Appendix 9.1: Ornithology

Creachan Wind Farm Appendix 9.1

Ornithology

RWE

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1.0 Introduction

MacArthur Green (now part of SLR) was commissioned by RWE Renewables UK Onshore Wind Ltd. to complete ornithological surveys for the proposed Creachan Wind Farm, located near to Loch Morie in the Highland Council Area (hereafter referred to as 'the Proposed Development'). The surveys were conducted between March 2022 and February 2024, with additional surveys undertaken along the Existing Forestry Access Track during the 2025 breeding season.

This technical report summarises the methods employed and the results of these field surveys and is supported by the following Annexes.

- **Annex A**: Ornithological Legal Protection;
- **Annex B**: Ornithological Survey Methodologies;
- **Annex C**: Ornithological Survey Effort and General Information;
- **Annex D**: Ornithological Survey Results; and
- **Annex E**: Collision Risk Assessments.

Confidential information relating to species listed on Annex 1 of the EU Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) is detailed in **Confidential Appendix 9.2.**

2.0 Legal Protection

With limited exceptions, all wild birds and their eggs are protected by law. Specific levels of protection are determined by a species' inclusion on certain lists. **Annex A** to this Appendix details the various levels of legal protection afforded to bird species in Scotland.

3.0 Field Survey Methods

The following surveys were undertaken between March 2022 and February 2024:

- Flight activity surveys (2022 and 2023 breeding seasons and 2022/2023 and 2023/2024 non-breeding seasons), from a total of five vantage points (VPs) (**Figure 9.1**);
- Scarce breeding bird surveys (2022 and 2023 breeding seasons), 2 km survey buffer (**Figure 9.3**);
- Black grouse surveys (2022 and 2023 breeding seasons), 1.5 km survey buffer (**Figure 9.4**);
- Moorland breeding bird surveys (2022 and 2023 breeding seasons), 500 m survey buffer (**Figure 9.5**); and
- Winter walkover surveys (2022/2023 and 2023/2024 non-breeding seasons), 500 m survey buffer (**Figure 9.5**).

Survey methods followed the recommended NatureScot guidance (2025a[i]) available at the time of survey and methods are described in detail within Annex B. Where possible, each survey was carried out within buffer distance from a preliminary Wind Turbine Zone (WTZ)[1]

[1] Which was slightly larger than the Main Development Area (MDA) shown in **Figure 9.1**. **Figure 3.2** shows both these areas.

specific to that method (e.g. 2 km buffer for the scarce breeding bird surveys) and these are detailed within **Annex B**.

Additionally, during the 2025 breeding season, a moorland breeding bird and scarce breeding bird survey was undertaken along the Existing Forestry Access Track, with a 500m and 1km survey buffer adopted respectively (**Figure 9.3** and **9.5**).

Target species for surveying/recording were defined from the following lists and refined on the basis of the species perceived sensitivity to onshore wind farm developments (e.g. as set out in NatureScot guidance, 2025a[i] and Annex 1 of NatureScot guidance, 2025b[ii]

- Annex I of the EU Birds Directive[iii];
- Schedule 1 the Wildlife and Countryside Act 1981 (as amended)[iv]; and
- Species (excluding passerines) included on the Birds of Conservation Concern (BoCC) red list (Stanbury et al. 2022[v] and Stanbury et al. 2024[vi]).

Secondary species for survey/recording were defined as the non-red list raptor and owl species (i.e. buzzard, kestrel, sparrowhawk, tawny owl and long-eared owl), amber or green listed waders, feral species (e.g. Canada goose), mallard, raven and any notable Schedule 1 or red listed passerine species observed during surveys.

4.0 Field Survey Results

All valid surveys were undertaken during suitable weather conditions (as described within **Annex B**). Where weather conditions deteriorated below acceptable conditions (see definitions in **Annex B**), surveys were either suspended or additional surveys were undertaken. In the case of flight activity surveys, any time where the visibility was <1 km was excluded from total survey effort and subsequent analysis.

