Scawd Law Wind Farm

Additional Information: Volume 2
Additional Ornithological Information

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Contents

List of Abbreviations

Abbreviation	Description
AIR	Additional Information Report
BoCC	Birds of Conservation Concern
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modelling
CRZ	Collision Risk Zone
ECU	Energy Consents Unit
EcIA	Ecological Impact Assessment
EIAR	Environmental Impact Assessment Report
GET	Golden Eagle Topographical
GPS	Global Positioning System
IOF	Important Ornithological Feature
LBAP	Local Biodiversity Action Plan
PAT	Predicting Aquila Territories
PCH	Potential Collision Height
RSG	Raptor Study Group
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SPA	Special Protection Area
SRMS	Scottish Raptor Monitoring Scheme
SSGEP	South of Scotland Golden Eagle Project
SSSI	Site of Special Scientific Interest
SUP	Southern Upland Partnership
VP	Vantage Point
ZoI	Zone of Influence

Glossary

Term	Definition
Baseline	The existing conditions that prevail against which the effects of the Proposed Development are compared.
Birds of Conservation Concern (BoCC)	A five-yearly assessment of ornithological conservation priorities, provided by a review of the population status of birds regularly found in the UK, Channel Islands and the Isle of Man conducted by the UK's leading bird conservation organisations.
Collision Risk Zone (CRZ)	The area derived by applying a buffer around each turbine with a radius equal to the length of the turbine blades, plus an additional precautionary 200 m.
Ecological Impact Assessment	Ecological Impact Assessment is a process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems.
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for potential negative effects of a development.
The Proposed Development	The proposed Scawd Law Wind Farm development as described in Chapter 4 of the EIAR.
The Proposed Development Area	The development area within the red line site boundary (application area) as shown in Volume 3a of the EIAR, Figure 1.2 Site Layout.
Site of Special Scientific Interest (SSSI)	Sites of Special Scientific Interest are protected areas that represent the UK's most important wildlife and/or geological sites.
Zone of Influence	This is "the area over which ecological features[1] may be subject to significant effects as a result of the proposed project or associated activities" (CIEEM)[2].

[1] Ornithological features are included under 'ecological features'.
[2] CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3*. Chartered Institute of Ecology and Environmental Management, Winchester.

8. Ornithology

8.1. Introduction

8.1.1. This section provides an updated assessment of potential impacts on ornithological receptors relevant to the proposed Scawd Law Wind Farm (hereafter referred to as the Proposed Development). An assessment of the effects of the Proposed Development on ornithological receptors was provided within Chapter 8 of the Environmental Impact Assessment Report (EIAR) submitted to the Energy Consents Unit (ECU) in December 2022, which predicted a low negative/negligible impact on all Important Ornithological Features (IOFs). All impacts predicted were considered to result in effects which are not significant.

8.1.2. The author has five years of experience in the environmental sector in ecology and conservation, with four of those years in environmental consultancy focused on onshore renewable energy developments including wind and solar. The author was assisted by an Associate Technical Director of onshore ornithology with 12 years of experience in ornithological consultancy and a Technical Director of onshore ecology with 16 years of experience in ecological consultancy.

8.1.3. Following establishment of a nearby breeding territory, additional vantage point (VP) surveys to record golden eagle flight activity between May and August were completed in 2022 prior to submission of the EIAR. As these surveys covered only part of a single breeding season, further VP surveys to record golden eagle flight activity were completed between March 2023 and January 2024, at the request of consultees.

8.1.4. Flight data of all target species from the full suite of VP surveys completed between 2017 and 2024 was used to reassess collision risk for all ornithological receptors with respect to the Proposed Development. However, a full account of methods and results previously provided in the EIAR are not repeated here for VP surveys completed between September 2017 and August 2022. Methods and results of VP surveys completed prior to 2023 are included where relevant for comparison or completeness of information regarding the updated impact assessment only. For all other information relating to impact assessment of all ornithological receptors, refer to Chapter 8 of the EIAR.

8.1.5. As discussed later in this section, the updated assessment concludes that no significant effects have been identified for all ornithological receptors as a result of the Proposed Development.

8.2. Consultation

8.2.1. Details of consultee responses to the EIAR with specific relevance to ornithology are provided in Table 3.1. Pre-application consultation is not included within this table but can be found in in Table 8.5, Chapter 8 of the EIAR. Consultee responses with relevance to ecology are presented in Table 4.1, Section 4.2.

Table 8.1: Summary of consultee responses following submission of the EIAR

Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
NatureScot 26 May 2023	Recommended that a brief explanation of the change to VPs used during VP surveys following submission of the EIAR in 2022 should be included in an AIR, should an AIR be required.	An explanation of changes to VP locations, used in 2023 and 2024, is provided in Section 8.3, Paragraph 8.3.9.

Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
RSPB 24 November 2023	Disagreed with assessment of significance of impact of the Proposed Development on golden eagle due to the location of proposed turbines 7 and 8, on an important ridge within a breeding territory. Proposed that turbines 7 and 8 should be removed from the Proposed Development to avoid displacement and reduce collision risk of breeding golden eagle from the newly established territory.	An updated assessment of the impacts of the Proposed Development on golden eagle have been reassessed in this AIR following collection of additional data.
	Advised that an outline Habitat Management Plan (HMP) be submitted prior to consent of the Proposed Development, if granted to ensure that the HMP appropriately addresses mitigation, compensation and enhancement measures required to comply with NPF4.	An outline HMP will be submitted alongside this AIR.
NatureScot 2 February 2024	Disagreed with assessment of significance of impact of the Proposed Development on golden eagle due to the location of proposed turbines 7 and 8, on an important ridge within a breeding territory. Proposed that turbines 7 and 8 should be removed from the Proposed Development to avoid displacement of breeding golden eagle from the newly established territory.	An updated assessment of the impacts of the Proposed Development on golden eagle have been reassessed in this AIR following collection of additional data.
	Satisfied that an Appropriate Assessment (AA) is not required for the Gladhouse Reservoir Special Protection Area (SPA) and Fala Flow SPA.	None
	Satisfied that the Proposed Development will have no impact on the breeding bird assemblage notified feature of the Moorfoot Hills Site of Special Scientific Interest (SSSI).	Impact on the notified breeding bird assemblage feature of the Moorfoot Hills SSSI has not been assessed within this AIR.
	Noted that impact of the Proposed Development on the notified golden plover population feature of the Moorfoot Hills SSSI was not assessed.	Impact on the notified golden plover population feature of the Moorfoot Hills SSSI has been assessed within this AIR.

8.3. Method of Assessment

8.3.1. Chapter 8 of the EIAR assessed the following potential impacts during construction, operation and decommissioning of the Proposed Development on ornithological receptors:

- Habitat loss due to land-take;
- Disturbance and/or displacement; and
- Collision with turbines.

8.3.2. As additional VP surveys were completed following submission of the EIAR, results of all VP surveys completed between September 2017 and January 2024 have been combined to provide an updated assessment of collision risk on all ornithological receptors recorded at the Proposed Development.

8.3.3. It is considered that only potential effects in relation to potential IOFs previously identified within Chapter 8 of the EIAR and potential effects of collision risk on ornithological receptors that have since been identified require re-assessment.

8.3.4. All appropriate embedded mitigation as identified within the EIAR will be retained.

8.3.5. In addition, the cumulative impact assessment (CIA) has been refreshed to allow consideration of any additional developments proposed, consented or becoming operational since the submission of the EIAR.

Desk Study

8.3.6. In order to obtain two full years of satellite tag data (July 2021 to September 2023), further data recorded between September 2022 and September 2023 (inclusive) relating to golden eagles monitored as part of the South of Scotland Golden Eagle Project (SSGEP) was requested from the Southern Upland Partnership (SUP) in September 2023.

Vantage Point Surveys

8.3.7. Additional VP surveys to target golden eagle flight activity within the Proposed Development Area (the same as that defined within the EIAR) were completed between March 2023 and January 2024, following NatureScot guidance[3]. Recording of flight data was consistent with methods used during baseline VP surveys carried out between September 2017 and August 2022, including time and duration, and the altitude of the bird at the start of the observation and at 15 second intervals thereafter into one of four height bands (HBs):

- HB 1 = 0-25 m;
- HB 2 = 25-50 m;
- HB 3 = 50-200 m; and
- HB 4 = >200 m.

8.3.8. Although the VP surveys focused on recording golden eagle flights, flights of other target species, including all raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[4] and/or Annex I of the Birds Directive[5], waterfowl (except Canada goose and mallard), wader species and black grouse, were recorded. Additionally, information relating to secondary species (all other raptor species (e.g. buzzard and kestrel), gull species, red grouse, raven, grey heron, cormorant, and flocks of >20 passerines listed on the UK Birds of Conservation Concern (BoCC) Red List[6]) was also recorded in line with the methods carried out during VP surveys completed between 2017 and 2022.

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[3] SNH (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms.* Scottish Natural Heritage (now NatureScot), Battleby.
[4] *Wildlife and Countryside Act (1981).* Available from https://www.legislation.gov.uk/ukpga/1981/69 [Accessed: 26/07/2024]
[5] *Directive 2009/147/EC of the European Parliament and of the Council (2009).* Available from - https://www.legislation.gov.uk/eudr/2009/147/contents [Accessed: 31/07/2024]
[6] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021). Birds of Conservation Concern 5: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 114, 723–747.

8.3.9. The VP surveys completed between September 2017 and August 2022 were carried out from three VPs: VP1 (NT 378413), VP2 (NT 351400), and VP3 (NT 377424). The additional VP surveys completed between March 2023 and January 2024 were undertaken from two alternative VP locations: VP4 (NT 367405) and VP5 (NT 366415), selected to minimise disturbance to breeding golden eagle within proximity to the Proposed Development, of which NatureScot was notified (See Table 8.1). The locations of VPs 4 and 5 are shown on Figure 8.2, AI Volume 2 Annex A.

8.3.10. The survey effort completed at VPs 4 and 5 between March 2023 and January 2024 is detailed in Table 8.2, below. Details of survey effort completed at VPs 1-5 between 2017 and 2024 is provided in AI Volume 2 Annex B AI Appendix 8.1.

Table 8.2: Survey effort completed at VP4 and VP5 between March 2023 and January 2024

Year	VP4	VP5
March 2023	6	6
April 2023	6	6
May 2023	12	12
June 2023	6	6
July 2023	6	6
August 2023	6	6
Breeding season total	**42**	**42**
September 2023	6	6
October 2023	6	6
November 2023	6	6
December 2023	6	6
January 2024	6	6
Non-breeding season total	**30**	**30**

Collision Risk Modelling

8.3.11. The results of additional VP survey data collected at the Proposed Development Area between March 2023 and January 2024 (inclusive) from VPs 4 and 5 were combined with results of VP surveys completed between September 2017 and August 2022 to provide an overall collision risk estimate for all ornithological receptors recorded which qualified for Collision Risk Modelling (CRM). The methods used to calculate collision risk were consistent with those used to inform the assessment in Chapter 8 of the EIAR.

8.3.12. An updated CRM was carried out for all ornithological receptors recorded at the Proposed Development during VP surveys completed between September 2017 and January 2024 for which at least three flights or ten individuals were recorded within the collision risk zone (CRZ) at potential collision height (PCH), defined below.

