Fred. Olsen Renewables

Chapter 8

Ornithology

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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 as defined by guidance.
Environmental Impact Assessment (EIA)	Environmental Impact Assessment (EIA) is a means of drawing together, in a systematic way, an assessment of the likely significant environmental effects arising from a Proposed Development.
Ecological Impact Assessment (EcIA)	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 (EIAR)	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations.
Habitat	The area or environment where a species naturally occurs.
Important Ornithological Feature (IOF)	Species identified as being of importance in the context of the Proposed Development, assigned a geographical value level in accordance with CIEEM Guidelines and professional judgement.
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for potential negative effects of a development.
Proposed access	The access route which leaves the public road to the west of the Proposed Development Area and approaches the site making use of existing tracks where possible.
Proposed Development	The proposed Windy Standard I Repower Wind Farm
Proposed Development Area	The area shown delineated by the red line boundary shown on Figure 1.2.
Protected species	Animals or plants protected by European and/or domestic legislation.
Ramsar site	A Ramsar Site is a wetland site designated of international importance under the Ramsar Convention.
Scoping Report	Whilst not a statutory requirement, scoping is designed to ascertain which issues the EIA process should cover. The Scoping Report considers the potential issues relating to the proposal and discusses which issues are likely to be significant.
Scottish Biodiversity List (SBL)	A list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland.
Site of Special Scientific Interest (SSSIs)	Sites of Special Scientific Interest are protected areas that represent the UK's most important wildlife and/or geological sites.
Special Protection Area (SPA)	Special Protection Area, an internationally important area for nature conservation, specifically birds, classified under the Birds Directive.
Survey area	The area within which the ornithological surveys took place, referring to the site boundary plus a defined surrounding buffer area as stated in the methodology for the species/group being surveyed
The "Applicant"	The applicant is Fred. Olsen Renewables Limited.
Windy Standard Complex	The 'present Windy Standard Developments' refers collectively to the operational existing Windy Standard I Wind Farm, Windy Standard II Wind Farm and the consented Windy Standard III Wind Farm.
Zone of Influence (ZoI)	The area over which ecological features may be subject to significant effects as a result of the Proposed Development

List of Abbreviations

Abbreviation	Description
BoCC	Birds of Conservation Concern
BTO	British Trust for Ornithology
CEH	Centre for Ecology and Hydrology
CEMP	Construction Environment Management Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modelling
CRZ	Collision Risk Zone
DEFRA	Department for Environment, Food and Rural Affairs
DGRSG	Dumfries and Galloway Raptor Study Group
EC	European Commission
EcIA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ES	Environmental Statement
EU	European Union
HMP	Habitat Management Plan
IOF	Important Ornithological Feature

Abbreviation	Description
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan (for Dumfries and Galloway)
MAGIC	Multi-Agency Geographic Information for the Countryside
Natural Power	Natural Power Consultants Limited, the lead EIA Co-Ordinator
NBN	National Biodiversity Network
NHZ	Natural Heritage Zone
PAN	Planning Advice Note
PCH	Potential Collision Height
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency
SINC	Site of Interest for Nature Conservation
SNCI	Site of Nature Conservation Interest
SNH	Scottish Natural Heritage (former name of NatureScot)
SOC	Scottish Ornithologists' Club
SPA	Special Protection Area
SR	Scottish Renewables
SRMS	Scottish Raptor Monitoring Scheme
SSSI	Site of Special Scientific Interest
SWBSG	Scottish Windfarm & Bird Steering Group
SWSEIC	South-West Scotland Environmental Information Centre
VP	Vantage Point
WCA	Wildlife and Countryside Act 1981 (as amended)
ZOI	Zone of Influence

8.1 STATEMENT OF COMPETENCE

8.1.1 This Environmental Impact Assessment Report (EIAR) chapter has been prepared by suitably qualified and experienced ecologist following a scoping process culminating in a Scoping Report[1] (see Technical Appendix 1.1 of this EIAR) which was issued on 21 September 2021. All data were collected by suitably qualified and experienced surveyors.

8.1.2 The author of this chapter has three and a half years of experience in environmental consultancy and has been working as an Ecologist for the duration of that time. During this time, she has been involved with design, implementation and management of ecological assessments, production of EIAR chapters, Scoping Reports, technical baseline reports and operational monitoring reports as well as client and consultee liaison. The author obtained her M.Sc. in Evolutionary Ecology from the University of Bern, Switzerland. The author was assisted by a Senior Environmental Consultant with seven years of experience in undertaking Ecological Impact Assessment (EcIA) and EIAR compilation, and a Principal Environmental Consultant with 12 years of experience in EcIA and EIAR compilation.

