- habitat loss due to land-take;
- habitat modification; and
- disturbance/displacement.

87. Note that the following assessments of potential construction phase effects on IOFs are dependent on consent being granted.

8.6.3.1 Habitat Loss

88. Construction of wind turbine bases and associated infrastructure would 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 a development site and surrounding area. In this case, the extent of direct habitat loss would be 26.72ha in total, the majority of which (85.07%) would be coniferous plantation, with the remainder (14.93%) consisting of a mix of bog (9.51%), dry heath (4.19%) and semi-improved neutral grassland (1.23%) habitats. As the proportion of habitat loss would be relatively low, it is likely that species affected by habitat loss can be accommodated by suitable habitat in the wider area.

8.6.3.1.1 Galloway Forest Park IBA

89. The construction of the Proposed Development would result in the loss of 26.72ha of habitat, which represents 0.05% of the Galloway Forest Park IBA. Furthermore, opening up parts of the canopy could potentially benefit black grouse, which is one of the “trigger species” for this IBA. As such, potential effects on the IBA due to habitat loss are assessed as being negligible and not significant under the EIA Regulations.

8.6.3.1.2 Osprey

90. Although construction of the Proposed Development would result in a loss of potentially suitable breeding habitat for osprey, the species generally shows high levels of site-fidelity, often using the same nest for many years (Hardey *et al.*, 2013) and no active or historic nest sites would be lost due to habitat loss for construction of the Proposed Development, and none are located within the Site Boundary. Although it is theoretically possible that habitat loss could reduce the extent of suitable breeding habitat within the Site, there is a large extent of alternative habitat in the wider area that is likely to provide suitable nest sites and it is considered highly unlikely that habitat loss would constrain any expansion in the local breeding osprey population.

91. Breeding adults, particularly females, generally roost on or close to nests (Hardey *et al.*, 2013). Given the extent of plantation habitat within the Site and surroundings, ospreys would not be impacted by loss of roost sites and there would be no loss of foraging habitat due to construction of the Proposed Development.

92. As such, potential effects on the NHZ 17 and NHZ 19 breeding osprey populations due to habitat loss are assessed as being negligible and not significant under the EIA Regulations.

8.6.3.1.3 Goshawk

93. Similar to osprey, habitat loss during construction of the Proposed Development would result in a loss of potentially suitable breeding habitat for goshawk. Goshawks often use the same nesting range (with nests from different years clustered within a small area) for many years (Hardey *et al.*, 2013). Two confirmed goshawk breeding territories, and a third possible territory, were identified within the Breeding Raptor Study Area. Although no nest sites were identified within 500m of the Site, the possibility that an inactive goshawk nest site could be lost cannot be excluded, and the removal of key holed areas of mature forest around some of the proposed wind turbine locations prior to construction would reduce the area of available breeding habitat within the Site. Extensive clear-felling is not proposed, however, and thus large areas of suitable breeding habitat would be retained on Site and in the surrounding area. Given that pairs can have up to four different nesting areas within their territory (Hardey *et al.*, 2013) and the fact that goshawks regularly breed in commercial forestry plantations, despite periodic changes in forest structure during scheduled forestry operations, it is considered unlikely that any breeding territories would be permanently lost due to habitat loss for construction of the Proposed Development.

94. Although construction of the Proposed Development may result in the loss of suitable foraging habitat for goshawk, the species will hunt over open ground as well as within woodland (Hardey *et al.*, 2013). Furthermore, based on the relatively limited proportion of plantation habitat within the Site that would be lost, it is considered unlikely that significant proportions of traditional foraging areas would be lost. Given the extent of plantation habitat within the Site and surroundings, it is also considered highly unlikely that goshawks would be impacted by loss of roost sites due to construction of the Proposed Development.

95. As such, potential effects on the NHZ 17 and NHZ 19 breeding goshawk populations due to habitat loss are assessed as being low and not significant under the EIA Regulations.

8.6.3.1.4 Peregrine

96. The habitat that would be lost due to construction of the Proposed Development is unsuitable for nesting peregrine and likely to be sub-optimal for foraging birds. As such, potential effects on peregrine due to habitat loss are scoped out of the assessment.

