



Dalfad Wind Farm

Baseline Ornithology Surveys

Technical Appendix 7.1

Brockwell Energy

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Basis of Report

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1.0 Introduction

SLR were commissioned by the Applicant to complete baseline ornithological surveys at the proposed Dalfad Wind Farm (hereafter referred to as 'the Proposed Development'), located 1.5 km to the east of Cronberry and 1.8 km east of Lugar in East Ayrshire, Scotland. The surveys were conducted between April 2023 and March 2025 to inform an assessment of the potential ornithological effects of the Proposed Development on the species assemblage present.

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

- **Annex A:** Ornithological Survey Effort and General Information;
- **Annex B:** Ornithological Survey Results.

In Scotland, all wild birds are protected under the Wildlife and Countryside Act 1981ⁱ (the 'Act'), as amended by the Nature Conservation (Scotland) Act 2004ⁱⁱ. This protection also extends to their eggs and nests, with further special protection under the Act afforded to species listed on Schedule 1 of the Act. **Confidential Technical Appendix 7.2** contains the sensitive information relating to species listed on Schedule 1 of the Act, those listed on Annex I of the EU Birds Directiveⁱⁱⁱ or species defined by NatureScot (2016^{iv}, 2025^v) to be 'environmentally sensitive species'.

Information relating to the collision risk modelling (CRM) is detailed in **Technical Appendix 7.3**.

A range of surveys were employed to accurately record baseline conditions within the Proposed Development and appropriate survey areas (detailed in **Annex B**). In this Technical Appendix, associated **Annexes A & B**, **Confidential Technical Appendix 7.2**, **Technical Appendix 7.3**, and **Chapter 7 (Ornithology)** of the EIA Report. Terms referred to are as follows:

- 'the Site' refers to the area within the red line boundary, e.g. **Figure 7.3**;
- 'survey area' is defined as the area covered by each survey type for the Proposed Development; and
- 'study area' is defined as the area of consideration of effects on each species at the time of assessment (**Figure 7.3**).

2.0 Baseline Field Survey Methods

A target species list for surveying/recording was 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 2025a^{vi} and Annex 1 of NatureScot 2025b^{vii}):

- Annex I of the EU Birds Directive^{viii};
- Schedule 1 the Wildlife and Countryside Act 1981 (as amended)^{ix}; and
- Species (excluding passerines) included on the Birds of Conservation Concern (BoCC) red list (Stanbury *et al.* 2022^x and Stanbury *et al.* 2024^{xi}).

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.

The following surveys were undertaken at the Site between April 2023 and March 2025:

- Flight activity surveys: two breeding season[s] and two non-breeding season[s], from five vantage points (VPs) (**Figure 7.2**). Surveys were undertaken monthly with reference to NatureScot 2025a^{vi}.
- Black grouse surveys: 1.5 km survey buffer, two breeding seasons with visits in April and May. Surveys were undertaken with reference to with NatureScot 2025a^{vi} and Gilbert *et al.* (1998^{xii});
- Scarce breeding bird¹ surveys: 2 km survey buffer, two breeding seasons with monthly visits between April and August. Surveys were undertaken with reference to with NatureScot 2025a^{vi}, Hardey *et al.* (2013^{xiii}) and Gilbert *et al.* (1998^{xii});
- Moorland breeding bird surveys: 500 m survey buffer, two breeding seasons with monthly visits between April and July. Surveys were undertaken with reference to with NatureScot 2025a^{vi}, Brown & Shepherd (1993^{xiv}), Bibby *et al.* (2000^{xv}) and Calladine *et al.* (2009^{xvi}); and
- Winter walkover surveys: 500 m survey buffer, two non-breeding seasons with three visits made in 2023/2024 and seven in 2024/2025 between September and March. Surveys were undertaken with reference to with NatureScot 2025a^{vi}, Hardey *et al.* (2013^{xiii}) and Gilbert *et al.* (1998^{xii}).

VP selection and viewshed analysis was conducted using Arc GIS Pro to confirm suitable VP locations and their associated visible areas (viewsheds) at 20 m above ground level², with reconnaissance surveys undertaken to refine VP locations as needed. Care was taken to maximise the area visible from accessible land whilst minimising potential disturbance to birds and with reference to NatureScot guidance regarding viewshed selection. The final five VP locations were selected with the aim of achieving coverage of all the proposed turbine locations such that no turbine was more than 2 km from a VP. This objective was achieved for all of the turbines.