8.2 INTRODUCTION

8.2.1 This EIAR chapter considers the potential effects of the Windy Standard I Repower (hereafter referred to as the Proposed Development) on Important Ornithological Features (IOFs). The Proposed Development forms part of the Windy Standard Complex, consisting of the operational Windy Standard I, Windy Standard II and the consented Windy Standard III. There is currently an operational wind farm in the Proposed Development Area (Windy Standard I) which has been generating power for 25 years and which is set to be decommissioned in 2027. It is proposed that the area in which Windy Standard I is located is repowered with new turbines (see Chapter 1: Introduction).

8.2.2 The Windy Standard Complex has been subject to survey work and monitoring, for different phases through the 25 years since the original Windy Standard I became operational in 1995. As such, the Windy Standard Complex has been extensively covered by various ornithological surveys leading to an excellent understanding of the area and the species present to provide ornithological context for the proposal. However, to provide updated data some baseline ornithological surveys were undertaken as part of this application.

8.2.3 This chapter details the methods used to identify the baseline bird community within the Proposed Development Area and surrounding locale, and the process used to determine the nature conservation value of the bird populations present. The chapter then sets out the potential impacts of the Proposed Development on birds during the decommissioning of Windy Standard I, and the construction, operation and decommissioning phases of the Proposed Development, and assesses the significance of potential effects on bird populations, including cumulative effects, at an appropriate bio-geographic scale. An assessment of residual effects, taking into consideration proposed mitigation measures, is also provided. Non-avian ecology is assessed in Chapter 9: Ecology, of the EIAR and complements this chapter.

8.2.4 Following submission of the Scoping Report and subsequent consultation, this assessment focusses only on those features which have the potential to be subject to significant effects by the Proposed Development, in line with the updated Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (CIEEM, 2018[2]) and principles of proportionate Environmental Impact Assessment (EIA).

8.2.5 The following impacts to ornithological features were scoped out of further assessment during the scoping process following agreement with consultees:

- Impacts on designated sites;
- Disturbance and/or displacement on breeding upland birds; and

[1] Windy Standard 1 Repowering Scoping Report. Nature Power (2021). Document ref: 1252957-1-A

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

- Disturbance and/or displacement on breeding raptors (excluding goshawk).

8.2.6 No statutory sites with a designation for ornithological features are located within the Zone of Influence (ZoI) of the Proposed Development. Designated sites were therefore scoped out of further assessment.

8.2.7 Windy Standard Repower specific baseline surveys were carried out over a seven-month period: between March 2020 and September 2020 (inclusive) (see Section 8.4 and Appendix 8.1 for further details). NatureScot agreed that no further ornithological survey work was required to describe the baseline conditions of the Proposed Development. A combination of desk study, data from the Windy Standard Complex and baseline ornithological survey results were used to assess the ornithological baseline conditions (see Section 8.6). All Latin names for species mentioned in this chapter are listed in the Appendix 8.1.

8.2.8 The following Figures and Appendices are associated with this chapter:

- Figure 8.1: Ornithology Survey Areas;
- Figure 8.2: Vantage Point Survey Results 2009 – 2010;
- Figure 8.3: Raptor Survey Results 2017 – 2019;
- Figure 8.4: Black Grouse Survey Results 2009, 2010 and 2013 – 2019;
- Figure 8.5: Raptor and Black Grouse Survey Results 2020; and
- Appendix 8.1: Technical appendix

8.3 LEGISLATION, POLICY AND GUIDANCE

8.3.1 The ornithological baseline surveys and subsequent assessment have been carried out with reference to a number of national policy documents, as addressed in Chapter 2: Legal and Policy Context of the EIAR. Legislative and guidance documents with specific relevance to ornithology are listed below:

Legislation

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations), which transposed the Habitats Directive (Council Directive 92/43/EC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) and elements of the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds) into UK law[3];
- The Conservation of Habitats and Species Regulations 2017 (as amended), relating to reserved matters in Scotland[4];
- Council Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive)[5];
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive)[6];
- Wildlife and Countryside Act (WCA) 1981 (as amended) which transposed elements of the Birds Directive into UK law[7];
- The Nature Conservation (Scotland) Act 2004[8];
- The Wildlife and Natural Environment (Scotland) Act 2011[9]
- Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, which transposed the EIA Directive (Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment) into the Scottish planning system[10]; and
- The Electricity works (Environmental Impact Assessment) (Scotland) Regulations 2017.

National Policy Guidance

- Planning Advice Note (PAN) 51: Planning, Environmental Protection and Regulation (Scottish Government, 2006);
- Planning Advice Note (PAN) 60: Planning for Natural Heritage (Scottish Government, 2000);
- PAN 1/2013 – Environmental Impact Assessment (Scottish Government, 2013); and
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended (Scottish Executive, 1995).