8.6.3.2 Black Grouse

97. The majority of the habitat that would be lost due to construction is conifer plantation, which is unsuitable for lekking black grouse and no lek sites were identified within 500m of the Proposed Development. Although, it is possible that birds could lose some nesting, foraging and roosting habitat, the proportion of suitable habitat within the Site that would be lost is relatively small, and it is considered that there is sufficient habitat in the surrounding area to support similar numbers of black grouse. Furthermore, opening up parts of the canopy may be beneficial to black grouse, creating new areas of suitable habitat.

98. As such, potential effects on the NHZ 17, NHZ 19 and Galloway Forest Park IBA black grouse populations due to habitat loss are assessed as being low and not significant under the EIA Regulations.

8.6.3.2.1 Crossbill

99. Small numbers of breeding crossbills were recorded during the Ornithology Field Surveys and, as summarised in **Table 8.8**, are likely to be nesting within the Site. It is therefore highly likely that keyholing of the plantation would result in a loss of suitable nesting, roosting and foraging habitat. However, the proportion of suitable habitat within the Site that would be lost is relatively small, and it is likely that there is sufficient habitat in the surrounding area to support similar numbers of crossbills. Furthermore, the number of birds affected is likely to represent only a very small proportion of the NHZ 17 and NHZ 19 populations of breeding crossbill.

100. As such, potential effects on crossbill populations due to habitat loss are assessed as being low and not significant.

8.6.3.3 Habitat Modification

101. Although habitat modification due to keyholing could result in minor changes in use of the Site by IOFs, the extent of new open habitats created would be relatively limited and, based on the ecology of the identified IOFs, it is considered unlikely that there would be any significant changes in use of the Site. Potential effects on IOFs due to habitat modification have therefore been scoped out of the assessment.

8.6.3.4 Disturbance and Displacement

102. During the construction phase of the Proposed Development, should it be consented, there would 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 involved 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; and
- the behavioural sensitivity of birds using a development site (which is likely to vary between species).

8.6.3.4.1 Osprey and Peregrine

103. No evidence of breeding osprey or peregrine within 750m¹¹ of the Proposed Development was identified during the Ornithology Field Surveys or Desk Study. As such, it is considered highly unlikely that breeding birds of either species will be disturbed during construction of the Proposed Development. Although there is suitable foraging and roosting habitat for both species within 750m of the Proposed Development, it is considered that there is sufficient alternative roosting and foraging habitat available in the wider area to support any birds temporarily displaced due to construction disturbance.

104. As such, potential effects on the NHZ 17 and NHZ 19 breeding osprey and peregrine populations, as well as the IBA peregrine population, due to disturbance during construction of the Proposed Development are assessed as being low and not significant under the EIA Regulations.

8.6.3.4.2 Goshawk

105. Disturbance during construction works could deter goshawk from nesting in parts of the Site. However, construction works will be temporary, reversible, and of short-term duration, most likely only deterring breeding attempts for 1-2 breeding seasons within the disturbance distance for nesting goshawk (300-500m; Ruddock and Whitfield, 2007). A possible goshawk breeding territory was identified within 500m of the Proposed Development Area¹¹, based on a single observation of a pair of displaying birds in June 2020. However, displaying birds are not always linked to an active nest site (Hardey *et al.*, 2013) and no other evidence of breeding was observed in the area during subsequent surveys, and no evidence of historic breeding in the area was identified during the Desk Study. This indicates that the potential for breeding birds to be disturbed is minimal. Furthermore, birds may be habituated to existing levels of disturbance associated with forestry operations, and as pairs can use alternative nesting areas up to 2.5km apart, it is considered unlikely that there would be a permanent loss of any breeding territories. Additionally, although any works within 300-500 m of nesting goshawk have the potential to disturb breeding birds, which is an offence and could impact on nesting success, this risk will be avoided through implementation of the embedded mitigation described in **Section 8.6.2.1**.

106. Although it is possible that goshawks foraging and roosting on the Site could be disturbed due to construction of the Proposed Development, it is considered that there is sufficient alternative roosting and foraging habitat available in the wider area to support any displaced birds.

107. As such, potential effects on the NHZ 17 and NHZ 19 breeding goshawk populations due to disturbance during construction of the Proposed Development are assessed as being low and not significant under the EIA Regulations.

8.6.3.4.3 Black Grouse

108. Parts of the Proposed Development are suitable for lekking black grouse, and two of the areas where leks have been recorded are within 750m¹² of the Proposed Development. Therefore, lekking birds could potentially be disturbed and displaced during construction, which could affect breeding success. There is also the potential for nesting black grouse to be disturbed. However, the embedded mitigation described in **Section 8.6.2.1** includes measures to protect all breeding birds, as well as specific measures to minimise the risk of disturbance to lekking black grouse.