Schedule 1/Annex 1 surveys were carried out by appropriately licensed surveyors. All survey data were reviewed, inputted, and analysed by MacArthur Green (now part of SLR).

Survey effort and results of the field surveys are detailed within **Annex C** and **Annex D**. The following sections summarise the results from each survey undertaken.

4.1 Flight Activity

The flight activity surveys recorded all target species' flight activity within the preliminary WTZ[1]. These data have been used in subsequent collision risk modelling, with flights used including those within the 'Collision Risk Analysis Area' (CRAA) (i.e. the area to be occupied by operational turbines, together with a 500 m buffer).

Flight activity surveys across the 2022 and 2023 breeding seasons and 2022/2023 and 2023/2024 non-breeding seasons were undertaken across five VPs. Valid survey effort[2] is summarised in **Table 9.1.1**.

Further details are provided within **Annex B, C** and **D**.

Table 9.1.1: Summary of total hours of valid survey per VP in each season

Period	VP1	VP3	VP4	VP5	VP6
2022 breeding season	36	36	36	36	36
2022/2023 non-breeding season	36	36	36	36	36

[2] Hours where visibility was >1 km are not considered valid for use in collision risk modelling as less than half the 2 km viewshed can be seen.

Period	VP1	VP3	VP4	VP5	VP6
2023 breeding season	36	36	36	36	36
2023/2024 non-breeding season	36	36	36	36	36

A total of 14 target species were recorded during the flight activity surveys. Further details are provided in **Annex D**.

For each species across the whole flight activity survey period, **Table 9.1.2** shows the total number of flights recorded and the total number of birds recorded[3]. The bird seconds are calculated for each observation as the product of flight duration and number of individuals. This is then summed per species to give the total bird seconds recorded across the entire surveyed period.

Table 9.1.2: Target species recorded and total number of flights recorded during flight activity surveys

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded
Black grouse	2	12	126
Dunlin	1	1	17
Golden eagle	45	48	8380
Golden plover	21	47	1,939
Goshawk	3	3	225
Greenshank	4	5	390
Greylag goose	1	3	114
Hen harrier	3	3	332
Herring gull	1	1	300
Merlin	11	11	470
Pink-footed goose	17	1105	210,225
Red-throated diver	5	8	422
Red kite	16	16	2,219
White-tailed eagle	1	1	221

Flightlines Used in Collision Mortality Risk Modelling

Only flightlines identified to be within the CRAA and recorded within the 2 km viewshed of the associated VP were considered in subsequent collision risk modelling. **Annex E** provides details of the bird seconds from flights identified to be 'at- risk':

- 'At-risk' defined as – a flight having at least part of its duration (i) at Potential Collision Height (PCH)[4]; (ii) within the CRAA; and (iii) recorded within the 2 km viewshed of the associated VP.

[3] This includes flights that would not technically be 'at-risk' of collision (e.g. recorded outwith the CRAA and/or not at rotor height).

[4] In some cases, only part of a total flight duration was recorded at PCH, and it is assumed that this proportion is applicable for that part of the flight within the CRAA and 2 km viewshed area.

- PCH is defined as – the altitude between the minimum and maximum blade height[5] (taken to be from 10m to 200 m for the Proposed Development depending on turbine specification, see **Annex E**).

It should be noted that whilst black grouse, greylag goose, herring gull and white-tailed eagle were recorded during flight activity surveys, no flights were considered to be 'at-risk'[6]. Collision mortality risks have therefore not been calculated for these species.

Further survey results detailing the findings from each survey visit (including target species' flightlines considered not 'at-risk' and secondary species information) can be found within **Annex D**. Only bird seconds for observations identified as within the CRAA and associated viewshed are considered in the following discussions.