Other Guidance

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland[2];
- SNH (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms[11];
- Birds and Wind Farms: Risk Assessment and Mitigation[12];
- Developing field and analytical methods to assess avian collision risk at wind farms[13];
- SNH (2000) Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action[14];
- SNH (2018) Assessing significance of impacts from onshore windfarms on birds outwith designated areas[15];
- SNH (2009) Monitoring the impacts of onshore wind farms on birds[16];
- SNH (2009) Guidance on methods for monitoring bird populations at onshore wind farms[17];
- SNH (2018) Avoidance rates for the onshore NatureScot wind farm collision risk model[18];
- SNH (2018) Assessing the cumulative impact of onshore wind farms on birds[19];

[3] https://www.legislation.gov.uk/uksi/1994/2716/contents/made (last accessed 14/03/2022)

[4] https://www.legislation.gov.uk/uksi/2017/1012/regulation/2/made?view=plain (last accessed 14/03/2022)

[5] https://legislation.gov.uk/eudr/2009/147/contents (last accessed 14/03/2022)

[6] https://www.legislation.gov.uk/uksi/1994/2716/contents/made (last accessed 14/03/2022)

[7] https://www.legislation.gov.uk/ukpga/1981/69 (last accessed 14/03/2022)

[8] https://www.legislation.gov.uk/asp/2004/6/contents (last accessed 14/03/2022)

[9] https://www.legislation.gov.uk/asp/2011/6/contents/enacted (last accessed 14/03/2022)

[10] https://www.legislation.gov.uk/ssi/2017/102/contents/made (last accessed 14/03/2022)

[11] SNH (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms*. Scottish Natural Heritage, Battleby.

[12] de Lucas, M., Janss, G. & Ferrer, M. (eds.) (2007) *Birds and Wind Farms: risk assessment and mitigation*. Quercus, Madrid.

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

[14] SNH (2000) *Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action*. Scottish Natural Heritage, Edinburgh.

[15] SNH (2018) *Assessing significance of impacts from onshore windfarms on birds outside designated areas*. Scottish Natural Heritage, Inverness.

[16] SNH (2009) *Monitoring the impact of onshore wind farms on birds* (Guidance note). Scottish Natural Heritage, Edinburgh.

[17] SNH (2009) *Guidance on methods for monitoring bird populations at onshore wind farms*. Scottish Natural Heritage, Edinburgh.

[18] SNH (2018) *Avoidance rates for the onshore SNH wind farm collision risk model*. Scottish Natural Heritage, Battleby.

[19] SNH (2018) *Assessing the cumulative impacts of onshore wind farms on birds: guidance*. Scottish Natural Heritage, Inverness.

- SNH (2016) Assessing connectivity with Special Protection Areas (SPAs)[20];
- Natural Research (2017) A Review of Disturbance Distances in Selected Bird Species[21];
- British Standard 42020:2013 Biodiversity – code of practice for planning and development;
- Natural Heritage Zone (NHZ) bird population estimates. Scottish Windfarm Bird Steering Group (SWBSG). Commissioned report number 1504[22];
- Scottish Renewables (SR); SNH; SEPA (2019) Good Practice during Wind Farm Construction[23];
- Birds of Conservation Concern (BoCC) 5: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man[24];
- Scottish Biodiversity List (SBL); and
- The Local Biodiversity Action Plan (LBAP)[25].

8.4 METHOD OF ASSESSMENT

8.4.1 Although a wide range of habitats and species are normally assessed when considering a new wind farm development, this Proposed Development is located within the footprint of an existing wind farm. Following removal of the current 36 turbines, eight larger turbines will be erected in different locations, with seven of these in the existing wind farm footprint and the eighth turbine to be located along an existing track to the north-west of the current wind farm in an area which is currently standing commercial forestry. The site will be reinstated except where existing shared infrastructure (substation, control building, temporary borrow pits) will be used for the repower.

8.4.2 Based on the ornithological data collected as part of the Windy Standard Complex, the Proposed Development Area does not contain high levels of activity for ornithological receptors and the Proposed Development will result in minor physical changes to the site. Therefore, effects due to construction, disturbance / displacement, operational effects of the larger turbines, and decommissioning and restoration of Windy Standard I on target bird species are considered within this EIAR.

8.4.3 Embedded mitigation has been included at every stage of the project, from the decommissioning of Windy Standard I, and the construction, operation and decommissioning phases of the Proposed Development.

Desk study

Data search

8.4.4 The following organisations were contacted in February 2022 to request any records they hold from within 10 km of the central point of the Proposed Development within the last 10 years (2011 – 2021 inclusive):

- Dumfries and Galloway Raptor Study Group (DGRSG);
- RSPB; and
- The South-West Scotland Environmental Information Centre (SWSEIC).