109. Although it is possible that foraging and roosting black grouse could also be disturbed due to construction of the Proposed Development, it is considered that there is sufficient alternative roosting and foraging habitat available in the wider area to support any displaced birds.

110. As such, potential construction phase effects on the NHZ 17, NHZ 19 and Galloway Forest Park IBA black grouse populations due to disturbance and displacement are assessed as being low and not significant under the EIA Regulations.

8.6.3.4.4 Crossbill

111. It is considered likely that crossbill was breeding within the 150m¹¹ of the Proposed Development. However, the embedded mitigation described in **Section 8.6.2.1** includes specific measures to protect breeding birds and avoid disturbance to Schedule 1 breeding species, including crossbill.

112. Although it is possible that foraging and roosting crossbill could also be disturbed due to construction of the Proposed Development, it is considered that there is sufficient alternative roosting and foraging habitat available in the wider area to support any displaced birds.

113. As such, potential construction phase effects on crossbill due to disturbance and displacement are assessed as being low and not significant.

8.6.4 Operation

114. The main ways in which a windfarm may affect IOFs during the operational phase are via:

- disturbance/displacement (including barrier effects); and
- collision with wind turbines.

115. Note that the following assessments of potential operational phase effects on IOFs are dependent on consent being granted.

8.6.4.1 Disturbance and Displacement

116. The operation of wind 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 are likely to be of a lower magnitude than during construction, as some species may become habituated to wind turbines. Additionally, the level of human activity and associated disturbance onsite would be considerably reduced compared to the construction phase, with the level of human activity on the Site during operational works expected to be infrequent and of limited extent (both spatially and temporally).

117. Individual wind turbines, or a windfarm 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 windfarms in the wider area, habitats within the Site and wider area, and target species flight activity, it is considered highly unlikely that there would be any barrier effects on any IOF. Potential barrier effects have therefore been scoped out of the assessment.

118. If any significant maintenance works (including felling) are required during the operational phase of the Proposed Development, relevant good practice measures described in **Section 8.6.2.1** would be applied to ensure compliance with legislation protecting breeding birds, including Schedule 1 species.

119. As such, potential operation phase effects are assessed as being low and not significant.

8.6.4.2 Collision with Wind Turbines

120. 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 a site), the nature of the surrounding environment and the structure and layout of the wind turbines. Clearly, 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 over a site. The risk of bird collisions at windfarms 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), and in poor flying conditions, such as strong winds that affect birds' ability to control flight manoeuvres, or in rain, fog and on dark nights when visibility is reduced (Langston and Pullan, 2003; Drewitt and Langston 2006 and references therein). Birds may also be more susceptible if the windfarm is located in an area of high prey density. For diurnal foraging raptors, the proximity of structures on which to perch can also increase the likelihood of collision with wind turbines (Percival, 2005 and references therein).

121. 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 windfarm due to disturbance cannot be at risk of collision with the wind turbine rotors at the same time. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid a windfarm but habituate to it and could then be at risk of collision (Madders and Whitfield, 2006).

8.6.4.2.1 Osprey

122. High levels of osprey flight activity were recorded during the Flight Activity Surveys but the CRM for osprey predicted a mean annual collision rate of 0.101 birds, or one collision every 9.9 years. The predicted annual mortality represents 1.01% and 0.82% respectively of the NHZ 17 and NHZ 19 breeding osprey populations (Wilson *et al.*, 2015).