Due to major soil importation works conducted near to the location of VP3 from the end of August 2024, the decision was made to undertake the 2024/25 non-breeding season VP surveys from a new location (VP5). This location consisted of a similar viewshed to VP3 however was located further away from the works to reduce disturbance and for surveyors health & safety.

3.0 Baseline Survey Summary

All valid surveys were undertaken during suitable weather conditions (refer to **Annex A**). Where weather conditions deteriorated below acceptable conditions (refer to **Annex A**), 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. Surveys for species listed on Schedule 1 of the Act were carried out by appropriately licensed surveyors. All survey data were reviewed, inputted, and analysed by SLR.

A total of 99 bird species were recorded within, or adjacent to, the Site during the various ornithological surveys conducted (**Table 7-1-1**). Survey effort and results of the field surveys are detailed within **Annex A** and **Annex B**. The following sections summarise the results from the flight activity surveys and the various distribution and abundance surveys (by species groups).

¹ For these surveys, 'scarce breeding birds' are considered to include any regionally present raptors, divers or owls listed on Schedule 1 of the Act and/or Annex I of the EU Birds Directive.

² The viewsheds are based on a 5 m DTM to provide a representation of visibility from the observer locations; this is confirmed and refined through field site visits.



3.1 Flight Activity

Valid survey effort³ is detailed in **Table 7-1-1** and full details of the flight activity surveys are contained in **Annex A**. NatureScot recommend a minimum of 36 hours of valid survey hours per VP per season (NatureScot 2025a^{vi}), which was achieved.

Table 7-1-1: Summary of total hours of valid survey per VP per season

Period	VP1	VP2	VP3	VP4	VP5
2023 breeding season	36	36	36	36	-
2023/2024 non-breeding season	36	36	36	36	-
2024 breeding season	36	36	36	36	-
2024/2025 non-breeding season	36	36	*-	36	*36
*VP location changed due to works, viewshed coverage similar to VP3 location					

A total of 14 target species were recorded during the flight activity surveys (further details are provided in **Annex B**). For each species across the whole flight activity survey period, **Table 7-1-2** shows the total number of flights recorded and the total number of birds recorded⁴. 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. Refer to **Technical Appendix 7.3** for information relating to the CRM.

Table 7-1-2: Target species recorded and total number of flights recorded during flight activity surveys, 2023-2025

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded
Curlew	38	57	2,067
Golden plover	13	881	195,010
Greylag goose	8	56	2,440
Hen harrier	65	71	12,011
Herring gull	31	91	8,681
Lapwing	3	3	48
Merlin	6	6	238
Osprey	1	1	19
Peregrine falcon	30	36	4,125
Pink-footed goose	9	830	132,140
Red kite	43	47	8,672
Ringed plover	1	1	5
Short-eared owl	4	7	7,510
Whooper swan	1	6	360

3.2 Black Grouse

No instances of black grouse were recorded across all survey types.

³ 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.

3.3 Raptors and Owls

3.3.1 Breeding

Barn owl and peregrine falcon were confirmed to be breeding, additionally red kite showed probable breeding evidence within the survey area. Breeding activity is summarised in **Table 7-1-**. Goshawk, merlin, hen harrier, osprey, and short-eared owl were also recorded during the spring/summer but were not considered to be breeding/no breeding attempts were located. **Annex B** and **Confidential Technical Appendix 7.2** contain the full details of all activity relating to target raptor and owl species; refer to **Annex A** for general weather/survey data.

Table 7-1-3: Target raptor and owl activity summary (breeding seasons)

Species	2023	2024
Barn owl	Three confirmed breeding locations and five potential breeding locations identified.	One confirmed breeding location, one probable breeding location. Seven potential breeding locations identified.
Peregrine falcon	One confirmed territory, three chicks fledged.	One confirmed territory, two chicks successfully fledged.
Red kite	No evidence of breeding.	One probable territory, with one recently fledged juvenile recorded and a nest identified post-breeding season.

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

3.3.2 Roosting

Barn owl and hen harrier were both identified to be roosting within the survey area and roosting activity is summarised in **Table 7-1-**. **Annex B** and **Confidential Technical Appendix 7.2** contain the full details of all activity relating to target raptor and owl species; refer to **Annex A** for general weather/survey data.