Review of existing data

8.4.5 The Proposed Development forms part of the Windy Standard Complex, consisting of Windy Standard I, Windy Standard II and Windy Standard III (see Figure 8.1). The Windy Standard Complex has been subject to survey work and monitoring for different phases throughout the 25 years since the original Windy Standard I became operational. The EIA for the original Windy Standard I Wind Farm was completed in 1995 and due to differences in the guidance for onshore wind developments at that time, minimal surveys (by current standards) were undertaken then. However, there is a considerable amount of existing data for the Windy Standard Complex as a whole to provide ornithological context for the proposal. Table 8.1 summarises ornithological survey and monitoring work for all wind farms included in the Windy Standard Complex since baseline surveys for the original Windy Standard I Wind Farm commenced in 1993.

Table 8.1: Ornithology survey work undertaken at the Windy Standard Complex 1993 - 2020

Development phase	Survey type	Windy Standard I[26]	Windy Standard II[27]	Windy Standard III[28]
Baseline	Brown & Shepherd[29]	1993-1994	1994-2001*	2013
	Breeding raptors			2009, 2012, 2013
	Black grouse			2009, 2010
	VPs			2009, 2010
Pre-construction / construction	Crossbill point count		2013	
	Brown & Shepherd	1995	2013	
	Nest checks		2014-2017	
	Breeding raptors		2013-2017	
	Black grouse		2013-2017	
Operational	Brown & Shepherd	1996-2000	2018-2020	
	Breeding raptors		2018-2020	
	Black grouse		2018-2020	

Source: Natural Power

** Windy Standard I surveys from 1994 to 2000 were for Windy Standard I plus a larger control area and were used for the baseline for Windy Standard II.*

[20] SNH (2016) *Assessing connectivity with Special Protection Areas (SPAs)* (Guidance note: Version 3). Scottish Natural Heritage, Edinburgh.

[21] Ruddock, M. & Whitfield, D.P., (2007) *A Review of Disturbance Distances in Selected Bird Species*. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

[22] Wilson, M.W., Austin, G.E., Gillings, S. & Wernham, C.V. (2015) *Natural Heritage Zone bird population estimates*. SWBSG commissioned report number 1504. Pp72. Available from www.swbsg.org

[23] Scottish Renewables, SNH, SEPA, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science, AEECoW (2019) *Good Practice during windfarm construction*. Version 4.

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

[25] The Dumfries and Galloway Local Biodiversity Action Plan (2009) Available at https://swseic.org.uk/resource/dglbap-part1/ (last accessed 14/03/2022)

[26] Fred. Olsen Ltd. (1995) Environmental Statement. Proposed Wind Farm at Windy Standard, Carsphairn Forest, Dumfries and Galloway.

[27] Natural Power (2001) Planning Applications for the Proposed Wind Farm Extension at Windy Standard, Dumfries and Galloway.

[28] Natural Power (2015) Brockloch Rig III / Windy Standard III Environmental Statement.

[29] Brown, A. F. & Shepherd, K. B. (1993) A method for censusing upland breeding waders. Bird Study, 40: 189-195.

8.4.6 Following the outcome of the Scoping Report and consultations, the data from the following surveys carried out at the Windy Standard Complex are deemed relevant to describe the baseline conditions and will be presented and used further to inform the assessment:

- Vantage Point (VP) survey (VP1 and VP2) 2009 – 2010 for Windy Standard III (viewsheds for VP1 and VP2 overlook some areas of the Proposed Development and cover the locations of proposed turbines 1, 2, 5 and 7);
- Raptor survey 2017 – 2019 for Windy Standard II;
- Black grouse survey 2009 and 2010 for Windy Standard III; and
- Black grouse survey 2013 – 2019 for Windy Standard II.

8.4.7 Specific baseline survey work for the Proposed Development to inform scoping and therefore the EIA was carried out between March and September 2020; the surveys methods are summarised in the following sections.

Ornithological Survey Programme

Black grouse surveys: 2020

8.4.8 In line with NatureScot guidance[11], dedicated surveys for black grouse were carried out in spring 2020 following methods described in Gilbert *et al*[30]. The surveys covered the Proposed Development Area plus a 1.5 km buffer around the site boundary, access permitting (see Paragraph 8.4.21) for further information regarding survey access limitations and Figure 8.1 for survey areas). All suitable black grouse habitat within the Proposed Development Area was surveyed. As the Windy Standard Complex has previously been surveyed on many occasions, the initial visit to assess habitat suitability was not required, so a two-visit survey approach was undertaken in 2020 to establish presence/absence and to count lekking black grouse. The dates and times of these surveys can be found in Appendix 8.1.

8.4.9 In addition, operational black grouse surveys were conducted at Windy Standard II in 2020 following the same methods as outlined above.