123. Based on an existing background mortality rate of 15% for adult ospreys (Poole, 1989; cited in Robinson *et al.*, 2005), and the NHZ populations estimated by Wilson *et al.* (2015), annual natural mortality rates of adult birds would be 1.5 birds in NHZ 17 and 1.8 birds in NHZ 19. Assuming all collisions were of breeding adult birds, predicted collision mortality would be equivalent to 6.73% and 5.61% increases over the existing baseline mortality for the NHZ 17 and NHZ 19 populations respectively. In reality, however, it is likely that juveniles would be at greater risk of collision than adults due to inexperience (in terms of both flight ability and familiarity with the Site).
124. Estimated background mortality rates for juvenile ospreys in their first year are much higher at 40% (Poole, 1989; cited in Robinson *et al.*, 2005). As such the proportional increase in background mortality rates due to collision risk would be much lower. Furthermore, as noted in **Table 8.8**, recent estimates indicate that the regional osprey population is increasing (Challis *et al.*, 2019), in which case, the percentage increase in natural background mortality rates due to collisions would be further reduced.
125. Further to the above, as PCH was defined as all flights above 30m, whereas the RSH of the candidate wind turbine model is 30-200m, predicted collision rates may be an overestimate, as all flights within height band 3 have been included in CRM.
126. Nonetheless, although collision rates in the UK are relatively low, with at least three reported in the UK to date (RSPB, 2016), reported osprey collision rates at European wind farms are relatively high (Dürr, 2019) in comparison to some other raptor species. Birds may be particularly vulnerable to collisions during particular periods such as poor visibility due to low cloud or fog, and at particular life stages, such as newly fledged chicks.
127. The above collision risk assessment assumes that osprey flight behaviour, and specifically the foraging flight behaviour recorded, would not change over the lifetime of the Proposed Development. Flight behaviour suggests a single core foraging site located to the south the Site, however a relatively small number of flights outwith this core foraging area and within Site, were recorded. Some of these flights suggested an alternative foraging resource to the east of the Site may be used on an occasional basis. Although no strong evidence of an established alternative foraging area was recorded, it is possible that a change in prey availability within the core foraging area, could lead to an increase in flight activity at collision risk height.
128. It is acknowledged that natural annual fluctuations in prey species populations are feasible (Frear, P.A & Cowx, I.G, 2003). However, considering the dominant and consistent use of the core foraging location, a considerable reduction in prey populations would likely be required to reduce the use of the core foraging area sufficiently enough to result in a notable change flight behaviour, and there is no evidence to suggest that this would occur.
129. In the unlikely event of a dramatic change in the prey availability within the core foraging area, with an extensive availability of suitable nesting resources in the wider local area (suitable trees within woodland/forestry) (in proximity to alternative foraging areas) the breeding pair would likely relocate to a new nesting location closer to an alternative suitable foraging resource, rather than considerably increasing their foraging distance and associated energy costs by staying at the existing nesting location. As such, it is feasible that a change in prey availability sufficient to change foraging behaviour would be more likely to reduce collision risk, due to a relocation of the nest, and a reduction of foraging flights through the wind turbine envelope.
130. In addition, should prey availability within the core foraging area dramatically reduce, and the pair do not relocate, there is an abundance of alternative foraging locations within the osprey core foraging range of 10 km (SNH, 2016a), and the use of the majority of these would not involve an increase in the number of foraging flights at collision risk, as the windfarm would not act as a barrier between the nest and likely alternative foraging resources.
131. In summary, although an effect is predicted, it is not considered of sufficient magnitude to affect the abundance and distribution of the species locally, and thus undermine their conservation status, particularly if birds continue expand their breeding range and numbers in the local area as they become more established. However, given that the breeding osprey population in Ayrshire specifically is small, with successful breeding occurring relatively recently, a long-term monitoring programme is proposed for this species.

132. Potential collision risk to osprey is considered to be low and not significant under the EIA Regulations.

8.6.4.2.2 Goshawk

133. Low levels of goshawk flight activity were recorded during the Flight Activity Surveys and the CRM predicted a mean annual collision rate of 0.004 birds, or one collision every 283.4 years. This is clearly negligible and not significant under the EIA Regulations.

8.6.4.2.3 Peregrine

134. Relatively low levels of peregrine flight activity were recorded during the Flight Activity Surveys and the CRM predicted a mean annual collision rate of 0.006 birds, or one collision every 177.7 years. As for goshawk, this is clearly negligible and not significant under the EIA Regulations.

8.6.4.2.4 Black Grouse

135. Levels of observed black grouse flight activity were very low, with just two flights recorded during a total of 792 hours of observation across a two-year survey period. CRM was, therefore, not completed for black grouse, and potential collision risk to this species has been scoped out of the assessment.

8.6.4.2.5 Crossbill

136. It is generally considered that passerine species are not significantly impacted by windfarms (SNH, 2017). In accordance with this guidance, passerine species such as crossbill were not recorded as target species during Flight Activity Surveys and potential collision risk to crossbill is considered to be negligible and has been scoped out of the assessment.