Collision Mortality Risks

The bird seconds for target species flights within the CRAA and at PCH were input into the NatureScot Collision Risk Model (CRM) (Band et al., 2007[vii]) to estimate collision mortality risks per season. The CRM calculations for each species can be found in **Annex E** and which have been undertaken using two potential turbine specifications for the Proposed Development (i.e. a maximum tip height of 200m based on a Nordex 163 and a maximum tip height of 180m based on a Siemens Gamesa (SG) 7.0-170)

Table 9.1.3 presents a summary of estimated collision risks for a turbine specification with maximum tip height of 180m and based on an SG 7,0-170, with a maximum rotor diameter of 170m and hub height of 95m, and which predicted the overall worst case mean annual collision mortality risks for all species.

Table 9.1.3: Estimated collision mortality risks (SG 7.0-170).

Species	2022 breeding season	2022/23 non-breeding season	2023 breeding season	2023/24 non-breeding season	Mean breeding	Mean non-breeding	Mean annual	No. of years per collision[7]
Dunlin	0.0016	0.0000	0.0000	0.0000	0.0000	0.0008	0.0016	1,246.99
Golden eagle	0.0210	0.0170	0.0021	0.0322	0.0246	0.0115	0.0210	27.65
Golden plover	0.0000	0.0574	0.0616	0.0000	0.0287	0.0308	0.0000	16.80
Goshawk	0.0112	0.0000	0.0000	0.0004	0.0002	0.0056	0.0112	172.90
Greenshank	0.0455	0.0000	0.0000	0.0000	0.0000	0.0228	0.0455	43.93
Hen harrier	0.0017	0.0000	0.0000	0.0000	0.0000	0.0009	0.0017	1,170.17
Merlin	0.0084	0.0000	0.0000	0.0044	0.0022	0.0042	0.0084	155.29
Pink-footed goose	0.0000	0.0813	0.0000	0.0518	0.0666	0.0000	0.0000	15.02

[5] Where the actual rotor blade altitude differs from the pre-defined survey height bands, the collision risk model accounts for this difference on the assumption of an even flight distribution within each particular survey height band, and an adjustment can be made to estimate total flight duration at actual rotor blade altitude.

[6] i.e. the flights were either not within the CRAA or at PCH.

[7] Based on mean annual collision risk.

Species	2022 breeding season	2022/23 non-breeding season	2023 breeding season	2023/24 non-breeding season	Mean breeding	Mean non-breeding	Mean annual	No. of years per collision[7]
Red-throated diver	0.0031	0.0000	0.0000	0.0000	0.0000	0.0016	0.0031	636.28
Red kite	0.0032	0.0022	0.0000	0.0000	0.0011	0.0016	0.0032	367.62

4.2 Scarce Breeding Birds

Scarce breeding bird surveys were conducted during the 2022 (March to August) and 2023 (March to August) breeding seasons. The survey area comprised the preliminary WTZ[1] and a buffer of out to 2 km.

Red-throated diver was confirmed to be breeding within the survey area, with focal breeding loch watches also conducted in July and July 2022 and May-July 2023. Merlin where also considered likely to be breeding, although no confirmed nest sites were recorded.

Breeding activity is summarised in **Table 9.1.4**.

Black-throated diver, golden eagle, goshawk, hen harrier, osprey, peregrine falcon, red kite and white-tailed eagle were also recorded during surveys but were not considered or confirmed to be breeding within the survey area.

Buzzard, kestrel and sparrowhawk (secondary raptor species) were also recorded across the survey area and are likely to have bred within the wider area.

Further details of the scarce breeding bird surveys are provided within **Annex B, C** and **Annex D**, with sensitive information presented in **Confidential Appendix 9.2**.

Table 9.1.4: Scarce breeding bird summary

Species	2022	2023
Red-throated diver	Two territories, one confirmed breeding, success unknown.	Five territories, one possible breeding, but no evidence of successful breeding.
Merlin	One possible territory, no nest found	One possible territory, no nest found.

Additionally, a survey area along the Existing Forestry Access Track and a buffer of out to 1 km was surveyed in July 2025. No breeding evidence of any Schedule 1 raptor or divers were recorded, and the predominant coniferous plantation habitats within survey area are considered largely unsuitable for such.