Breeding raptor surveys: 2020

8.4.10 Dedicated breeding raptor surveys, covering the Proposed Development Area and a 2 km buffer around the site boundary, access permitting (see Paragraph 8.4.21 for further information regarding survey access limitations and Figure 8.1 for survey areas), were carried out during 2020. The details of these surveys can be found in Appendix 8.1. The nature of these surveys was determined by the target species considered to have the potential to breed within the survey area based upon the available habitat and survey results recorded within the Windy Standard Complex between 1993 and 2020. Surveys involved a mixture of walkovers, short VP watches and targeted surveys of historic nesting locations to identify potential breeding sites and, where possible, to monitor productivity. Surveys were undertaken by experienced surveyors holding a Schedule 1 Licence. Species-specific survey methods were informed by the methods outlined in Gilbert *et al*. (1998)[30] and Hardey *et al*. (2013)[31].

8.4.11 In addition, operational raptor surveys were conducted at Windy Standard II in 2020 following the same methods as outlined above.

Bird carcass searches: 2020

8.4.12 Weekly searches for bird carcasses using trained sniffer dogs and skilled handler (Wagtail UK Ltd.) were undertaken for 13 weeks between 7 July and 30 September 2020. The hub height of the operational turbines at Windy Standard I is 35 m, with a rotor diameter of 37 m and a tip height of 53.5 m. Based on previously published research[32], 50 m from the base of the Windy Standard I turbines was considered an appropriate search radius as they are of considerably smaller dimensions than those for which the guidance was designed. Searches of a 50 m radius area were undertaken at 16 of the 36 turbines (44%) each week; the locations of carcass searches are shown on Figure 8.1. Locations for carcass searches were chosen to give representative cover of the habitat features present throughout the Proposed Development.

Bird carcass persistence and searcher efficiency trials: 2020

8.4.13 Bird carcass persistence trials and searcher efficiency trials were run to allow analysis to be undertaken on the carcass search results for the purposes of impact assessment.

8.4.14 Carcass persistence trials were conducted during summer/autumn (1 September to 1 October 2020) using buzzard, kestrel, peregrine and sparrowhawk carcasses obtained from the Centre for Ecology and Hydrology (CEH) in Lancaster. Carcasses were placed out and monitored by trail camera, which allows an accurate result for the length of time carcasses remain on site before either decomposing or being removed by scavengers.

8.4.15 Searcher efficiency trials involved a second surveyor placing out bird carcasses at random locations within the carcass search area, on the morning of search days. Carcasses were placed at locations unknown by both the dog and dog handler one to two hours prior to the start of dog searches. The proportion of these trial carcasses which were subsequently located by the search team allows the identification of a percentage searcher efficiency rate, which can then be used within the analysis of the baseline results.

Collision risk modelling

8.4.16 Collision Risk Modelling (CRM) uses data collected during flight activity surveys to predict the number of individuals per target species that have the potential to collide with the wind turbine rotors. This is undertaken when sufficient flight activity occurs within the Collision Risk Zone (CRZ) at potential collision height (PCH) (i.e. the height at which rotor blades sweep), as per the Band *et al*. (2007)[13] collision risk model recommended by NatureScot[14]. Sufficient flight activity was defined as three or more flights or more than ten individuals at PCH in the CRZ. Thus, species that rarely pass through the Proposed Development Area and which are not considered to be at risk of significant effects, did not undergo CRM.

8.4.17 For the purposes of this EcIA, flights which pass through or touch a 281 m buffer (200 m plus the length of the turbine blades) of the proposed turbine locations are considered to be in the CRZ.

8.4.18 Since planning consent was granted for Windy Standard I Wind Farm, NatureScot published guidance in 2014[33] in relation to the repowering of wind farms and birds survey requirements. The guidance[33] recommends that one year of distribution/abundance surveys may be required to be carried out at sites which are to be repowered with larger, higher output turbines, which is the case for this proposal. Although new development guidance[11] requires two years of surveys, it specifically states that this is not appropriate for repowering schemes. For repowering schemes, it is proposed that a basic estimation of collision can be achieved by using either nest locations as an approximate indicator of likely activity, using old data or using data from similar sites. However, the data gathered from the original bird surveys is not extensive or detailed enough to allow retrospective CRM to be undertaken. It is acknowledged from responses provided by NatureScot in relation to the Scoping Report[1] that new repowering guidance will be issued in the near future, but these have not yet been made available to developers. Therefore, this assessment has been undertaken based on this approach as outlined in scoping.

8.4.19 CRM provides a theoretical estimate of likelihood of collision based on bird behaviour in the absence of turbines. CRM cannot be accurately used to predict the risk of collision for species that are observed to be avoiding turbines and so is likely only to provide qualitative, anecdotal evidence on the use of a site at best. Carcass searching surveys are considered to provide a much more accurate picture of actual, as opposed to theoretical,

[30] Gilbert, G., Gibbons, D.W. & Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.