8.7 Mitigation

8.7.1 Construction

137. Embedded mitigation measures to be implemented during the construction of the Proposed Development are outlined in **Section 8.6.2.1**. This would ensure that all breeding birds and any roosting hen harriers are protected. It is not considered that any additional mitigation is required during the construction phase.

8.7.2 Operation

138. Embedded mitigation measures to be implemented during any significant works during the operational phase of the Proposed Development are outlined in **Section Error! Reference source not found.** This would ensure that all breeding birds and any roosting hen harriers are protected.

8.7.3 Monitoring

139. Although there are no significant effects predicted, operational monitoring is proposed for Osprey to help validate the assessment and design mitigation.

140. Operational osprey monitoring will be carried out for the first three years of operation. Full scope and methodologies will be confirmed should the Proposed Development be consented, as part of the Osprey Monitoring Plan, however it is anticipated that the scope will comprise of annual osprey Nest Monitoring Surveys and Vantage Point Flight Activity Surveys. Monitoring will take place from early April, until the departure of all birds from the nest, and will be increased in occurrence during the fledging period.

141. In addition, SPR have an established system for detecting and recording carcasses found under turbines across every windfarm in their portfolio. The system integrates a programme of weekly external turbine inspections to include a visual check of the hardstanding and adjacent access track for dead or injured animals. While not covering the entire area where carcasses could potentially fall, this method provides a systematic sample which can be used to generate estimates of collisions and will be employed for the duration of the operational period.

142. As mentioned above, the aim of this monitoring would be to record osprey activity to help validate the assessment and design mitigation, but also to provide data to inform future assessments of osprey and interactions with windfarms.

143. Routine maintenance required during operation is expected to be minimal, involving only small areas and of a temporary duration. However, should significant operational works be required during the nesting bird season, or if any Schedule 1 birds or roosting hen harriers are suspected or confirmed to be present, the mitigation measures outlined above for the construction phase will be explored in order to protect these species.

8.8 Residual Effects

8.8.1 Construction

144. Following implementation of the embedded mitigation measures described in **Section 8.6.2.1**, no significant effects on any IOFs during construction of the Proposed Development are predicted.

8.8.2 Operation

145. Following implementation of the embedded mitigation measures described in **Section Error! Reference source not found.**, no significant effects on any IOFs during operation of the Proposed Development are predicted.

8.8.3 Summary

146. A summary of predicted residual effects on IOFs is presented in **Table 8.10**.

Description of Effect	Pre-mitigation Effect*		Mitigation Measure	Residual Effect	
	Magnitude	Significance		Magnitude	Significance
During Construction					
Habitat loss – Osprey, goshawk, black grouse and crossbill	Low to Negligible	Not significant	N/A	Low to Negligible	Not significant
Disturbance and displacement – all IOFs	Low	Not significant	N/A	Low	Not significant
During Operation					
Disturbance and displacement – all IOFs	Low	Not significant	N/A	Low	Not significant
Collision risk – Osprey, goshawk and peregrine	Low to Negligible	Not significant	N/A	Low to Negligible	Not significant
*The magnitude and significance of pre-mitigation effects assume that the embedded mitigation described in Section 8.6.2 is fully implemented					

Table 8.10 Residual Effects Table

8.9 Cumulative Assessment

147. The potential for the Proposed Development to make a material contribution to cumulative effects on IOFs is assessed below following SNH (2018b) guidance. As the potential for the Proposed Development to result in

any detectable effects on IOFs due to habitat modification or barrier effects was scoped out of the assessment, the potential for cumulative habitat modification and barrier effects has also been scoped out. Note that developments that have been refused or withdrawn were excluded from the cumulative assessment because, even if these applications are re-submitted, it is likely that the development layout and/or number of wind turbines, and hence potential effects on IOFs, will change and/or the development may never be consented. Proposed developments in planning but for which an application has not been submitted (i.e. those at the screening or scoping stage, such as Knockcronal Windfarm which is immediately adjacent to the Site) were also excluded from the assessment because it is assumed that the number and design of wind turbines/infrastructure has not been finalised at this stage, baseline data is not complete and an assessment of effects on IOFs is not publicly available.

8.9.1 Construction

8.9.1.1 Habitat Loss

With the exception of crossbill (which was likely to be breeding across the Site), it was determined that none of the identified IOFs would lose any nest sites, and the extent of suitable breeding, foraging and roosting habitat that would be lost would be relatively low and is considered to be low to negligible. Furthermore, it is expected that sufficient suitable habitat is present in the surrounding area to support similar levels of breeding crossbills. Similarly, the proportion of the Galloway Forest Park IBA that would be lost due to construction of the Proposed Development is considered to be negligible. It is therefore considered highly unlikely that there would be any potential for significant cumulative effects on IOFs due to habitat loss and this has been scoped out of the assessment.