8.3.13. Flights considered to represent a potential collision risk were those that passed within the CRZ; a 277.5 m buffer of the proposed turbine locations representing half the rotor diameter of the maximum turbine specification proposed plus a 200 m precautionary buffer zone, at PCH. PCH was defined as the 25 – 180 m height range within which the proposed turbines will operate. Flight activity was recorded relative to the four height bands detailed in Paragraph 8.3.7.

8.3.14. Since the height within which the proposed turbine blades will rotate (PCH) falls within height bands 2 and 3, only flight activity within these height bands was considered to be at potential collision risk. A precautionary approach was taken in which it was assumed that all flight activity within the 25 m – 200 m height range covered by the height bands was assumed to be within the 25 m – 180 m height range that would be rotor-swept under the scenario in which the maximum turbine size is used.

8.3.15. CRM was carried out according to the Band Collision Risk Model[7]. Data collected during all VP surveys completed at the Proposed Development were used to predict the number of individuals expected to collide with the turbine rotors per season.

8.3.16. Ornithological receptors which qualify for CRM are categorised into receptors which exhibit 'non-directional flight' (i.e. those that spend time travelling randomly within the Proposed Development e.g. raptor species) or 'directional flight' (passing directly through the Proposed Development e.g. goose and swan species). For species which exhibit random/non-directional flight behaviour, the observed time spent flying within the CRZ at PCH is used to calculate collision risk; whereas for species that exhibit regular/directional flight behaviour, the number of flights that pass through the rotor-swept volume is used. This information is extrapolated up to predict the number of seconds within the CRZ at PCH or the number of transits through the rotor-swept volume per season (Band *et al*., 2007)[7].

8.3.17. For each species, the risk of collision for an individual is calculated by estimating the likelihood of collision based on the characteristics of each species and of the turbines. This is then scaled using a species-specific avoidance rate[8]. Further details of parameters and assumptions used in the CRM are provided in AI Volume 2 Annex B AI Appendix 8.1.

Golden Eagle Topography Model

8.3.18. In the UK, golden eagle is confined almost exclusively to the Scottish Highlands and Islands, with very few pairs nesting regularly further south. Although historically more home ranges were occupied across Scotland, in south-east Scotland just one territory was regularly occupied[9] during the period 2007-2013. As a result, the SSGEP[10] was launched in 2018 to boost the population of golden eagles in southern Scotland through translocations of juveniles and immature birds. A report published in September 2023 revealed that the population within the south of Scotland had since grown to 46 individuals[11] and currently stands at 49 individuals (Cat Barlow *pers comm,* November 2024).

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[7] Band, W., Madders, M. and Whitfield, D. P., (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G. F. E. and Ferrer, M. (eds) *Birds and Wind Farms: Risk Assessment and Mitigation*, pp 259-275. Quercus, Madrid.
[8] SNH (2018a). *Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model*. September 2018, v2.
[9] Murray, R.D., Andrews, I.J. & Holling, M. (2019). *Birds in South-east Scotland 2007-13: a tetrad atlas of the birds in Lothian and Borders.* The Scottish Ornithologists' Club, Aberlady.
[10] *South of Scotland Golden Eagle Project*. Available from - https://www.goldeneaglessouthofscotland.co.uk/ [Accessed 26/07/2024].
[11] NatureScot (2023). *Pioneering conservation project reveals new record number of golden eagles in southern Scottish skies and confirms love is in the air for established pair.* Available from -

8.3.19. A previous report on golden eagles in southern Scotland concluded that the south of Scotland could potentially hold 14-16 pairs[12]. The study indicated that the Moorfoot Hills, local to the Proposed Development, had the capacity to support a single pair of golden eagles or provide suitable habitat for non-breeding golden eagles. In 2022, a newly established golden eagle breeding territory was identified within 10 km of the Proposed Development. As such, a Golden Eagle Topography (GET) Model was carried out as recommended by NatureScot[13]. The GET Model assessed the suitability of habitat for golden eagles within the Proposed Development and surrounding 300 m buffer.

8.3.20. The GET Model is a simple model that has been developed to predict golden eagle habitat usage within a site based on the topographical characteristics of that site[14]. The model is based around the assumption that golden eagles will use ridges and rugged topography to exploit the vertical lift generated by such features. It has been developed and validated using Global Positioning System (GPS) telemetry records from satellite-tagged golden eagles in Scotland. It has been demonstrated that the GET Model is suitable to predict habitat use by both dispersing, and territorial golden eagles which occupy a home range[15].

Survey Limitations

8.3.21. The following survey limitations are specific to the additional VP surveys completed between March 2023 and January 2024, except where it is relevant to refer to baseline ornithology surveys completed prior to submission of the EIAR for full context of limitations. For details of survey limitations of all baseline ornithology surveys completed before March 2023, refer to Chapter 8 of the EIAR.

Weather Conditions

8.3.22. Weather conditions during the VP surveys were not always optimal, with occasional periods of heavy rain, strong winds, low cloud and moderate visibility reported. However, it is not always possible to avoid poor weather conditions and surveying in a range of weather conditions is considered to give an accurate representation of the environment within and surrounding the Proposed Development. It is therefore considered that occasional periods of poor weather are not a significant limitation to the dataset obtained.

Survey Effort

8.3.23. The golden eagle breeding season runs between February and August (inclusive). The VP surveys completed during the 2023 breeding season did not start until March. However, an additional six hours of VP survey was completed at both VP4 and VP5 in May. A total of 30 hours of VP survey was completed during the golden eagle non-breeding season (September

https://www.nature.scot/pioneering-conservation-project-reveals-new-record-number-golden-eagles-southern-scottish-skies-and [Accessed 26/07/2024]

[12] Fielding, A.H. and Haworth, P.F. (2014). *Golden eagles in the south of Scotland: an overview.* Scottish Natural Heritage Commissioned Report No. 626.

[13] NatureScot (2021). *NatureScot statement on modelling to support the assessment of forestry and wind farm impacts on golden eagles.* Available from - https://www.nature.scot/doc/naturescot-statement-modelling-support-assessment-forestry-and-wind-farm-impacts-golden-eagles [Accessed 26/07/2024]

[14] Fielding, A.H., Haworth, P.F., Anderson, D., Benn, S., Dennis, R., Weston, E., & Whitfield, D.P. (2020). A simple topographical model to predict Golden Eagle Aquila chrysaetos space use during dispersal. *Ibis*, 162, 400-415.

[15] Fielding, A.H., Anderson, D., Benn, S. Taylor, J., Tingay, R., Weston, E.D. & Whitfield, D.P. (2023). Responses of GPS-Tagged Territorial Golden Eagles Aquila chrysaetos to Wind Turbines in Scotland. *Diversity*, 15, 917.

to January) which is under the minimum number of observation hours recommended in NatureScot guidance.

8.3.24. However, the discrepancies in survey effort are not considered to be a limitation to the assessment of golden eagle as supplementary satellite tag data between July 2021 and September 2023 provided by SSGEP gives an indication of flight activity and use of the area surrounding the Proposed Development during the early part of the golden eagle breeding season and during the non-breeding season.

Collision Risk Modelling

8.3.25. Overall collision risk could not be calculated by combining all breeding and non-breeding seasons due to the changes in VPs and viewsheds between survey years. As such, collision risk was calculated for each individual breeding season and non-breeding season between 2017 and 2024 for each species which qualified for CRM (see Table 8.1.7, AI Volume 2 Annex B AI Appendix 8.1). Overall breeding season and non-breeding season collision risk estimates were then calculated as the mean of all collision risk estimates across all individual breeding seasons and non-breeding seasons. The annual collision risk estimate for each species was then calculated using the sum of the overall breeding season and non-breeding season estimates for each species.

8.3.26. Breeding season VP surveys in 2022 were carried out between May and August. The flight data recorded during this period was extrapolated up to cover the March to August breeding season (February to August for golden eagle), assuming that flight activity during May to August is representative of overall activity during the respective breeding seasons. Similarly, the breeding season VP surveys in 2023 were carried out between March and August. The CRM has therefore been conducted under the assumption that flight activity across March to August is representative of golden eagle flight activity from February to August.

8.4. Baseline Results

8.4.1. Overall results of VP surveys completed between September 2017 and January 2024 are presented below. For more detailed results of VP surveys completed during each breeding and non-breeding season, see AI Volume 2 Annex B AI Appendix 8.1.

8.4.2. For results of all other baseline ornithology surveys, refer to Chapter 8 the EIAR.

Desk Study

8.4.3. Details of data provided by the SSGEP is included in AI Volume 2 Annex B Confidential AI Appendix 8.2.

Vantage Point Surveys

8.4.4. Sixteen target species were recorded during the breeding season VP surveys carried out in 2018, 2019, 2022 and 2023. Of these, nine qualified for CRM: greylag goose, golden plover, curlew, golden eagle, goshawk, hen harrier, red kite, merlin and peregrine. During the non-breeding season VP surveys completed between 2017-2018, 2019-2020 and 2023-2024, eight target species were recorded, of which six, golden plover, golden eagle, goshawk, red kite, merlin and peregrine, qualified for CRM. Details of the number of flights and individuals observed for each target species during each breeding and non-breeding season between 2017 and 2024 are provided in AI Volume 2 Annex B AI Appendix 8.1.

8.4.5. The total number of flights recorded during all VP surveys between September 2017 and January 2024, including the flights and individuals observed passing through the CRZ at PCH,

during the breeding season and non-breeding season for target species which qualified for CRM are shown in Table 8.3. Breeding and non-breeding season collision risk estimates for these species were calculated using the mean value across all breeding seasons and non-breeding seasons.

8.4.6. Figures 8.3 and 8.4 show breeding season flights for all species recorded between 2018-2023, excluding golden eagle and hen harrier. Figure 8.5 shows non-breeding season flights for all species recorded between 2017-2024, excluding golden eagle. Figures 8.3-8.5 are provided in AI Volume 2 Annex A. Figures relating to golden eagle and hen harrier flights are provided in AI Volume 2 Annex B Confidential AI Appendix 8.2.

Table 8.3: Number of flights and individuals observed passing through the CRZ at PCH during the breeding season flight activity surveys (February to August inclusive for golden eagle and March to August inclusive for all other species) and non-breeding season flight activity surveys (October to January inclusive for golden eagle and October to February inclusive for all other species)

Species	Season	Total number of flights	Total number of individuals	Risk flights**	Risk individuals***
Greylag goose	Breeding	3	12	2	10
	Non-breeding	0	0	0	0
	Total	**3**	**12**	**2**	**10**
Golden plover	Breeding	5	26	5	26
	Non-breeding	7	287	4	166
	Total	**12**	**313**	**9**	**192**
Curlew	Breeding	70	112	14	28
	Non-breeding	0	0	0	0
	Total	**70**	**112**	**14**	**28**
Golden eagle	Breeding	19	19	12	12
	Non-breeding	14	16	4	5
	Total	**33**	**35**	**16**	**17**
Goshawk*	Breeding	15	16	7	8
	Non-breeding	27	29	9	10
	Total	**42**	**45**	**16**	**18**
Hen harrier	Breeding	50	50	34	34

Species	Season	Total number of flights	Total number of individuals	Risk flights**	Risk individuals***
	Non-breeding	0	0	0	0
	Total	**50**	**50**	**34**	**34**
Red kite	Breeding	8	8	4	4
	Non-breeding	2	2	2	2
	Total	**10**	**10**	**6**	**6**
Merlin	Breeding	11	20	4	8
	Non-breeding	4	4	0	0
	Total	**15**	**24**	**4**	**8**
Peregrine	Breeding	4	4	1	1
	Non-breeding	5	5	2	2
	Total	**9**	**9**	**3**	**3**

**Six additional goshawk flights comprising 7 individuals were also recorded in the 2018 – 2019 non-breeding season. Of these, three goshawk flights of one individual each were recorded within the CRZ at PCH. However, surveys were only conducted for a single month (September) during this season so an analysis has not been carried out due to the temporal bias that would be introduced if it were to be included; **Number of flights within the CRZ at PCH; ***Number of individuals recorded within the CRZ at PCH.*

Collision Risk Modelling

8.4.7. Greylag goose is expected to commute through the Proposed Development, passing directly through it ('directional flight'). All other ornithological receptors which qualified for CRM, golden plover, curlew, golden eagle, goshawk, hen harrier, red kite, merlin and peregrine, are expected to spend time travelling within the Proposed Development ('non-directional flight') rather than passing directly through ('directional flight').