[31] 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.

[32] Hull, C. L., Muir, S. (2010). *Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model*. Australasian Journal of Environmental Management. 17. 77-87.

[33] SNH (2014) *Repowering onshore wind farms: bird survey requirements*. Scottish Natural Heritage, Edinburgh.

risk posed to bird species by the ongoing operation of the turbines, and as such, they were undertaken at the Proposed Development as part of the baseline monitoring.

8.4.20 More current NatureScot guidance[34] in relation to the impact assessment of repowered wind farms on nature, states that baseline bird activity should be estimated using a qualitative, desk-based approach to identify and review original bird survey data and assessment, operational monitoring data and data requested from relevant organisations. The assessment should take into account current species conservation statuses, current risk understanding to sensitive species present and new CRM calculations based on proposed new turbine dimensions.

Survey Limitations

8.4.21 Access for the repower surveys in 2020 was not possible in all areas of the 2 km raptor survey buffer or the 1.5 km black grouse survey buffer, as the land surrounding the Proposed Development is under several different land ownerships and access permission was not granted to some areas of land (see Figure 8.1). Surveyors spent time scanning the inaccessible parts of the buffer with binoculars from vantage points at the boundary, such as the summit at Windy Standard and listening for lekking black grouse. Several areas of the Proposed Development give good views of the airspace over areas of the buffer, and so this is not considered to represent a significant constraint to the data collected. In addition, the majority of the area where access was not allowed was of similar habitat and nature to the area found within the Proposed Development Area.

8.4.22 Carcass searches carried out for the Proposed Development in 2020 covered 44% of turbines. Whilst carcass searches were only carried out on 44% of all turbines present, the search locations chosen were selected in order to provide a representation of all habitats present within the site. The statistical modelling of potential collisions accounts for the percentage of turbines searched in addition to the searcher efficiency and carcass persistence rate to provide an indication of the predicted number of carcasses for the whole wind farm.

Approach to impact assessment

8.4.23 The approach to the EcIA adopted within this assessment follows the CIEEM guidelines[2], and in line with these, professional judgement has been applied where appropriate. The criteria used and the underlying rationale are described further within the following sections.

Key issues

8.4.24 It is widely accepted that wind turbines present three main areas of potential risk to birds[35]:

- Direct habitat loss resulting from the construction of a wind farm and associated infrastructure;
- Displacement of birds from wind farms due to disturbance during the construction and operational phases; this may be temporary or permanent. Displacement can include barrier effects in which birds alter their migration flyways or local flight paths to avoid a wind farm; and
- Death due to collision or interaction with rotating turbine blades, overhead wires, guy lines and fencing. Collision risk depends on a range of factors related to bird species, numbers and behaviour, weather conditions, and topography, and the nature of the wind farm itself, but is generally considered to be of particular relevance for sites located in areas known to support raptors or large concentrations of wildfowl.

8.4.25 These issues are considered in this assessment (Section 8.6).

Target species

8.4.26 NatureScot guidance[11] states that work to establish the ornithological baseline should focus on those species which are afforded a higher level of legislative protection, or those which, as a result of their behaviour, may be more likely to be subject to impact from wind farms. There are three important species lists from which target species may be drawn:

- Annex I of the EC Birds Directive;
- Schedule 1 and Schedule 1A of the Wildlife & Countryside Act 1981 (as amended); and
- Red-listed Birds of Conservation Concern (BoCC).

8.4.27 Consideration is also given to species of regional conservation concern, as listed within Local Biodiversity Action Plans (LBAPs).

8.4.28 Target species should be restricted to those likely to be affected by wind farms. It is generally considered that passerine species are not significantly impacted by wind farms. As such, and in accordance with the NatureScot guidance[11], the following are considered target species in the context of the Proposed Development:

- All species of raptors and owls listed in Annex I of the EC Birds Directive and/or Schedule 1 and 1A of the WCA 1981 (as amended);
- All species of wildfowl (with the exception of Canada goose and mallard);
- Black grouse; and
- All wader species.

Determining Important Ornithological Features (IOFs)

Evaluating ornithological features

8.4.29 In accordance with CIEEM guidelines[2] the importance of an ornithological feature is based upon its respective elements relating to biodiversity and ecosystem services. The importance of a feature is determined within a geographical frame of reference as detailed in Table 8.2. It should be noted that these criteria are intended as a guide and are not definitive; professional judgement has also been applied in determining value level for ornithological features.