Table 7-1-4: Target raptor and owl activity summary (non-breeding seasons)

Species	2023/2024	2024/2025
Barn owl	Four confirmed, and five potential roosting locations identified.	One confirmed, one probable, and seven potential roosting locations identified.
Hen harrier	No evidence of roosting.	One potential roost location identified.

3.4 Breeding Waders

Surveys recorded five target wader species, of which three were considered to be breeding (**Table 7-1-**). Golden plover and green sandpiper were also recorded during the spring/summer but were not considered to be breeding. **Annex B** contains the full details of all target wader activity recorded; refer to **Annex A** for general weather/survey data.

⁴ This includes flights that would not technically be 'at-risk' of collision (e.g. recorded outwith the CRAA and/or not at rotor height).



Table 7-1-5: Breeding wader territories, 2023 and 2024

Species	Number of territories 2023	Number of territories 2024
Curlew	4 - 6	2 - 3
Lapwing	1 - 2	1 - 4
Ringed plover	9 - 12	9 - 10

3.5 Non-Breeding Waterfowl and Waders

Surveys recorded four target wader/waterfowl species during the autumn/winter (Table 7-1-). Annex B contains the full details of all target wader activity recorded; refer to Annex A for general weather/survey data.

Table 7-1-6: Target species wintering activity (number of birds recorded per season)

Species	2023/2024 non-breeding season		2024/2025 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds
Golden plover	5	136	6	270
Greylag goose	1	9	1	18
Pink-footed goose	-	-	1	42
Ringed plover	2	6	2	5

3.6 Gulls

Surveys recorded five species of gull (black-headed, common, great black-backed, herring and lesser black-backed) (Table 7-1-7). Of these, a small number of common gull were identified to be breeding. Activity of all five gull species was predominantly recorded to be associated with the area of dormant opencast (including a lagoon) to the west of the Site or in the wider area foraging in the lowland farmland. At the time of surveys only herring gull, common gull and great-black backed gull were considered target species as surveys were conducted prior to the updated NatureScot guidance in 2025.

Annex B contains the full details of all target gull activity recorded; refer to Annex A for general weather/survey data.

Table 7-1-7: Target gull species activity (number of birds recorded per season)

Species	2023 breeding season		2023/2024 non-breeding season		2024 breeding season		2024/2025 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds	Number of records	Total number of birds	Number of records	Total number of birds
Black-headed gull	4	2	-	-	1	1	2	*N/A
Common gull	34	41	-	-	15	2	-	-
Great black-	8	9	1	*N/A	5	*N/A	-	-

Species	2023 breeding season		2023/2024 non-breeding season		2024 breeding season		2024/2025 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds	Number of records	Total number of birds	Number of records	Total number of birds
backed gull								
Herring gull	7	212	6	220	3	*N/A	3	580
Lesser black-backed gull	36	304	-	-	21	*N/A	4	*N/A
*N/A – total number of birds was not recorded								

4.0 Bird Species Index

Table 7-1-8: All bird species recorded at Dalfad Wind Farm

Species	Conservation status	Species	Conservation status
Barn owl	Schedule 1, BoCC Green	Linnet	BoCC Red
Blackbird	BoCC Green	Little grebe	BoCC Green
Blackcap	BoCC Green	Long-tailed tit	BoCC Green
Black-headed gull	BoCC Amber	Magpie	BoCC Green
Blue tit	BoCC Green	Mallard	BoCC Amber
Bullfinch	BoCC Amber	Meadow pipit	BoCC Amber
Buzzard	BoCC Green	Merlin	Annex 1, Schedule 1, BoCC Red
Canada goose	No status	Mistle thrush	BoCC Red
Carrion crow	BoCC Green	Moorhen	BoCC Amber
Chaffinch	BoCC Green	Mute swan	BoCC Green
Chiffchaff	BoCC Green	Nuthatch	BoCC Green
Coal tit	BoCC Green	Osprey	Annex 1, Schedule 1, BoCC Amber
Collared dove	BoCC Green	Oystercatcher	BoCC Amber
Common crossbill	Schedule 1, BoCC Green	Peregrine falcon	Annex 1, Schedule 1, BoCC Green
Common gull	BoCC Red	Pheasant	No status
Common redstart	BoCC Amber	Pied wagtail	BoCC Green
Common sandpiper	BoCC Amber	Pink-footed goose	BoCC Amber
Common whitethroat	BoCC Amber	Raven	BoCC Green
Cormorant	BoCC Green	Red kite	Annex 1, Schedule 1, BoCC Green
Cuckoo	BoCC Red	Redwing	Schedule 1, BoCC Amber
Curlew	BoCC Red	Reed bunting	BoCC Amber
Dipper	BoCC Amber	Ringed plover	BoCC Red
Dunnock	BoCC Amber	Robin	BoCC Green
Feral pigeon	BoCC Green	Rook	BoCC Amber