8.4.8. The risk of collision for greylag goose, golden plover, curlew, golden eagle, goshawk, hen harrier, red kite, merlin and peregrine, calculated with avoidance factors of 95%, 98%, 99%, 99.2% and 99.8%, is presented in Table 8.4. The values shown in bold represents the species-specific avoidance level recommended for collision risk analysis for each species by NatureScot[8].

8.4.9. Details of the collision risk estimates calculated for each ornithological receptor during each breeding and non-breeding season between 2017 and 2024 are provided in AI Volume 2 Annex B AI Appendix 8.1.

Table 8.4: Estimated number of collisions during the species-spcific breeding and non-breeding seasons. The breeding season and non-breeding season values are the mean of individual breeding season and non-breeding season estimates across all survey years. Annual values are the sum of the breeding and non-breeding season mean estimates*. Values marked in bold represent avoidance rates recommended by NatureScot[8].

Species	Model type	Season	Estimated mortality assuming avoidance of:				
			95%	98%	99%	99.5%	99.8%
Greylag goose	Directional	Breeding**	0.30	0.12	0.06	0.03	**0.01**
		Non-breeding	0	0	0	0	**0**
		Annual	0.30	0.12	0.06	0.03	**0.01**
Golden plover	Non-directional	Breeding**	0.57	**0.23**	0.12	0.06	0.02
		Non-breeding	2.23	**0.89**	0.45	0.22	0.09
		Annual	2.80	**1.12**	0.56	0.28	0.11
Curlew	Non-directional	Breeding**	0.69	**0.28**	0.14	0.07	0.03
		Non-breeding	0	**0**	0	0	0
		Annual	0.69	**0.28**	0.14	0.07	0.03
Golden eagle	Non-directional	Breeding**	0.24	0.10	**0.05**	0.02	0.01
		Non-breeding	0.02	0.01	**0.00**	0.00	0.00
		Annual	0.26	0.10	**0.05**	0.03	0.01
Goshawk	Non-directional	Breeding**	0.24	**0.10**	0.05	0.02	0.01
		Non-breeding	0.13	**0.05**	0.02	0.01	<0.01
		Annual	0.37	**0.15**	0.07	0.04	0.01
Hen harrier	Non-directional	Breeding**	1.26	0.50	**0.25**	0.13	0.05
		Non-breeding	0	0	**0**	0	0
		Annual	1.26	0.50	**0.25**	0.13	0.05
Red kite	Non-directional	Breeding**	0.07	0.03	**0.01**	0.01	<0.01
		Non-breeding	0.05	0.02	**0.01**	<0.01	<0.01
		Annual	0.11	0.05	**0.02**	0.01	0.01
Merlin	Non-directional	Breeding**	0.09	**0.04**	0.02	0.01	<0.01
		Non-breeding	0	**0**	0	0	0

Species	Model type	Season	Estimated mortality assuming avoidance of:				
			95%	98%	99%	99.5%	99.8%
		Annual	0.09	**0.04**	0.02	0.01	0.00
Peregrine	Non-directional	Breeding**	0.04	**0.02**	0.01	0.01	<0.01
		Non-breeding	0.07	**0.03**	0.01	0.01	<0.01
		Annual	0.11	**0.04**	0.02	0.01	0.01

**All values were calculated based on three decimal places, therefore some annual values appear to be lower than the sum of breeding and non-breeding season values; **Data collected during a survey period of May to August 2022 is extrapolated up to cover the full March to August breeding season (February to August for golden eagle), assuming that the activity on site during May to August is representative of overall activity during this season.*

8.4.10. A comparison of the collision risk estimates calculated for each ornithological receptor at risk of collision within Chapter 8 of the EIAR with an updated collision risk estimate calculated within this AIR is provided in Table 8.5, below. Hen harrier, red kite and merlin flights were recorded during the VP surveys between 2017 and 2022 but did not qualify for CRM within the EIAR. Therefore, a comparison is not provided for these species in Table 8.5.

Table 8.5: A summary of the estimated number of collisions during the species-specific breeding and non-breeding seasons for each ornithological receptor assessed for collision risk in Chapter 8 of the EIAR compared with updated estimates presented in this AIR, based on species-specific avoidance rates recommended by NatureScot (SNH, 2018a)[8].

Species	Season	EIAR	AIR
Golden plover	Breeding	0.56	0.23
	Non-breeding	1.74	0.89
	Annual	2.30	1.12
Curlew	Breeding	0.12	0.28
	Non-breeding	0.00	0.00
	Annual	0.12	0.28
Golden eagle	Breeding	0.02	0.05
	Non-breeding	0.00	0.00
	Annual	0.02	0.05
Goshawk	Breeding	0.06	0.10
	Non-breeding	0.11	0.05
	Annual	0.17	0.15

Golden Eagle Topography Model

8.4.11. An updated GET Model report which provides detailed results is provided in Volume 2 Annex B Confidential AI Appendix 8.2.

8.4.12. The newly established golden eagle home range, in which the Proposed Development is situated, is estimated to be approximately 7,786 ha. Of the home range, 95.2% (6,491 ha) comprises available good golden eagle habitat (GET 6+). The exclusion zone (the Proposed Development turbine array and a surrounding 300 m buffer) is 287 ha, which equates to 4.4% of the total available GET 6+ habitat within the home range.

8.5. Updated Feature Assessment

8.5.1. An updated feature assessment has been completed for the ornithological receptors and predicted impacts previously assessed in Chapter 8 of the EIAR which are considered to require re-assessment. These are golden plover, curlew, golden eagle and goshawk.

8.5.2. Predicted impacts on black grouse were not reassessed as no changes have been made to the Proposed Development. The closest known lek site to the Proposed Development infrastructure remains to be beyond 750 m maximum disturbance distance during the breeding season[16]. Similarly, predicted impacts on snipe were not reassessed as there is no change to the number of breeding territories impacted (a single territory within 500 m of the Proposed Development). As such there is no change to the assessments of black grouse and snipe provided within Chapter 8 of the EIAR.

8.5.3. As no changes have been made to the Proposed Development and no further breeding bird surveys or breeding raptor surveys were completed following submission of the EIAR, the assessment of predicted impacts of disturbance/displacement on breeding golden plover, curlew, snipe and goshawk were not reassessed in this AIR. It is considered that the impact of the Proposed Development on disturbance/displacement of golden plover, curlew, snipe and goshawk remains as **not significant**, as assessed in the EIAR.

8.5.4. Predicted impacts on the ornithological features of the Moorfoot Hills SSSI were not assessed in Chapter 8 of the EIAR. NatureScot noted that the breeding bird assemblage notified feature of the SSSI will not be impacted by the Proposed Development (See Table 8.1) and therefore has not been assessed in this AIR. However, predicted impacts on the golden plover breeding population notified feature of the SSSI have been assessed within this AIR.

8.5.5. Following the results of additional VP surveys, a further five ornithological receptors have been assessed for collision risk in this AIR: greylag goose, hen harrier, red kite, merlin and peregrine.

8.5.6. No breeding raptor surveys were undertaken during 2023, however the flight activity exhibited by hen harrier during the breeding season indicates that hen harrier held a breeding territory within or close to the Proposed Development Area (See Confidential AI Volume 2 Annex B Appendix 8.2). As many of the hen harrier flights recorded at PCH in the CRZ were associated with territorial breeding behaviour, the impact of disturbance and/or displacement on hen harrier has also been assessed.

8.5.7. There was no indication that greylag goose flights were associated with foraging behaviour, or that red kite, merlin and peregrine flights were associated with breeding behaviour (or roosting

[16] NatureScot (2022). *Disturbance Distances in selected Scottish Bird Species – NatureScot Guidance.* Available at: https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance [Accessed: 12/02/2025]

behaviour in the case of red kite). Therefore, disturbance and/or displacement impacts were not assessed for these species.

8.5.8. A list of the ornithological receptors and predicted impacts that have been assessed within this AIR are shown in Table 8.6.

8.5.9. Furthermore, a summary of each ornithological receptor in combination with legislation, guidance and baseline results, and its determination as an IOF requiring full ecological impact assessment (EcIA), is detailed in Table 8.7.

Table 8.6: A summary of the ornithological features and associated impacts assessed within Chapter 8 of the EIAR and this AIR

Feature	EIAR	AIR
Fala Flow SPA/SSSI	Pink-footed goose non-breeding population qualifying feature	Not reassessed (See Table 8.1)
Gladhouse Reservoir SPA/SSSI	Pink-footed goose non-breeding population qualifying feature	Not reassessed (See Table 8.1)
Moorfoot Hills SSSI	Not assessed	Golden plover breeding population qualifying feature (See Table 8.1)
Greylag goose	Not assessed	Collision
Pink-footed goose	Connectivity with Fala Flow and Gladhouse Reservoir SPAs	Not reassessed (See Table 8.1)
Black grouse	Disturbance/displacement	Not reassessed (See Paragraph 8.5.2, above)
Golden plover	Collision and disturbance/displacement	Collision Disturbance/displacement not reassessed (See Paragraph 8.5.3, above)
Curlew	Collision and disturbance/displacement	Collision Disturbance/displacement not reassessed (See Paragraph 8.5.3, above)
Snipe	Disturbance/displacement	Not reassessed (See Paragraph 8.5.2, above)
Golden eagle	Collision and disturbance/displacement	Collision and disturbance/displacement
Goshawk	Collision and disturbance/displacement	Collision Disturbance/displacement not reassessed (See Paragraph 8.5.3, above)
Hen harrier	Not assessed	Collision and disturbance/displacement
Red kite	Not assessed	Collision
Merlin	Not assessed	Collision

Feature	EIAR	AIR
Peregrine	Not assessed	Collision

Table 8.7: Determination of ornithological features as IOFs occurring within the Proposed Development Area

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
Greylag goose	Amber	Local	UK: 47,000 breeding pairs; 230,000 wintering individuals Scotland: 20,000 breeding individuals; 85,000 wintering individuals No NHZ estimate	This is a common resident species breeding and wintering in Scotland, with a further wintering population arriving from Iceland (Scotland supports 95% of the Icelandic greylag goose population in winter). The breeding population in the south of	A total of two flights by ten birds were recorded at PCH in the CRZ.	As a total of two flights by ten birds were recorded at PCH in the CRZ, greylag goose qualified for CRM. Breeding season and annual predicted collision mortality is 0.01 birds.	No	Greylag goose is a UK BoCC Amber-listed species for the wintering population in the UK. A predicted breeding season and annual collision mortality of 0.01 birds represents 0.00005% of the breeding population in Scotland and 0.00001% of the breeding population in the UK. As no greylag goose flights were recorded during the non-breeding season, there is no predicted collision mortality of wintering birds. Collision risk is therefore considered to be of **negligible magnitude** and **not significant**.