Table 8.2: Approach used to evaluate ornithological features by defined geographical context

Value level	Examples
International	A regularly occurring species listed as a qualifying feature of an internationally designated site (e.g., Special Protection Areas (SPA) or Ramsar wetland site) within the Zone of Influence (ZoI) of the Proposed Development and found in numbers that are crucial to the integrity of the designated site. Species populations present with sufficient conservation importance to meet criteria for SPA selection.
National	A regularly occurring species listed as a qualifying feature of a nationally designated site (e.g., Site of Special Scientific Interest (SSSI)) within the ZoI of the Proposed Development.

[34] SNH (2018) *Assessing the impact of repowered wind farms on nature.* Scottish Natural Heritage, Battleby.

[35] Drewitt, A.L. & Langston, R.H.W. (2006) *Assessing the impacts of wind farms on birds*. Ibis, 148: 29-42 (and references therein).

Value level	Examples
	Species populations present with sufficient conservation importance to meet criteria for SSSI selection[36;37].
Regional	A species occurring within SPAs, Ramsar sites and SSSIs, but not listed as a qualifying feature (not crucial to the integrity of the site). Species populations present falling short of SSSI selection criteria but with sufficient conservation importance to likely meet criteria for selection as a local site e.g., important in the context of NatureScot Natural Heritage Zone (NHZ) populations.
Local	Species described above but which are present very infrequently or in very low numbers. Other species of conservation concern, including species included on the UK Birds of Conservation Concern (BoCC) Red and Amber Lists[24] or Local Biodiversity Action Plan (LBAP) listed.
Negligible	All other species that are widespread and common and which are not present in locally important (or greater) numbers and which are considered to be of low conservation concern (e.g. UK BoCC Green List species[24]).

8.4.30 The assessment of ornithological features recorded during the baseline surveys also considers the importance of the site for the species under consideration, rather than only considering the nature conservation importance of the species itself. As such, a species of international conservation importance may only have local or negligible importance in the context of the Proposed Development if very rarely recorded at the site.

8.4.31 Therefore, while the importance of the species is considered, in order to assess the nature conservation importance of the site, the number of individuals of that species using it and the nature and level of this use is also considered. An assessment is then made of the importance of the site to the species in question in order to determine whether they are an IOF.

8.4.32 In line with the principles of proportionate EIA, embedded mitigation (i.e. mitigation which has been embedded within the project design) is considered at the outset of the assessment. IOF status has only been assigned where there is still considered to be the potential for significant effects to the feature at the assigned value level arising from the Proposed Development, after the application of embedded measures.

Characterising potential effects on ornithological features

8.4.33 Impacts on IOFs are judged in terms of magnitude and duration[2]. Magnitude refers to the size of an impact and is determined on a quantitative basis where possible. This may relate to the area of habitat lost to the development footprint in the case of a habitat feature or predicted loss of individuals in the case of a population of a particular species of bird. Magnitude is assessed within six levels, as detailed in Table 8.3.

Table 8.3: Approach used to evaluate ornithological features by defined magnitude

Impact magnitude	Description
Very high adverse	Total or almost complete loss of a feature resulting in a permanent adverse effect on the integrity of the feature. The conservation status of the feature would be affected.
High adverse	Result in large-scale, permanent changes in a feature, and likely to change its ecological integrity. These impacts are therefore likely to result in overall changes in the conservation status of a feature.
Moderate adverse	Include moderate-scale long-term changes in a feature, or larger-scale temporary changes, but the integrity of the feature is not likely to be affected. This may mean that there are temporary changes in the conservation status of the feature, but these are reversible and unlikely to be permanent.
Low adverse	Include impacts that are small in magnitude, have small-scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a feature.
Negligible	No perceptible change in the ornithological feature.
Beneficial	The changes in the ornithological feature are considered to be beneficial to its integrity or nature conservation status.

8.4.34 Effects and spatial magnitude are assessed within the appropriate bio-geographic regions (SNH, 2018[15]). These are detailed below:

- Effects on breeding bird populations are assessed in a regional context. The appropriate regional bio-geographic unit has been identified by NatureScot as the (NHZ. NHZ classifications represent areas with a high level of bio-geographic coherence and are unrelated to administrative boundaries. Current NHZ population estimates are presented in Wilson *et al*. (2015) [22]; and
- The Proposed Development lies within NHZ 19 (Western Southern Uplands and Inner Solway). Regional impacts are assessed within this area as far as is practicable/reasonable.

8.4.35 In the case of designated sites, spatial magnitude is assessed in respect of the area within the designated site boundary. For non-designated sites, spatial magnitude is assessed at an appropriate scale depending on the feature's importance, e.g., impacts on breeding bird populations are assessed in a regional context.

8.4.36 Duration is defined as the time for which the impact is expected to last before recovery, i.e., return to pre-construction baseline conditions (SNH, 2018[15]). This is summarised in Table 8.4 below.