4.3 Black Grouse

Surveys to identify areas of black grouse activity, locate lek locations and establish lek size were conducted in the 2022 and 2023 lekking seasons (April and May). The survey area comprised the preliminary WTZ[1] and areas out to 1.5 km.

Surveys identified six lek locations, with BK_1 recording the largest numbers in 2022 (**Table 9.1.5**). Further details of the black grouse surveys are provided within **Annex B, C** and **Annex D**.

Table 9.1.5: Black grouse lek activity

Lek	2022		2023	
	Maximum number of males recorded	Maximum number of females recorded	Maximum number of males recorded	Maximum number of females recorded
BK_1	3	1	1	0
BK_2	2	0	1	0
BK_3	1	0	1	0
BK_5	0	0	1	0
BK_6	0	0	1	0
BK_7	0	0	1	0

4.4 Moorland Breeding Bird Surveys

Moorland breeding bird surveys were completed during the 2022 and 2023 breeding bird seasons, comprising of four visits in each year, April to July. The survey area comprised the preliminary WTZ[1] and a buffer of out to at least 500m.

Surveys recorded six breeding wader species and ptarmigan (**Table 9.1.6**). Dotterel were also recorded on one occasion but were not considered to be breeding within the survey area.

Further details of the moorland breeding bird surveys are provided within **Annex B, C** and **D**.

Table 9.1.6: Moorland breeding bird territories

Species	Number of territories 2022	Number of territories 2023
Common sandpiper	2-3 (1)	2-4 (0)
Curlew	0	0-3 (0-1)
Dunlin	1-5 (1-5)	3 (3)
Golden plover	8-13 (6-7)	9-18 (7-8)
Greenshank	5-10 (2-4)	6-12 (5-7)
Ptarmigan	2-3 (1)	2-3 (0)
Snipe	6-8 (3)	8-13 (3-5)

Additionally, a survey area comprising the Existing Forestry Access Track and a buffer of 500m was surveyed in July 2025. No observations of waders or other (non-raptor) target species were recorded, and the predominant coniferous plantation habitats within survey area are considered unsuitable for such.

4.5 Winter Walkovers

Winter walkover surveys were conducted during the 2022/2023 and 2023/2024 non-breeding seasons, with the survey area comprising the preliminary WTZ[1] and a buffer of out to 500m. Surveys recorded 25 species of which six are considered to be target species (**Table 9.1.7**).

Further details of the winter walkover surveys are provided within **Annex B, C** and **D**.

Table 9.1.7: Winter walkover: target species records (number of birds recorded per visit).

Species	2022/2023 non-breeding season		2023/2024 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds
Black grouse	3	11	-	-
Golden eagle	4	4	1	1
Golden plover	9	12	3	8
Merlin	2	2	-	-
Ptarmigan	1	1	-	-
Woodcock	1	1	-	-

[i] NatureScot (2025a) Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms. Available at: https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

[ii] NatureScot (2025b) Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas. Available at: https://www.nature.scot/doc/guidance-note-assessing-significance-impacts-bird-populations-onshore-wind-farms-do-not-affect