8.9.1.2 Disturbance and Displacement

148. The embedded mitigation outlined in **Section 8.6.2.1** would be implemented to avoid disturbance and displacement of breeding and roosting birds (including IOFs). Although it is possible that construction works could deter IOFs from breeding in new parts of the Site, any works would be temporary. As such, it is considered that the potential for any IOFs to be displaced or disturbed during construction would be so minimal that it would not result in any potentially significant cumulative disturbance impacts.

8.9.2 Operation

8.9.2.1 Disturbance and Displacement

149. If any significant works are required during operation of the Proposed Development, the embedded mitigation outlined in **Section 8.6.2.1** would be implemented to avoid disturbance and displacement of breeding and roosting birds (including IOFs). As such, it is considered that the potential for any IOFs to be displaced or disturbed during construction would be so minimal that it would not result in any potentially significant cumulative disturbance impacts.

8.9.2.1.1 Collision Risk

150. The only IOF for which it was considered that the Proposed Development could contribute to a potentially significant cumulative collision risk was osprey.

151. The Site is located in NHZ 17 but is close to the border with NHZ 19; as such, a cumulative assessment could potentially consider a vast area. In reality however, osprey has a core foraging range of 10km, with some regular foraging up to 20km, and a maximum recorded distance of 28km (SNH 2016). Furthermore, while defining populations based on NHZs is a useful tool, in most cases populations are likely to be contiguous across NHZs. As such, it was considered that a search area of 30km around the Proposed Development was proportionate and sufficient to allow a robust assessment of cumulative collision impacts on osprey.

152. A summary of the results is presented in **Table 8.11**.

Development Name	Status	Predicted Annual Collision Risk
Afton	Operational	No information
Arcleloch	Operational	No information
Arcleloch Extension	Consented	No osprey recorded
Assel Valley	Operational	No information
Benbrack	Consented	No osprey recorded

Development Name	Status	Predicted Annual Collision Risk
Chirmorie	Consented	No information
Clauchrie	Application	0.009
Craiginmoddie	Application	No osprey recorded
Dersalloch	Operational	No osprey recorded
Dowhill Farm	Operational	No information
Enoch Hill	Consented	No information
Enoch Hill (variation)	Application	No information
Euchanhead	Application	Single flight. CRM not required.
Glenshimmeroch	Consented	No osprey recorded
Greenburn	Application	No osprey recorded
Hadyard Hill	Operational	No information
Hare Hill	Operational	No information
Hare Hill Extension	Operational	No osprey recorded
Kilgallioch	Operational	No information
Kilgallioch Extension	Application	No osprey recorded
Kirk Hill	Consented	No information
Knockshinnoch	Consented	No osprey recorded
Kype Muir	Operational	No osprey recorded
Lorg	Consented	No osprey recorded
Mark Hill	Operational	No information
North Kyle	Application	No information
North Threave	Operational	No information
Overhill	Consented	No osprey recorded
Pencloe	Consented	No osprey recorded
Pencloe (variation)	Application	No osprey recorded
Penwhapple	Operational	No information.
Polquairn	Consented	No osprey recorded
Polquairn (variation)	Consented	No osprey recorded
Sanquhar II	Application	Single flight. CRM not required.
Sanquhar Six	Consented	No information.
Shepherd's Rig	Application	0.0135
South Kyle	Under construction/ Consented	0.02
Stranoch	Consented	No information.
Stranoch 2	Consented	No osprey recorded
Stranoch 2 (variation)	Application	No osprey recorded
Tralorg	Under construction/ Consented	No information
Torrs Hill	Under construction/ Consented	No information
Windy Standard	Operational	No information
Windy Standard Extension	Operational	No information
Windy Standard 3	Application	No osprey recorded
Windy Rig	Operational	No osprey recorded
		Total: 0.0425

Table 8.9 Summary of Potential Cumulative Collision Risk to Osprey

153. The annual cumulative collision risk for osprey would be 0.101 collisions per year due to the Proposed Development and a further 0.0425 (see **Table 8.11**) from the other developments for which information was available, giving a total risk of 0.1435 collisions per year, which represents 1.44% and 1.20% respectively of the NHZ 17 and NHZ 19 breeding osprey populations. As such, it is considered that the effect would be negligible and would not result in a significant cumulative effect.