[17] Scottish Government (2020). *Scottish Biodiversity List*. Available from - https://www.nature.scot/doc/scottish-biodiversity-list [Accessed 31/07/2024]
[18] Scottish Borders Council (2018). *Supplementary Guidance Scottish Borders Local Biodiversity Action Plan (2018-2028)*. Scottish Borders Council, Melrose.
[19] Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, D.A. & Noble, D. (2020). Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 113: 69–104.
[20] Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy D.S. (eds). (2007). *The Birds of Scotland.* The Scottish Ornithologists' Club, Aberlady.
[21] Wilson, M.W., Austin, G.E., Gillings, S. & Wernham, C.V. (2015). *Natural Heritage Zone bird population estimates.* SWBSG commissioned report number 1504. pp72.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
				Scotland is considered to be naturalised and feral and not of conservation importance. The non-breeding population which winters in Scotland (with the exception of the native population in the north-west), however, largely comprises birds that breed in Iceland, and is of conservation importance.				Therefore, greylag goose is not considered to be an IOF.
Golden plover	Annex I, Scottish Biodiversity List (SBL), Local Biodiversity Action Plan (LBAP)	Local	UK: 32,500-50,500 breeding pairs; 410,000 wintering individuals Scotland: 15,000 breeding pairs; 25,000-35,000	Golden plover is a widespread breeding bird in upland habitat in Scotland, supporting 80% of the breeding population in the UK.	Two breeding territories were located within 500 m of the Proposed Development. As eight flights of 190	Two breeding territories were located within 500 m of the Proposed Development. An updated total of nine flights of 192	No	Golden plover is an Annex I, SBL-listed species of conservation concern that is also listed on the Scottish Borders LBAP. It is also a qualifying feature of the Moorfoot Hills SSSI for the breeding population.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	**AIR (2017-2024)**		
			wintering individuals; 10,000-30,000 spring passage individuals; 20,000-60,000 autumn passage individuals NHZ: 1,058 breeding pairs	During winter, golden plover occupy coastal areas around Scotland, joined by other wintering golden plover from Fennoscandia and Greenland.	birds were recorded at PCH in the CRZ, golden plover qualified for CRM. Breeding season and non-breeding season predicted collision mortality was 0.56 and 1.74 birds, respectively.	birds were recorded at PCH in the CRZ. The updated breeding season and non-breeding season predicted collision mortality is 0.23 and 0.89 birds, respectively.		As no changes have been made to the Proposed Development, the assessment of predicted impacts of disturbance/displacement on breeding golden plover remains as not significant, as assessed in the EIAR. An updated predicted breeding season collision mortality of 0.23 birds represents 0.01% of the NHZ breeding population, 0.0008% of the breeding population in Scotland and 0.0004% of the breeding population in the UK. An updated predicted non-breeding season collision mortality of 0.89 birds represents 0.004% of the non-breeding population in Scotland and 0.0001% of the non-breeding population in the UK. The impact of collision risk is lower than previously assessed in Chapter 8 of the EIAR. It is considered to be of **negligible magnitude** and **not significant**.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
								Therefore, golden plover is not considered to be an IOF.
Curlew	Red, SBL, LBAP	Local	UK: 58,500 breeding pairs; 125,000 wintering individuals Scotland: 58,800 breeding pairs; 85,700 wintering individuals NHZ: 1,400 breeding pairs	There is a widespread population of breeding curlew within Scotland in upland and agricultural areas, supporting approximately 16-27% of the European breeding population. There has been a significant decline (60%) in breeding curlew in Scotland within the past 26 years[22].	Four breeding territories were identified within the Survey Area, two of which were located within 500 m of the Proposed Development. As six flights of 14 birds were recorded at PCH in the CRZ, curlew qualified for CRM. Breeding season predicted collision mortality was 0.12 birds.	Four breeding territories were identified within the Survey Area, two of which were located within 500 m of the Proposed Development. An updated total of 14 flights of 28 birds were recorded at PCH in the CRZ. Updated breeding season predicted collision mortality is 0.28 birds.	No	Curlew is a UK BoCC Red List and SBL-listed species of conservation concern also listed on the Scottish Borders LBAP. As no changes have been made to the Proposed Development, the assessment of predicted impacts of disturbance/displacement on breeding curlew remains as not significant, as assessed in the EIAR. An updated predicted breeding season collision mortality of 0.28 birds represents 0.01% of the NHZ breeding population, 0.0002% of the breeding population in Scotland, and the UK. The impact of collision risk is therefore considered to be of **negligible magnitude** and **not significant**.

[22] Heywood, J.J.N., Massimino, D., Balmer, D.E., Kelly, L., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P., Wotton, S., Gillings, S. & Harris, S.J. 2023. *The Breeding Bird Survey 2022*. BTO Research Report 756. British Trust for Ornithology, Thetford.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
								Therefore, curlew is not considered to be an IOF.
Golden eagle	Schedule 1, 1A, A1, Annex I, Red, SBL	Regional	UK: 510 breeding pairs Scotland: 440 breeding pairs; 1,000 wintering individuals NHZ 20: 3 occupied breeding territories (based on results of the 2003 golden eagle survey)	Golden eagle is widely distributed in the Scottish Highlands and on most Hebridean Islands. In south-east Scotland it was a very rare resident, with one occupied territory between 2007 and 2013[23]. Since 2018, juvenile and immature golden eagles have been released in the Moffat Hills as part of the SSGEP to boost the local population.	A breeding territory was identified within 10 km of the Proposed Development in 2022. As four flights by four birds were recorded at PCH in the CRZ, golden eagle qualified for CRM. Breeding season prediction collision mortality was 0.02 birds.	The breeding territory within 10 km of the Proposed Development was confirmed to be occupied in 2023. An updated total of 16 flights by 17 birds were recorded at PCH in the CRZ. Updated breeding season and annual predicted collision mortality is 0.05 birds.	**Yes**	Golden eagle is a Schedule 1, 1A, A1, Annex I, UK BoCC Red List and SBL-listed species of conservation concern also listed on the Scottish Borders LBAP. Given the high conservation status of golden eagle in Scotland, the translocation of a small population in the south of Scotland, and the close proximity of a newly established breeding territory to the Proposed Development, golden eagle is considered to be an IOF and is taken forward for full EcIA.

[23] Murray, R.D., Andrews, I.J. & Holling, M. (2019). *Birds in South-east Scotland 2007-13: a tetrad atlas of the birds in Lothian and Borders*. The Scottish Ornithologists' Club, Aberlady.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
				The most recent report produced by the SSGEP noted that since the start of the translocation project, there are 46 golden eagles within the south of Scotland population[24] (this now stands at 49 individuals (Cat Barlow *pers comm*), with 13 territorial pairs)[25].				
Goshawk	Schedule 1	Regional	UK: 620 breeding pairs Scotland: 130 breeding pairs; 350-450	Goshawk is a scarce breeding bird in Scotland, found primarily in woodland habitat during	An occupied breeding territory was identified approximately 2.5 km from the Proposed	An occupied breeding territory was identified approximately 2.5 km from the Proposed	No	Goshawk is a Schedule 1-listed species of conservation concern also listed on the Scottish Borders LBAP. As no changes have been made to the Proposed

[24] NatureScot (2023). *Pioneering conservation project reveals new record number of golden eagles in southern Scottish skies and confirms love is in the air for established pair*. Available from - https://www.nature.scot/pioneering-conservation-project-reveals-new-record-number-golden-eagles-southern-scottish-skies-and [Accessed 26/07/2024]

[25] Eaton, M. and the Rare Breeding Birds Panel. (2024). Rare breeding birds in the UK in 2022. *British Birds* 117, November 2024, p591-656.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
			wintering individuals NHZ 20: 13 breeding pairs	the breeding season. The breeding population is distributed mainly across the south and north-east of Scotland. In 2022, the most-recent estimated breeding population in the UK was 945 breeding pairs (range 740-1,252) and >315 pairs in Scotland. A total of 117 breeding pairs were located in the south of Scotland in 2022 (including 45 in the Scottish Borders)[25]. As goshawk is a secretive species and remains inconspicuous	Development in 2017-2018. As 11 flights of 12 birds were recorded at PCH in the CRZ, goshawk qualified for CRM. Breeding season and non-breeding season predicted collision mortality was 0.06 and 0.11 birds, respectively.	Development in 2017-2018. An updated total of 16 flights by 18 birds were recorded at PCH in the CRZ. Updated breeding season and non-breeding season predicted collision mortality is 0.10 and 0.05 birds, respectively.		Development, the assessment of predicted impacts of disturbance/displacement on breeding goshawk remains as not significant, as assessed in the EIAR. An updated predicted breeding season collision mortality of 0.10 birds represents 0.4% of the NHZ breeding population, 0.04% of the breeding population in Scotland, and 0.008% of the breeding population in the UK. These figures are based on data presented in the Population estimate column and therefore are likely to be underestimates given the most recent breeding population estimates for the Scottish Borders, Scotland and the UK. An updated predicted non-breeding season collision mortality of 0.05 birds represents 0.01% of the non-breeding population in Scotland.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
				for much of the year, this species is notoriously difficult to monitor and likely under reported, thus any population estimates are probably highly conservative.				The impact of collision risk is therefore considered to be of **negligible magnitude** and **not significant**. Therefore, goshawk is not considered to be an IOF.
Hen harrier	Schedule 1, 1A, Annex I, Red, SBL	Regional	UK: 545 breeding pairs Scotland: 633 breeding pairs; 1,050-1,540 wintering individuals NHZ 20: 13 breeding pairs	Hen harrier is a widespread but generally scarce breeding species in Scotland, found mostly in upland areas, with some moving to lower altitudes or south during winter. Persecution of this species across Scotland is well documented and remains	As a single flight by a single bird was recorded at PCH in the CRZ, hen harrier did not qualify for CRM.	Twenty-two of the 46 flights recorded during the 2023 breeding season were associated with breeding behaviour during which the bird was exhibiting territorial display within the Proposed Development Area. This concentrated flight activity suggests that hen harrier nested within	**Yes**	Hen harrier is a Schedule 1 and 1A, Annex I, UK BoCC Red List and SBL-listed species of conservation concern also listed on the Scottish Borders LBAP. Given the relatively high collision mortality rate in relation to the breeding population within NHZ 20 and the likely presence of a breeding territory within close proximity to the Proposed Development in 2023, hen harrier is considered to be an IOF and has been taken through to full EcIA.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
				severe in certain areas. The breeding population of hen harrier in Scotland was estimated at 633 pairs in 2004 and 505 in 2010[26]. The most recent estimated breeding population size in Scotland is 529 pairs in 2023, according to the most recent national hen harrier survey[27].		close proximity to the Proposed Development in 2023. As an updated total of 34 flights by 34 birds were recorded at PCH in the CRZ, hen harrier qualified for CRM. Breeding season and annual predicted collision mortality is 0.25 birds.		
Red kite	Schedule 1, 1A, Annex I, SBL	Local	UK: 4,400 breeding pairs Scotland: 60 breeding pairs;	Red kite is a scarce resident species within Scotland, with a growing	As two flights by two birds were recorded at PCH in the CRZ, red kite	As a total of six flights by six birds were recorded at PCH in the	No	Red kite is a Schedule 1 and 1A, Annex I and SBL-listed species of conservation concern.