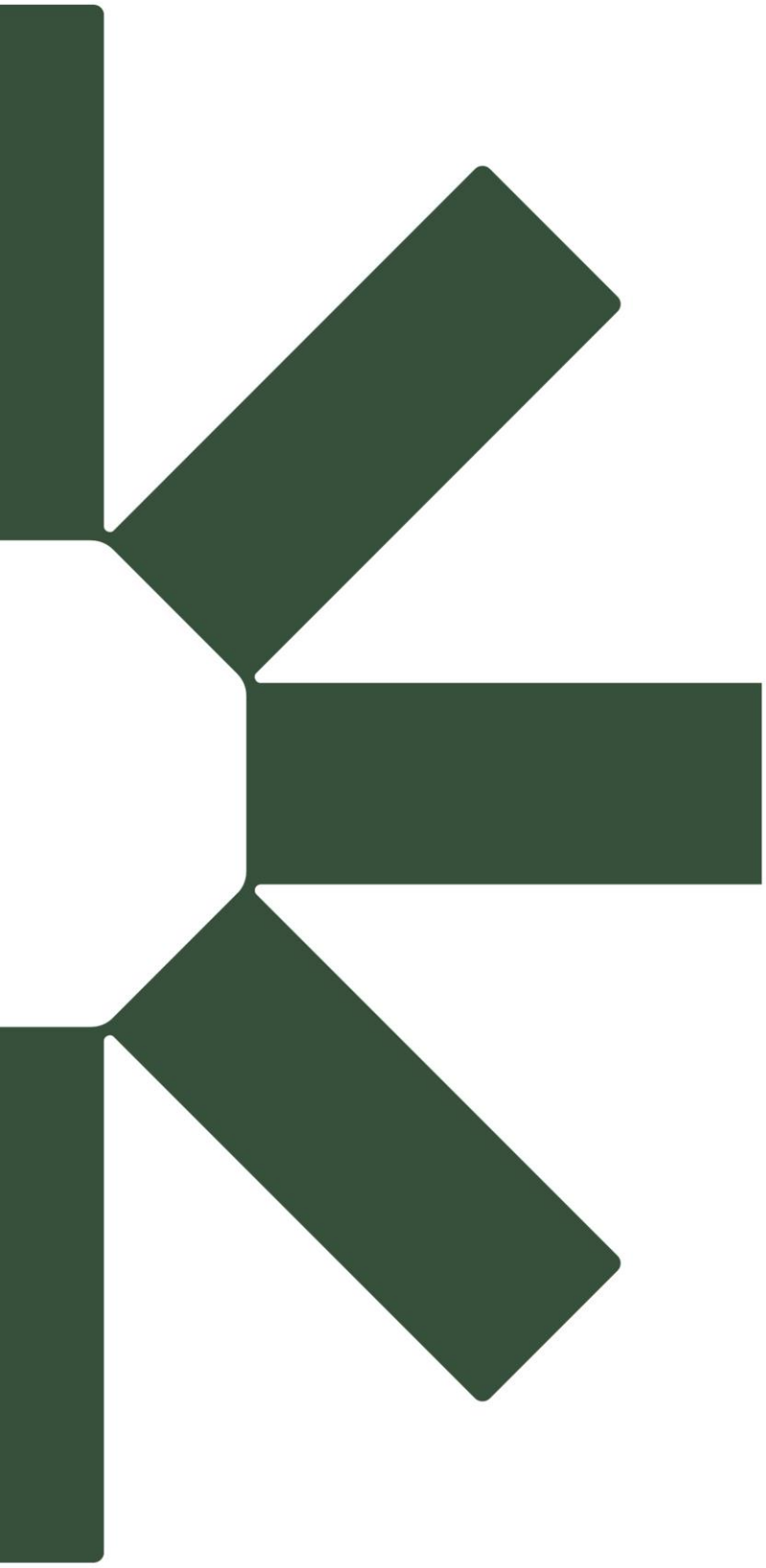
[iii] Directive 2009/147/EC of the European Parliament and of the Council. Available at: https://www.legislation.gov.uk/eudr/2009/147/contents

[iv] Scottish Government (1981). Wildlife and Countryside Act 1981. Available at: https://www.legislation.gov.uk/ukpga/1981/69

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

[vi] Stanbury, A. J., Burns, F., Aebischer, N. J., Baker, H., Balmer, D. E., Brown, A., Dunn, T., Lindley, P., Murphy, M., Noble, D. G., Owens, R., and Quinn, L. (2024) The status of the UK's breeding seabirds: an addendum to the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds, 117, pp. 471-487.

[vii] Band, W., Madders, M. & Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, M. (Eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp 259-275. Quercus, Madrid.



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