8.10 Summary

154. Two years of Ornithology Field Surveys were completed between September 2018 and August 2020 (inclusive). The survey programme comprised the following during both survey years: year-round Flight Activity Surveys, Black Grouse Surveys, Breeding Bird Surveys, Breeding Raptor Surveys, Winter Walkover Surveys; and a Breeding Nightjar Survey during Year 2 (2019-20) only.

155. Two statutory sites were identified within 10 km of the Site as part of the Desk Study: the Merrick Kells SSSI and Bogton Loch SSSI, both of which are designated for their breeding bird assemblage. However, it was considered unlikely that there was any connectivity between the Site and either of these statutory sites and therefore the Proposed Development would not have any effects on either SSSI.

156. In addition, two non-statutory sites of ornithological importance were identified: Galloway Forest Park IBA and River Stinchar (Milton to Black Hill) Provisional WS.

157. Across the two-year survey period, a total of 166 flights by 13 target species were recorded, with osprey recorded most frequently during both survey years; for the remaining species levels of activity were low (up to 11 flights per year).

158. Small numbers of male black grouse (a peak count of five) were occasionally recorded during the first year of surveys, the majority of which were during the non-breeding season. Multiple records of black grouse within 2km of the Site during the last ten years were identified during the Desk Study, including small numbers of lekking birds in four areas within the Black Grouse Study Area.

159. Breeding birds recorded included four breeding wader species: oystercatcher (a single territory in 2020 only), woodcock (a single territory in 2020 only), snipe (two territories in 2019 and four in 2020) and common sandpiper (a single territory during each survey year). Of these territories, only a single snipe territory was located within the Study Area Two breeding wildfowl species were also recorded: mallard (three territories during each survey year) and teal (two territories in 2019 and one in 2020): Other notable breeding species recorded during the Breeding Bird Surveys included small numbers of crossbill during both survey years. There were no observations of nightjar.

160. Active or historic territories of three breeding Schedule 1 raptor species were identified within the Breeding Raptor Study Area, details of which are provided in **Appendix 8.2 Baseline Ornithology Report 2018-19 (Year 1) Confidential Annex** and **Appendix 8.4 Baseline Ornithology Report 2019-20 (Year 2) Confidential Annex**. Merlin was also recorded occasionally during both survey years and there was a single registration of marsh harrier. However, there was no evidence that these species were breeding within the Breeding Raptor Study Area.

161. During the non-breeding season, the majority of birds recorded were common and widespread species typical of the plantation habitat present across the Site.

162. Six IOFs were identified: Galloway Forest Park IBA, osprey, goshawk, peregrine, black grouse and crossbill.

163. The total land-take for the Proposed Development would result in the permanent loss of 26.72ha in total, the majority of which (85.07%) would be coniferous plantation. The effects of habitat loss on all IOFs is considered to be low and not significant under the EIA Regulations.

164. Following implementation of embedded mitigation measures to protect breeding birds, the effects of disturbance and displacement on IOFs during the construction and operation phases of the Proposed Development is low and not significant under the EIA Regulations.
165. CRM was completed for osprey, goshawk and peregrine and the effects of collision on these species were predicted to be low for osprey, and negligible for both goshawk and peregrine, with annual collision risk predicted to affect less than 1% of the NHZ populations of these species. This was not considered to be significant under the EIA Regulations.
166. Cumulative effects were considered and cumulative collision risk to osprey was considered to be the only effect that the Proposed Development could potentially make a material contribution to. However, cumulative collision risk to osprey was assessed as being low and not significant under the EIA Regulations.
167. Ornithological sensitivities were taken into consideration during the design of the Proposed Development, with the layout designed to minimise potential effects on IOFs as far as possible.
168. A Bird Protection Plan would also be produced to ensure that all breeding birds, lekking black grouse and any roosting hen harriers are protected during construction of the Proposed Development as well as during any major works required during the operational phase. Following full implementation of this Plan, effects of the Proposed Development on bird species would be low to negligible and not significant.
169. Although no significant effects predicted, however operational monitoring is proposed for osprey to help validate the assessment and design mitigation, and provide data to inform future assessments of osprey and windfarms.
170. No additional formal mitigation was considered necessary.

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