[26] Hayhow D. B., Eaton M. A., Bladwell S., Etheridge B., Ewing S., Ruddock M., Saunders R., Sharpe C., Sim I. M. W. and Stevenson A. (2013) The status of the Hen Harrier, Circus cyaneus, in the UK and Isle of Man in 2010. *Bird Study* 60: 446-458

[27] Kelly, L. A., Tománková, I., Downing, S., Lindley, P., Mattingley, W., Morris, N. G., Murphy, S., Orr-Ewing, D., Owens, R., Rooney, E., Ruddock, M., Stevenson, A., Thomas, M. and Wotton, S. R. (2025). The status of breeding Hen Harriers *Circus cyaneus* in the UK and Isle of Man in 2023. *Bird Study*, 1–18.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
			300-350 wintering individuals NHZ 20: 0 breeding pairs (based on 2013 data)	population and breeding range following successful re-introductions in Ross & Cromarty, Stirling and Dumfries & Galloway. Red kite breeds and forms winter roosts in coniferous and broadleaved woodland stands with open foraging habitat including moorland and lowland farmland. A total of 157 breeding pairs were located in the south of Scotland in 2022 of a national population of at least 298 pairs (six in South Strathclyde,	did not qualify for CRM.	CRZ, red kite qualified for CRM. Both breeding season and non-breeding season predicted collision mortality is 0.01 birds.		A predicted breeding season collision mortality of 0.01 birds represents 0.008% of the breeding population in Scotland, and 0.0001% of the breeding population in the UK. The most recently reported NHZ 20 breeding population of red kite is 0 pairs, based on Scottish Raptor Monitoring Scheme (SRMS) data recorded in 2013. Since then, the red kite population has expanded in size and distribution, with 157 breeding pairs reported in the south of Scotland in 2022. Given that red kite have established a presence within the south of Scotland since 2013, there is a risk that collision mortality may impact the local population. However, even if a single pair were present in NHZ 20, the estimated collision mortality of 0.01 birds would impact 0.5% of the NHZ population.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
				147 in Dumfries and Galloway, and four in Lothian and Borders)[28].				A predicted non-breeding season collision mortality of 0.01 birds represents 0.003% of the breeding population in Scotland. These figures are based on data presented in the Population estimate column and therefore are likely to be underestimates given the most recent breeding population estimates presented in the Scottish context column. The impact of collision risk is therefore considered to be of **negligible magnitude** and **not significant**. Therefore, red kite is not considered to be an IOF.
Merlin	Schedule 1, Annex I, Red, SBL	Local	UK: 1150 breeding pairs Scotland: 800 breeding pairs; 3000 wintering individuals	Merlin is a widespread but scarce resident breeding bird in Scotland, found mainly in upland heather moorland	As a single flight by a single bird was recorded at PCH in the CRZ, merlin did not qualify for CRM.	As a total of four flights by eight birds were recorded at PCH in the CRZ, merlin qualified for CRM.	No	Merlin is a Schedule 1, Annex I, UK BoCC Red List and SBL-listed species of conservation concern. A predicted breeding season collision mortality of 0.04 birds represents 0.09% of the NHZ

[28] Challis, A., Beckmann, B.C., Wilson, M.W., Eaton, M.A., Stevenson, A., Stirling-Aird, P., Thornton, M. & Wilkinson, N.I. (2023). *Scottish Raptor Monitoring Scheme Report 2021 & 2022*. BTO Scotland, Stirling.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
			NHZ 20: 22 breeding pairs	habitat. During passage and winter, non-breeding birds move to coastal and lowland areas. The merlin population in Scotland was estimated at 800 breeding pairs in 1993-1994. The most recent estimated breeding population size in Scotland is 733 in 2008. In 2022, 37 pairs were located in the south of Scotland (including 28 in the Borders)[25].		Breeding season and annual predicted collision mortality is 0.04 birds.		breeding population, 0.003% of the breeding population in Scotland, and 0.002% of the breeding population in the UK. The impact of collision risk is therefore considered to be of **negligible magnitude** and **not significant**. Therefore, merlin is not considered to be an IOF.
Peregrine	Schedule 1, Annex I, SBL, LBAP	Local	UK: 1,750 (1,600-1,900) breeding pairs Scotland: 600 breeding pairs; 2,000-2,500	Peregrine is a scarce but widespread resident species in Scotland, which supports 42%	As no flights were recorded at PCH in the CRZ, peregrine did not qualify for CRM.	As a total of three flights by single birds were recorded at PCH in the CRZ, peregrine	No	Peregrine is a Schedule 1, Annex I, SBL-listed species of conservation concern, also listed on the Scottish Borders LBAP. A predicted breeding season collision mortality

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
			wintering individuals NHZ: 27 breeding pairs	of the UK population and 6% of the European population. Peregrine breeds in various habitats, nesting on cliffs in uplands, coasts, quarries and even in cities.		qualified for CRM. Breeding season and non-breeding season predicted collision mortality is 0.02 and 0.03 birds, respectively.		of 0.02 birds represents 0.04% of the NHZ breeding population, 0.002% of the breeding population in Scotland, and 0.0006% of the breeding population in the UK. A predicted non-breeding season collision mortality of 0.03 birds represents 0.002% of the non-breeding population in Scotland. The impact of collision risk is therefore considered to be of **negligible magnitude** and **not significant**. Therefore, peregrine is not considered to be an IOF.

Designated site	Notified feature	Importance	Assessed condition	IOF	Justification
Moorfoot Hills SSSI	Breeding golden plover	National	Unfavourable, no change	**Yes**	Breeding golden plover is a qualifying feature of Moorfoot Hills SSSI. Two golden plover breeding territories, one identified in 2018 and one identified in 2019, were located within 500 m of the Proposed Development.

Species	Conservation designation[4,5,6,17,18]	Value	Population estimate[19,20,21]	Scottish context[20]	Baseline		IOF	Justification
					EIAR (2017-2022)	AIR (2017-2024)		
								The SSSI lies 12 m to the north of the Proposed Development, therefore connectivity between the SSSI and the Proposed Development is highly likely.

8.6. Updated Impact Assessment

8.6.1. Following an updated feature assessment, three ornithological receptors have been identified as IOFs, requiring EcIA following the application of embedded mitigation (see Chapter 8 of the EIAR). These are:

- Moorfoot Hills SSSI – Breeding golden plover;
- Golden eagle; and
- Hen harrier.

8.6.2. An updated impact assessment for golden eagle, and impact assessments for Moorfoot Hills SSSI and hen harrier are provided below for the construction and operation periods. For all designations and species, decommissioning effects are predicted to be of similar or lower magnitude to the effects during construction.

Moorfoot Hills SSSI – Breeding Golden Plover

Introduction

8.6.3. Moorfoot Hills SSSI lies 12 m north of the Proposed Development at the closest point. The ornithological features for which the SSSI is designated include breeding golden plover and its breeding bird assemblage which includes red grouse, black grouse, oystercatcher, lapwing, curlew, dunlin, common sandpiper and redshank as further notified features. NatureScot noted that the Proposed Development would not impact the breeding bird assemblage (See Table 8.1) and therefore this has not been assessed in this AIR. This EcIA focuses on the impact of the Proposed Development on the breeding golden plover population feature of the SSSI, which was assessed as unfavourable in 2004 due to significant decline of >25% between 1976-78 (5.4-9.3 pairs per km^2) and 2004 (1.2 pairs per km^2)[29]. The most recent condition assessment in 2023 remains as unfavourable with no change[30].

Potential Disturbance Impacts

8.6.4. During construction of the Proposed Development, impacts of disturbance on breeding golden plover within the SSSI would be temporary and short-term in duration. Any impacts of disturbance would be avoided with the implementation of embedded mitigation (see Chapter 8 of the EIAR), and therefore would be of **negligible magnitude** and **not significant**. Similarly, any impacts of disturbance during operation of the Proposed Development would be occasional and short-term and therefore of no more than **negligible magnitude** and **not significant**.

Potential Displacement Impacts

8.6.5. Given the total area of the SSSI is 88.3 km^2, it can be estimated that approximately 106 pairs were present within the Moorfoot Hills SSSI in 2004[29] based on the assessment of 1.2 pairs per km^2. However, the SSSI has capacity for approximately 477 to 822 breeding pairs during favourable condition, as assessed in 1976-78 (5.4-9.3 pairs per km^2)[29]. The management objectives outlined in the Site Management Statement include the maintenance of extent and distribution of the blanket bog habitat qualifying feature within the SSSI, which was assessed as unfavourable in 2009[29]. Although the blanket bog qualifying feature was assessed as

[29] Moorfoot Hills SSSI (2011). *Site Management Statement*. Available from - file:///C:/Users/emmaa/Downloads/Site_Management_Statement_1186%20(6).pdf [Accessed 26/07/2024]
[30] SEPA (2024). *Protected Nature Sites Application*. Available from - https://informatics.sepa.org.uk/ProtectedNatureSites/ [Accessed 26/07/2024]

unfavourable it was noted as unfavourable, recovering. It is therefore expected that following the implementation of habitat management, ample available suitable habitat exists within the Moorfoot Hills SSSI for the current breeding golden plover population.

8.6.6. Approximately 0.95 km^2 of the Moorfoot Hills SSSI lies within 500 m (maximum disturbance distance[16]) of the proposed turbine locations, which, if suitable habitat is present, may hold 5.1-8.8 breeding territories during favourable condition (5.4-9.3 pairs per km^2) and 1.1 breeding territories during unfavourable condition (1.2 pairs per km^2). Up to nine breeding territories represents 1.1-1.9% of the SSSI population during favourable condition (822-477 breeding pairs, respectively) and up to two breeding territories represents 1.9% of the SSSI population during unfavourable condition (106 breeding pairs).

8.6.7. As there is likely to be ample alternative suitable breeding habitat within the SSSI when the population is in unfavourable condition, displacement of two breeding territories as a cause of the Proposed Development is not likely to impact the SSSI breeding population during unfavourable status. Although less alternative suitable breeding habitat would be available when the population is in favourable condition, a smaller proportion of the of the SSSI breeding population (1.1-1.9%) may be impacted during favourable status. As such, the potential displacement of breeding territories associated with the SSSI, within a maximum 500 m disturbance distance[16] of the Proposed Development during operation, is not expected to be of more than **low negative magnitude** and **not significant**.

Potential Collision Impacts

8.6.8. As the Proposed Development is in close proximity to the SSSI, it is likely that during the breeding season (March to August), golden plover breeding within the SSSI would pass through the Proposed Development to forage (3-11 km foraging range during the breeding season[31]). However, of the five golden plover flights recorded during the breeding season, four of these were recorded during March, with the fifth flight recorded during May. As such, the majority of these flights are likely to be associated with birds on passage rather than breeding birds associated with the SSSI.

8.6.9. Following a significant decline between 1995 and 2014, the breeding population of golden plover has shown a gradual recovery within the last ten years[32], reducing overall breeding population decline to 10% in Scotland between 1995 and 2022[33]. Given that the breeding population of golden plover in Scotland has been increasing within the last ten years and an estimated collision risk of 0.23 birds would impact 0.1% of the SSSI population, as estimated when in unfavourable condition (106 breeding pairs), it is considered that collision risk of the Proposed Development is unlikely to undermine the breeding population recovery.