Species	Conservation status	Species	Conservation status
Fieldfare	Schedule 1, BoCC Red	Sand martin	BoCC Green
Garden warbler	BoCC Green	Sedge warbler	BoCC Amber
Goldcrest	BoCC Green	Short-eared owl	Annex 1, BoCC Amber
Golden plover	Annex 1, BoCC Green	Siskin	BoCC Green
Goldeneye	BoCC Red	Skylark	BoCC Red
Goldfinch	BoCC Green	Snipe	BoCC Amber
Goosander	BoCC Green	Song thrush	BoCC Amber
Goshawk	Schedule 1, BoCC Green	Sparrowhawk	BoCC Amber
Grasshopper warbler	BoCC Red	Spotted flycatcher	BoCC Red
Great black-backed gull	BoCC Red	Starling	BoCC Red
Great spotted woodpecker	BoCC Green	Stock dove	BoCC Amber
Great tit	BoCC Green	Stonechat	BoCC Green
Green sandpiper	Schedule 1, BoCC Amber	Swallow	BoCC Green
Grey heron	BoCC Green	Swift	BoCC Red

Species	Conservation status	Species	Conservation status
Grey wagtail	BoCC Amber	Tawny owl	BoCC Amber
Greylag goose	BoCC Amber	Teal	BoCC Amber
Hen harrier	Annex 1, Schedule 1, BoCC Red	Treecreeper	BoCC Green
Herring gull	BoCC Red	Tufted duck	BoCC Green
House martin	BoCC Red	Wheatear	BoCC Amber
House sparrow	BoCC Red	Whinchat	BoCC Red
Jackdaw	BoCC Green	Whooper swan	Annex 1, Schedule 1, BoCC Amber
Jay	BoCC Green	Wigeon	BoCC Amber
Kestrel	BoCC Amber	Willow warbler	BoCC Amber
Lapwing	BoCC Red	Woodpigeon	BoCC Amber
Lesser black-backed gull	BoCC Amber	Wren	BoCC Amber
Redpoll	BoCC Red		

ⁱ Scottish Government (1981). Wildlife and Countryside Act 1981. Available at: <https://www.legislation.gov.uk/ukpga/1981/69>

ⁱⁱ Scottish Government (2004). Nature Conservation (Scotland) Act 2004. Available at: <https://www.legislation.gov.uk/asp/2004/6/contents>

ⁱⁱⁱ Conservation of Wild Birds ('Birds Directive'). Directive 2009/147/EC of the European Parliament and of the Council. Available at: <https://www.legislation.gov.uk/eudr/2009/147/contents>

^{iv} NatureScot (2016). Environmental Statements and Annexes of Environmentally Sensitive Bird Information. Available at: <https://www.nature.scot/doc/environmental-statements-and-annexes-environmentally-sensitive-bird-information>

^v NatureScot. Sensitive Species of Scotland. Available at: <https://www.nature.scot/doc/sensitive-species-scotland-list>

^{vi} 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>

^{vii} 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>

^{viii} Directive 2009/147/EC of the European Parliament and of the Council. Available at: <https://www.legislation.gov.uk/eudr/2009/147/contents>

^{ix} Scottish Government (1981). Wildlife and Countryside Act 1981. Available at: <https://www.legislation.gov.uk/ukpga/1981/69>

^x 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

^{xi} 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.

^{xii} Gilbert, G., Gibbons, D. W. and Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.

^{xiii} Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) Raptors: a field guide for surveys and monitoring (3rd edition). The Stationery Office, Edinburgh.

^{xiv} Brown, A. F. and Shepherd, K. B. (1993) A method for censusing upland breeding waders. Bird Study, 40: 189-195.

^{xv} Bibby, C. J., Neil D. Burgess, David A. Hill and Simon H. Mustoe (2000) Bird Census Techniques, 2nd Edition, London, Academic Press.

^{xvi} Calladine, J., Garner, G., Wernham, C., & Thiel, A. (2009) The influence of survey frequency on population estimates of moorland breeding birds. Bird Study, 56: 3, 381-388.





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