8.6.10. Additionally, it is unlikely that a predicted annual collision rate of 1.12 birds (0.0003% of the UK population) would be detectable against estimated annual background mortality of 22[34]-27%[35]

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[31] SNH (2016) *Assessing connectivity with Special Protection Areas (SPAs)* (Guidance note: Version 3). Scottish Natural Heritage (now NatureScot), Edinburgh.
[32] BTO (2024). *Bird Trends Explorer*. Available from - https://data.bto.org/trends_explorer/?species=Golden+Plover [Accessed 26/07/2024].
[33] Heywood, J.J.N., Massimino, D., Balmer, D.E., Kelly, L., Marion, S., Noble, D.G., Pearce-Higgins, J.W., White, D.M., Woodcock, P., Wotton, S. Gillings, S. (2024). *The Breeding Bird Survey 2023*. BTO Research Report 765. British Trust for Ornithology, Thetford.
[34] Parr, R. (1980). Population Study of Golden Plover Pluvialis apricaria, Using Marked Birds. *Ornis* Scandinavica (Scandinavian Journal of Ornithology), 11(3), 179–189.
[35] BTO (2024). *BirdFacts: Golden Plover*. Available from - https://www.bto.org/understanding-birds/birdfacts/golden-plover [Accessed 31/07/2024].

of adults in the UK, based on over-winter survival[36]. It is therefore considered that collision risk of the Proposed Development on the golden plover population within the Moorfoot Hills SSSI would be of **negligible magnitude** and **not significant**.

Golden Eagle

Introduction

8.6.11. In Scotland, a vast majority of the golden eagle population is distributed across the north of Scotland, mainly in the Highlands, and Inner and Outer Hebrides. Since 2018, a small, translocated population comprised largely of immature and sub-adult birds has been present in the south of Scotland and totalled 49 individuals in November 2024 (Cat Barlow *pers comm*). A total of 13 territorial pairs were recorded in southern Scotland in 2022[25].

8.6.12. A report commissioned by NatureScot estimated that a breeding population of approximately 14-16 pairs could be supported within the south of Scotland[12]. The Moorfoot Hills, where the Proposed Development is situated was estimated to be sufficient to support a single breeding pair. The same was estimated for the Lammermuir Hills which neighbour the Moorfoot Hills to the east, whereas the Tweedsmuir Hills which neighbour the Moorfoot Hills to the southwest could support 2-3 breeding pairs. Given the additional pressures of persecution within the Moorfoot and Lammermuir Hills, it was predicted that these ranges would be of greater suitability for non-breeding birds.

Baseline Summary

8.6.13. A newly established breeding territory was identified within 10 km of the Proposed Development in 2022 and was confirmed to be occupied again in 2023 and 2024. Further details are provided within AI Volume 2 Annex B Confidential AI Appendix 8.2.

8.6.14. A total of 19 flights were recorded during breeding season VP surveys between 2022 and 2023, with 14 recorded during the 2023-2024 non-breeding season VP surveys. Of these flights, 16 were at PCH in the CRZ, 12 of which were recorded during the breeding season and four during the non-breeding season.

Potential Disturbance Impacts

8.6.15. Golden eagle are considered to have a high sensitivity to disturbance, with a recommended maximum disturbance distance of 1 km around active nest sites and 500 m around roost sites[16]. In 2022, it was identified that a golden eagle territory had recently been established within 10 km of the Proposed Development, with an occupied nest located beyond disturbance distance of the nearest proposed turbine. As is typical of golden eagle, an alternative nest within the breeding territory was used in 2023 and 2024, both of which were further from the Proposed Development, and therefore again located beyond disturbance distance. Further details are provided in AI Volume 2 Annex B Confidential AI Appendix 8.2.

8.6.16. During the construction phase of the Proposed Development, effects of disturbance and displacement would be mitigated with the implementation of embedded mitigation (see Chapter 8 of the EIAR). This would include embedded mitigation measures such as pre-construction surveys and the implementation of exclusion zones up to recommended disturbance distances[16]. As such, disturbance effects during construction of the Proposed Development are considered to be of a **low negative magnitude** and **not significant**.

[36] Pearce-Higgins, J. W. & Yalden, D. W. (2003). Golden plover Pluvialis apricaria breeding success on a moor managed for shooting red grouse Lagopus lagopus. *Bird Study*, 50:2, 170-177.

8.6.17. Golden eagles exhibit clear avoidance behaviour in relation to turbine arrays, and in general do not utilise suitable habitat within or immediately surrounding a turbine array[37,38,39]. Although results of the GET Model (see Section 8.4, Paragraphs 8.4.11 and 8.4.12, and AI Volume 2 Annex B Confidential AI Appendix 8.2) show that there is good golden eagle habitat (GET 6+) suitable for nesting, roosting and foraging, within the Proposed Development, this is likely to be avoided during the operational period. Given that the locations of current known nest sites are situated beyond the maximum disturbance distance from the Proposed Development, it is considered that any impacts of disturbance during operation would be of **low negative magnitude** and **not significant**.

Potential Displacement Impacts

8.6.18. Results of the GET Model indicate that the golden eagle home range in which the Proposed Development is located is approximately 7,786 ha, of which 7,455 ha comprises good golden eagle habitat (GET 6+). Taking into account that 12.9% (964 ha) of all GET 6+ habitat within this home range is already lost due to forest cover, the overall available GET 6+ habitat (6,491 ha) covers 95.2% of the total area within the home range. This is considered to be a high proportion of available good quality habitat in comparison to other home ranges studied in Scotland. As such, the home range in which the Proposed Development is located is considerably large and comprises a high percentage of available good quality habitat.

8.6.19. It is expected that as golden eagles exhibit avoidance of turbines even if there is suitable foraging habitat within a turbine array[39], that any suitable habitat within and immediately surrounding a turbine array would be lost. Therefore, the GET Model assumes that the Proposed Development turbine array and a surrounding 300 m buffer ('exclusion zone') would be unavailable to the breeding pair within their home range. The total area of this exclusion zone is 287 ha (4.4% of total available habitat within the home range), which is below the 5% 'acceptable loss' threshold used in the Predicting Aquila Territories (PAT) model[40]. Given the high quantity of available good quality habitat within this home range, a loss of 4.4% of available habitat is unlikely to be significant in relation to this breeding pair.

8.6.20. The satellite tag data obtained from the SSGEP for this breeding pair spans 2.5 breeding seasons and two non-breeding seasons (July 2021 to September 2023). Out of all satellite tag records, 2.5% (84 of 3,321) were located within the exclusion zone (300 m buffer of the Proposed Development turbine array). The distribution of satellite tag records was not uniform within the exclusion zone, with 74% (62 of 84) concentrated within the north-east. Similarly, golden eagle flight patterns observed during the VP surveys also indicate that there has so far been little use of all available habitat within the exclusion zone. A total of 80% of flights that passed through the Proposed Development Area (16 of 20), concentrated within the north-east

[37] Fielding, A.H., Anderson, D., Benn, S., Dennis, R., Geary, M., Weston, E. and Whitfield, D.P. (2021). Responses of dispersing GPS_tagged golden eagles (Aqila chrysaetos) to multiple wind farms across Scotland. *Ibis* 164,(1), 102-117.
[38] Fielding, A.H., Anderson, D., Benn, S., Dennis, R., Geary, M., Weston, E. and Whitfield, D.P. (2021) Non-territorial GPS-tagged golden eagles *Aquila chrysaetos* at two Scottish wind farms: Avoidance influenced by preferred habitat distribution, wind speed and blade motion status. *PLoS ONE* 16(8): e0254159.
[39] Fielding AH, Anderson D, Benn S, Taylor J, Tingay R, Weston ED, Whitfield DP. (2024) Approach Distances of Scottish Golden Eagles Aquila chrysaetos to Wind Turbines According to Blade Motion Status, Wind Speed, and Preferred Habitat. Diversity. 2024; 16(1):71.
[40] McLeod, D.R.A., Whitfield, D.P., Fielding, A.H., Haworth, P.F. & McGrady, M.J. (2002). Predicting home range use by golden eagles Aquila chrysaetos in western Scotland. *Avian Science*, 2, 183-198.

of the Proposed Development exclusion zone. Further details of golden eagle flight patterns and satellite tag records are provided in Confidential Appendices 8.2 and 8.3.

8.6.21. The home range was established in 2021, so there has been limited opportunity to establish multiple nest sites, although three nests have been used by the pair in as many years. Golden eagles can use up to 13 alternative nest sites but more typically up to six[41]. Similarly, it has been demonstrated through studies of satellite tagged individuals, that golden eagles use multiple roost sites within the home range throughout the year[42]. The distribution of flights and satellite tag records, however, indicate that there is little use of the habitat within the exclusion zone, suggesting that this is not a preferred area within the home range for foraging, commuting or roosting (and has not yet been used for nesting). As such, it is considered that any displacement effects during construction would be avoided with the implementation of embedded mitigation measures including timing of works and pre-construction surveys, and would therefore be of **low negative magnitude** and **not significant**.

8.6.22. The north-eastern section of the Proposed Development which comprises two turbines (T7 and T8) appears to be the most frequently utilised area of good golden eagle habitat within the 300 m exclusion zone surrounding the proposed turbine array. The north-eastern section of the Proposed Development is situated between two identified core areas of the home range (see AI Volume 2 Annex B Confidential AI Appendix 8.2). Given the distribution of flights and satellite tag records, the north-eastern section of the Proposed Development may cause a barrier effect by restricting movement between these two core areas. Although the exclusion zone is predicted to result in a loss of 4.4% of available habitat within the home range, a reduction in connectivity between two core areas of the home range may change commuting routes and therefore the utilisation of available habitat within the home range. The tag data shows a relatively broad corridor of movement so any loss of habitat as a result of displacement would be relatively small in comparison to the total range area or the proportion of good golden eagle habitat (e.g. GET+6). However, a barrier effect created by the north-eastern section of the Proposed Development may lead to a greater loss of available suitable habitat within the home range than is predicted by the GET Model alone.

8.6.23. It is also expected that an exclusion zone within and surrounding a turbine array would apply to dispersing golden eagles. As the south of Scotland golden eagle population comprises a large proportion of juvenile, immature and sub-adult birds, and the Moorfoot Hills are considered to be of greater value for dispersing birds than breeding birds, it is likely that the wider area surrounding the Proposed Development will largely be used by dispersing golden eagles. However, as the Proposed Development is located within an occupied home range, dispersing birds are already displaced from this area. Given that this growing population would continue to produce dispersing birds and the expectation that the Moorfoot Hills can support a single breeding pair, this home range is unlikely to lie vacant if one or both of the members of the current pair were removed from the population.

8.6.24. Taking into account all of the above information, it is considered that displacement effects during operation of the Proposed Development on breeding and non-breeding golden eagles would be of **moderate negative magnitude** and **not significant**.

[41] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*. 3rd Edition. The Stationery Office, Edinburgh.
[42] Fielding, Alan H., David Anderson, Stuart Benn, John Taylor, Ruth Tingay, Ewan D. Weston, and D. Philip Whitfield. (2023). "Responses of GPS-Tagged Territorial Golden Eagles *Aquila chrysaetos* to Wind Turbines in Scotland" *Diversity* 15.

Potential Collision Impacts

8.6.25. The NHZ breeding population (three breeding territories) was based on 2003 survey data, however, the SSGEP has since led to an increase in the population of golden eagles within the south of Scotland to the most recently reported population of 46 individuals[24] (updated to 49 individuals in 2023 (Cat Barlow *pers comm*)). Although much of the newly established population within the south of Scotland comprises immature and sub-adult birds which have not yet reached breeding age, at least at least 13 territorial pairs are present within the south of Scotland[25]. Given that the Moorfoot Hills, Lammermuir Hills, Tweedsmuir Hills and Ettrick Hills, all present within NHZ 20, were predicted to support a total of six breeding territories combined, it is likely that there are more than three breeding territories currently within NHZ 20.

8.6.26. Of the 19 flights recorded during the breeding season VP surveys, 12 of these were recorded at PCH in the CRZ. During the non-breeding season VP surveys, four of 14 flights were recorded in the CRZ at PCH. Assuming a 99% avoidance rate, as recommended by NatureScot, a collision risk of 0.05 birds per breeding season was predicted, with a collision risk of zero birds predicted per non-breeding season, resulting in an annual collision mortality of 0.05 birds. A collision mortality rate of 0.05 birds represents 0.8% of the NHZ 20 breeding population, 0.006% of the breeding population in Scotland (this is assessed using a known underestimate of 440 pairs taken from Forrester *et al*. (2007)[20] rather than the latest national survey estimate of 508 breeding pairs in 2015[43]), and 0.005% of the breeding population in the UK and the non-breeding population in Scotland.

8.6.27. Despite the recent press release from the SSGEP regarding a golden eagle collision in southern Scotland[44], golden eagles are more likely to be impacted by the effects of displacement from suitable habitat within turbine arrays rather than collision. As such, the collision mortality estimate is not likely to be realised. The flight patterns observed during the VP surveys and supplementary satellite tag data provided by the SSGEP combined with the results of the GET model indicate that there is little use of suitable habitat in which the Proposed Development is located by golden eagles compared with suitable habitat in the surrounding area. The potential effects of collision risk are therefore considered to be of **low negative magnitude** and **not significant**.

Hen Harrier

Introduction

8.6.28. Hen harrier is a widespread but scarce breeding species in Scotland and is a Schedule 1, 1A and Annex I protected species. This species is also listed on the UK BoCC Red List for severe historic decline and moderate decline of the breeding population in the UK[6] and is listed on the SBL. The breeding population of hen harrier in Scotland declined from 633 pairs in 2004 to 505 pairs in 2010, with 529 pairs recorded during the most recent national hen harrier survey undertaken in 2023[27]. The most recent estimate of breeding pairs within the south of Scotland (Southern Uplands) in 2023 was 26 territorial pairs.

[43] Hayhow, D. B., Benn, S., Stevenson, A., Stirling-Aird, P. K., & Eaton, M. A. (2017). Status of Golden Eagle Aquila chrysaetos in Britain in 2015. *Bird Study*, 64(3), 281–294. https://doi.org/10.1080/00063657.2017.1366972

[44] SSGEP. (2024). *Sparky (B31) - Sad News from Galloway*. Available from https://www.goldeneaglessouthofscotland.co.uk/blog/sparky-b31-sad-news-from-galloway [Accessed: 22/11/2024].

Baseline Summary

8.6.29. A total of 50 flights were recorded during breeding season VP surveys between 2018 and 2023, four of which were recorded in 2018 and 46 in 2023. Of these flights, 34 were at PCH in the CRZ, all of which were recorded in 2023.

8.6.30. Of the 46 flights recorded during the breeding season in 2023, the majority of flights were recorded during April (13 flights) and May (30 flights), with 22 display flights recorded (13 of these were at PCH in the CRZ).

8.6.31. Although no breeding raptor surveys were completed in 2023, it was assumed that hen harrier held territory within proximity to the Proposed Development due to the flight activity observed (See AI Volume 2 Annex B Confidential AI Appendix 8.2).

Potential Disturbance Impacts

8.6.32. Hen harrier are considered to have a medium sensitivity to human-related disturbance, with a recommended maximum disturbance distance of 750 m[16]. Given that hen harrier do not exhibit evidence of disturbance when nesting within 750 m of operational turbines[45], it is during construction that hen harrier are most likely to be susceptible to disturbance. However, the implementation of embedded mitigation outlined in Chapter 8 of the EIAR would ensure that where possible during construction, works take place outside of the hen harrier breeding season. Where this is not possible other embedded mitigation measures would be implemented, including pre-construction surveys and exclusion zones around located nests. The impact of disturbance during construction and operation is therefore considered to be of **low negative magnitude** and **not significant**.

Potential Displacement Impacts

8.6.33. Almost half (22) of the 46 hen harrier flights recorded during the breeding season VP surveys in 2023 were associated with breeding behaviour. Due to the high concentration of these flights and their proximity to the Proposed Development Area, it was considered likely that hen harrier held a breeding territory close to the Proposed Development in 2023. Displacement of a single breeding pair from the Proposed Development Area would represent 7.7% of the NHZ 20 breeding population, and 3.8% of the most recently reported breeding population in the south of Scotland (Southern Uplands)[27].

8.6.34. However, hen harrier was not recorded during the breeding raptor surveys completed in 2018 and 2019, and no records of breeding hen harrier were returned by the Lothian and Borders RSG within 5 km of the Proposed Development between 2010 and 2020. Similarly, four hen harrier flights were recorded during the breeding season VP surveys in 2018, whereas none were recorded during breeding season VP surveys in 2019 or 2022. As such, there has been no historic indication of hen harrier regularly utilising the available habitat within the Proposed Development Area. The hen harrier flight activity recorded during the 2023 breeding season is therefore not considered to be typical within 5 km of the Proposed Development and is not predictive of future use of the habitat within the Proposed Development Area.

8.6.35. Given there is ample suitable breeding habitat within NHZ 20 and the wider area, any impact of displacement during the construction phase would be of **low negative magnitude** and **not significant**. Furthermore, hen harriers have been shown to nest within 200-300 m of turbines and continue to hunt within close proximity to operational turbines with no evidence of effects

[45] Whitfield, D. P. and Madders, M. (2005). *A review of the impacts of wind farms on hen harriers*. Natural Research Information Note 1. Natural Research Ltd., Banchory.

of disturbance[46], indicating that breeding pairs are not likely to be displaced. Therefore, it is considered that any impact of displacement during operation of the Proposed Development would be of **low negative magnitude** and **not significant**.

Potential Collision Impacts

8.6.36. Of the 50 flights recorded during the breeding season VP surveys across 2018-2023 (four in 2018 and 46 in 2023), 34 of these were recorded at PCH in the CRZ. Assuming a 99% avoidance rate, as recommended by NatureScot[8], a collision risk of 0.25 birds per breeding season was predicted, which represents 0.02% of the breeding population in Scotland and the UK. Based on the most recent available breeding population data for NHZ 20 (13 breeding pairs; taken from 2010 national hen harrier survey data)[21], a collision risk of 0.25 birds would represent 0.96% of the NHZ 20 breeding population.

8.6.37. The NHZ report noted that the total number of breeding pairs listed for the NHZs within the south of Scotland based on 2010 survey data (46 breeding pairs across NHZs 16- 20 inclusive) is likely to be an underestimate given that a total of 64 breeding pairs was recorded by the SRMS within the south of Scotland in 2014 for example (South Strathclyde (40 pairs), Lothian and Borders (four pairs) and Dumfries and Galloway (20 pairs))[47]. The most recent estimate for the south of Scotland was 26 territorial pairs in 2023[27]. An estimated collision mortality rate of 0.25 birds represents 0.5% of the most recently reported breeding population in the south of Scotland.

8.6.38. However, despite a relatively high estimated collision mortality rate associated with the Proposed Development on the NHZ 20 population (estimated in 2010) and south of Scotland breeding population (estimated in 2023), this is unlikely to be realised. Hen harrier collisions are generally uncommon due to foraging behaviour which comprises low, gliding flights, usually beneath turbine rotor height[48]. Even when foraging in close proximity to turbines, no adverse effects have been reported[49,50,51], indicating that hen harriers are not particularly vulnerable to collision when hunting. Hen harriers are generally most at risk of collision during the breeding season if nesting in close proximity to turbines, as territorial displays (known as skydancing), food passes and juvenile practise flights are most likely to occur at PCH. However, an eight-year long monitoring study[46] noted that despite high level of flight activity and a clear lack of avoidance behaviour by hen harrier when flying close to turbines, no collisions were reported during that time.

8.6.39. The majority of the hen harrier flights recorded at the Proposed Development were related to breeding activity, likely associated with a pair breeding in close proximity to the Proposed Development in 2023. As such, this led to a high concentration of flights at PCH in the CRZ

[46] Fielding, A. H. and Haworth, P.F. (2015). *Edinbane Windfarm: Ornithological Monitoring 2007-2014. A review of the spatial use of the area by birds of prey*. Haworth Conservation Ltd., Isle of Mull.
[47] Challis, A., Wilson, M.W., Holling, M., Roos, S., Stevenson, A. & Stirling-Aird, P. (2015). *Scottish Raptor Monitoring Scheme Report 2014*. BTO Scotland, Stirling
[48] McCluskie, A., Sansom, A. and Roos, S. (2017). *A Circus of Uncertainty; Collision Risk and Hen Harriers*. Presentation at CWW 2017, Available at - http://cww2017.pt/images/Congresso/presentations/oral/CWW17_talk_S06_4_McCluskie%20et%20al.pdf
[49] Thelander, C. G. & Rugge, L. (2000). *Avian risk behavior and fatalities at the Altamont wind resource area*. National Renewable Energy Laboratory NREL, Colorado.
[50] Green, M. (1995) *Effects of Windfarm Operation on the Winter Bird Community of the Bryn Titli Uplands: 1994/95*. Report to National Wind Power Ltd.
[51] Bioscan (UK) Ltd. (2001). *Novar Windfarm Ltd Ornithological Monitoring Studies: breeding bird and birdstrike monitoring 2001 results and 5-year review*. Report to National Wind Power Ltd.

likely by the same two birds. The majority of recorded flights took place in April and May 2023 during the peak time for territorial display, with three hunting flights recorded subsequently in July 2023 and no signs of juvenile birds later in the breeding season. It is possible that any breeding attempt made by the pair failed. Given the three flights recorded in July were by a hunting male (known to hunt up to 10 km from a nest, whereas females hunt up to 500 m from a nest), a second attempt may have been made up to 1.4 km from the initial nest location[41].

8.6.40. Prior to the 2023 VP surveys, the four hen harrier flights which were recorded were not associated with breeding behaviour. Similarly, during the breeding raptor surveys in 2018 and 2019, no hen harrier were recorded within the Proposed Development Area, nor had the Lothian and Borders RSG returned any records of breeding hen harrier within 5 km of the Proposed Development between 2010 and 2020. As such, the breeding territory within proximity to the Proposed Development may be newly established. However, hen harriers generally occupy large home ranges (males up to 7.3 km^2 and females up to 3.6 km^2)[41], so it is possible that the individuals recorded in 2023 previously nested 5 km beyond the Proposed Development.

8.6.41. Breeding hen harriers are known to continue to nest within proximity to turbines[45,46]. As a result, a breeding pair present on territory which overlaps with the Proposed Development may not be displaced and may continue to be at risk of collision. The latest hen harrier survey undertaken in 2023 indicates that the overall hen harrier breeding population in Scotland is increasing (460 breeding pairs in 2016 to 529 breeding pairs in 2023)[27]. However, as the breeding population of hen harrier within the Southern Uplands has shown a recent decline of 32%[27], the impact of collision risk is considered to be of moderate negative magnitude at a regional level. As such, operational monitoring (outlined in Section 8.7) will be undertaken to monitor the use of the Proposed Development Area by breeding hen harrier and assess if further mitigation is required.

8.6.42. Given the large home range of hen harriers, the available suitable nesting habitat within the wider area and the infrequency of hen harriers recorded breeding within 5 km of the Proposed Development, it is unlikely that the estimated collision mortality of 0.96% of the NHZ 20 population or 0.5% of the most recently estimated south of Scotland population would be realised as a cause of the Proposed Development. Furthermore, a collision mortality of 0.02% of the breeding population in Scotland is unlikely to be detected against annual background mortality of adult hen harriers (19%[52]). It is therefore considered that collision risk associated with the Proposed Development would not undermine the recovery of the breeding population of hen harrier in Scotland overall. As such, collision risk is considered to be of **low negative magnitude** overall and **not significant**.

8.7. Updated Mitigation and Residual Effects

8.7.1. The Proposed Development is predicted to have a low negative impact on the breeding golden plover population notified feature of the Moorfoot Hills SSSI, and a low-moderate negative impact on golden eagle and hen harrier. These impacts are considered to result in effects which are not significant.

8.7.2. For all IOFs, embedded mitigation measures (outlined in Chapter 8 of the EIAR) will be implemented to ensure compliance with legislation, and to follow good practice guidance with regards to breeding birds.

[52] BTO (2024). *BirdFacts: Hen Harrier*. Available from - https://www.bto.org/understanding-birds/birdfacts/hen-harrier [Accessed 01/08/2024].

8.7.3. It is recommended that should the Proposed Development receive consent, an Operational Monitoring Plan (OMP) to monitor the potential impact of the Proposed Development on golden eagle and hen harrier should be secured through a planning condition, in agreement with NatureScot. The OMP to monitor use of the Proposed Development by raptors would include:

- Breeding raptor surveys to locate breeding pairs within species-specific disturbance distances[16] of the Proposed Development during the first three years of operation;
- Monthly carcass searching for bird species during species-specific breeding seasons[53] for the first three years of operation; and
- If impacts on golden eagle, hen harrier or other Schedule 1[4] and/or Annex I[5]-listed raptors (and owls) as a result of the Proposed Development are identified during the operational phase, additional mitigation measures will be discussed and implemented in agreement with NatureScot.

8.8. Summary of Effects

8.8.1. The magnitude of pre-mitigation and residual impacts and the significance of residual effects on each IOF during the construction and operation phases of the Proposed Development is detailed in Table 8.8 below. As the Proposed Development is not predicted to have a significant effect on any IOF, embedded mitigation will ensure compliance with legislation and good practice guidance.

[53] NatureScot (2021). *Bird breeding season dates in Scotland*. Available from - https://www.nature.scot/doc/bird-breeding-season-dates-scotland [Accessed 26/07/2024]

Table 8.8: Summary of pre-mitigation impacts and residual impacts on IOFs, and the residual significance of effect.

IOF	Conservation importance	Nature of potential pre-mitigation impact	Magnitude of pre-mitigation impact	Significance of pre-mitigation effect	Specific mitigation/ enhancement measures	Magnitude of residual impact	Residual significance	Level of certainty/ comments
Construction/Decommissioning								
Moorfoot Hills SSSI	National	Disturbance and/or displacement	Negligible	Not significant	No specific mitigation required (after embedded mitigation measures outlined in Chapter 8 of the EIAR)	Negligible	Not significant	High
Golden eagle	Regional	Disturbance and/or displacement	Low negative	Not significant	No specific mitigation required (after embedded mitigation measures outlined in Chapter 8 of the EIAR)	Low negative	Not significant	High
Hen harrier	Regional	Disturbance and/or displacement	Low negative	Not significant	No specific mitigation required (after embedded mitigation measures outlined in Chapter 8 of the EIAR)	Low negative	Not significant	High
Operation								
Moorfoot Hills SSSI	National	Disturbance	Negligible	Not significant	None	Negligible	Not significant	High
		Displacement	Low negative	Not significant	Implementation of an OMP	Low negative	Not significant	Moderate-High
		Collision risk	Negligible	Not significant	None	Negligible	Not significant	High

IOF	Conservation importance	Nature of potential pre-mitigation impact	Magnitude of pre-mitigation impact	Significance of pre-mitigation effect	Specific mitigation/ enhancement measures	Magnitude of residual impact	Residual significance	Level of certainty/ comments
Golden eagle	Regional	Disturbance	Low negative	Not significant	Implementation of an OMP	Low negative	Not significant	Moderate-High
		Displacement	Moderate negative	Not significant	No specific mitigation required	Low negative	Not significant	Moderate-High
		Collision risk	Low negative	Not significant	Implementation of an OMP	Low negative	Not significant	High
Hen harrier	Regional	Disturbance	Low negative	Not significant	Implementation of an OMP	Low negative	Not significant	High
		Displacement	Low negative	Not significant	No specific mitigation required	Low negative	Not significant	High
		Collision risk	Low negative	Not significant	Implementation of an OMP	Low negative	Not significant	Moderate-high

8.9. Updated Cumulative Impact Assessment

8.9.1. The following section provides an updated assessment of the predicted cumulative effects on IOFs from the Proposed Development along with all other developments within an appropriate zone of influence (ZoI) and against the relevant NHZ 20 population estimates, following NatureScot guidance[54].

8.9.2. In line with this guidance, any wind farm developments of fewer than three turbines (small scale wind energy proposals[55]) were excluded from the cumulative impact assessment (CIA). Within Chapter 8 of the EIAR, three developments, Bowbeat Wind Farm, Greystone Knowe, and Longpark Wind Farm were included within the CIA. No additional operational, consented, submitted wind developments or developments under construction were identified within 10 km of the Proposed Development.

8.9.3. In line with the CIA completed within Chapter 8 of the EIAR, only IOFs for which a greater than negligible residual impact is predicted are considered in the CIA, as negligible impacts will not result in a detectable increase in cumulative impacts. The IOFs for which cumulative effects may occur are as follows:

- Golden eagle: collision and disturbance/displacement effects; and
- Hen harrier: collision and disturbance/displacement effects.

8.9.4. The residual effect of the individual operational, constructed, consented and submitted developments and the cumulative residual effect on each of the IOFs most likely to be affected by cumulative effects (as listed above) is described in Table 8.9 below.

8.9.5. No significant cumulative collision, displacement or disturbance effects were concluded for any IOFs.

[54] SNH (2018b). *Assessing the cumulative impacts of onshore wind farms on birds: guidance*. Scottish Natural Heritage (now NatureScot), Inverness.
[55] SNH (2016). *Assessing the impact of small-scale wind energy proposals on the natural heritage* (Guidance note). Scottish Natural Heritage.

Table 8.9: Cumulative Impact Assessment of IOFs for Developments within 10 km of the Proposed Development.

Site	Scawd Law (Proposed Development)	Bowbeat	Longpark*	Greystone Knowe	Cumulative residual effects
Site status	8 turbines	24 turbines Operational since 2002 Baseline surveys undertaken in 1997 Application for extension of life submitted 2024 Surveys for extension of life undertaken between 2020-2023	29 turbines (including extension) Operational since 2009 Baseline surveys undertaken between 2011 and 2013	15 turbines Application submitted, in planning Baseline surveys undertaken between 2017 - 2019	76 turbines
Golden eagle	A newly established home range was identified within 10 km of the Proposed Development in 2022 and was confirmed to be occupied again in 2023. A total of 19 flights were recorded during breeding season VP surveys between 2022 and 2023, with 14 recorded during the 2023-2024 non-breeding season VP surveys. Of these flights, 16 were at PCH in the CRZ, 12 of which were recorded during the breeding season and four during the non-breeding season. Updated breeding season predicted collision mortality is 0.05 birds, and non-breeding season	Golden eagle was not recorded during baseline surveys.	Golden eagle was not recorded during baseline surveys.	Golden eagle was not recorded during baseline surveys.	Given that there is no change to the cumulative number of turbines and there is no change to the number of consented and operational developments within 10 km of the Proposed Development, predicted impacts of cumulative disturbance, displacement and collision risk are still considered to be **not significant**.

Site	Scawd Law (Proposed Development)	Bowbeat	Longpark*	Greystone Knowe	Cumulative residual effects
	mortality is 0 birds, resulting in an annual collision mortality of 0.05 birds.				
Hen harrier	A total of 50 flights were recorded during breeding season VP surveys between 2017 and 2023, four of which were recorded in 2018 and 46 in 2023. Of these flights, 34 were at PCH in the CRZ, all of which were recorded in 2023. Although no breeding raptor surveys were completed in 2023, it was assumed that hen harrier held territory within proximity to the Proposed Development due to the flight activity observed. As an updated total of 34 flights by 34 birds were recorded at PCH in the CRZ, hen harrier qualified for CRM. Breeding season predicted collision mortality is 0.25 birds.	Hen harrier was not recorded during baseline surveys in 1997. Hen harrier was recorded during surveys for the extension of life between 2020-2023. However, no breeding territories were identified, and CRM was not undertaken.	Hen harrier was not recorded during baseline surveys.	No breeding territories were identified during baseline ornithology surveys. Three flights were recorded during the flight activity surveys. A predicted annual collision mortality rate of 0.005 birds was calculated, representing 0.019% of the NHZ 20 population.	A cumulative annual collision mortality rate of 0.30 birds represents 1.15% of the NHZ 20 population. As such, collision risk is considered to be of a **moderate negative magnitude** at a regional level. However, a cumulative mortality rate of 0.30 birds represents 0.06% of the most recently estimated breeding population in Scotland (529 in 2023[27]). Cumulative collision risk is therefore considered to be **not significant**. There are no additional cumulative impacts on displacement or disturbance. Therefore, a cumulative impact of displacement or disturbance is considered to be **not significant**.

** Original EIAR could not be accessed but EIAR for the 10-turbine extension (2014) was used for information.*

8.10. Statement of Significance

8.10.1. An updated assessment has been made of the predicted significance of effects of the Proposed Development on IOFs. The Proposed Development includes for a 50 m micrositing allowance where the environmental impacts would be assessed and signed-off by the ECoW.

8.10.2. By applying effective embedded mitigation measures and following good practice guidelines during construction, the magnitude of residual effects of the Proposed Development on all IOFs is assessed as being **moderate/low negative/negligible** in terms of magnitude, and **not significant**.

Volume 2 Annex A – AI Figures

- Figure AI 8.1: Proposed Development
- Figure AI 8.2: Vantage Point Locations and Viewsheds 2023-2024
- Figure AI 8.3: Wildfowl and Wader Breeding Season Flights (March to August) 2017-2023
- Figure AI 8.4: Raptor and Owl Breeding Season Flights (March to August) 2018, 2019, 2022 and 2023
- Figure AI 8.5: Non-breeding Season Flights (September to February) 2017-2024

Volume 2 Annex B – AI Appendices

AI Volume 2 Appendix 8.1: Ornithology

AI Volume 2 Appendix 8.2: Ornithology [CONFIDENTIAL]

AI Volume 2 Appendix 8.3: Ornithology [CONFIDENTIAL]