Table 8.4: Criteria for describing duration

Duration	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period (e.g., the replacement of mature trees by young trees which need more than 25 years to reach maturity, or restoration of ground after removal of a development. Such exceptions are termed "very long-term effects").
Temporary	Long-term (15 to 25 years or longer; see above) Medium term (five to 15 years) Short-term (up to five years)

8.4.37 Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g., by individuals being recruited from other populations elsewhere) is used to assess duration, where such information is available.

8.4.38 In addition, birds are assessed with consideration for their behavioural sensitivity and ability to recover from temporary negative conditions. Behavioural sensitivity is determined subjectively based on the species' ecology

[36] Drewitt, A.L., Whitehead, S. and Cohen, S. (2020) *Guidelines for the Selection of Biological SSSIs. Part 2: Detailed Guidelines for Habitats and Species Groups. Chapter 17 Birds (version 1.1)*. Joint Nature Conservation Committee, Peterborough.

[37] 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.

and behaviour, using the broad criteria set out in Table 8.5 below. The judgement takes account of information available on the responses of birds to various stimuli (e.g., predators, noise and disturbance by humans).

Table 8.5: Criteria for describing sensitivity

Sensitivity	Definition
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting (guide: greater than 20 minutes) reactions to disturbance events.
Moderate	Species or populations that appear to be warily tolerant of human activities, or that exhibit short-term reactions (guide: five to 20 minutes) to disturbance events.
Low	Species or populations occupying areas subject to frequent human activity and exhibiting mild and brief reaction (including flushing behaviour) to disturbance events.

8.4.39 It should be noted that behavioural sensitivity can differ between similar species and between different populations of the same species. Thus, the behavioural responses of birds are likely to vary with both the nature and context of the stimulus and the experience of the individual bird. Sensitivity also depends on the activity of the bird, for example, a species is likely to be less adaptable to disturbance whilst breeding than at other times. In addition, individual birds of the same species will differ in their tolerance depending on the level of human disturbance that they regularly experience in a particular area, and have become habituated to (e.g., individuals that live in an area with high levels of forestry activity and associated disturbance are likely to have a greater tolerance than those that occupy remote locations with little or no human disturbance). However, tolerance is likely to increase as breeding progresses.

Determining significance of potential ornithological effects

8.4.40 Having followed the process of identifying an IOF, determining its sensitivity, and characterising potential impacts, the significance of the effect is then determined as set out above. The CIEEM guidelines[2] use only two categories to classify effects: “significant” or “not significant”. In this EIA chapter, significance of effects is assessed following an assumption of the application of embedded mitigation measures (see Paragraphs 8.7.1-8.7.11). The significance of an effect is determined by considering the importance of the feature, the magnitude of the impact and applying professional judgement as to whether the integrity of the feature will be affected. The assessment includes potential impacts on each IOF from all phases of the development, e.g., decommissioning of WSI, construction, operation and decommissioning, and considers direct, indirect, secondary and cumulative impacts and whether the impacts and their effects are short, medium, long-term, permanent, temporary, reversible, irreversible, positive and/or adverse. A finding of significance or non-significance is then made using this assessment.

8.4.41 Effects are more likely to be considered significant where the feature affected is of higher conservation importance or where the magnitude of the impact is high. Effects not considered to be significant would be those where the integrity of the feature is not threatened, effects on features of lower conservation importance, or where the magnitude of the impact is low.

8.4.42 With reference to CIEEM (2018)[2], paragraph 5.25 provides “*A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a beneficial or adverse ecological effect that should be given weight in judging whether to authorise a project*”.

8.4.43 Where potential effects on an IOF of the Proposed Development are assessed as significant, specific mitigation measures are identified following the recognised hierarchy of ‘avoid, minimise, off-set’ in order to avoid, reduce and/or compensate’ for potentially significant effects.

8.4.44 The significance of residual effects on features after the implementation of mitigation measures can then be determined, along with any monitoring requirements (in line with the recommendations outlined in NatureScot guidance[17].

Trends and predicted future baseline

8.4.45 In the absence of the Proposed Development, Windy Standard I Wind Farm would be decommissioned following appropriate guidelines as approved by Dumfries and Galloway Council in accordance with the life extension planning consent.

8.4.46 Current habitat use within the Proposed Development Area is primarily forestry plantation, and sheep and cattle grazing. Following decommissioning it is likely that the habitats present within the Proposed Development would be retained as they currently are, having been under relatively similar management since before the Environmental Statement[26] (ES) for Windy Standard I Wind Farm was submitted in 1995.

8.4.47 Predicted future baseline is a tool to allow comparison of the proposal with the conditions that would be likely to occur on the site in the absence of the proposal. As the repower is proposed for a maximum of 35 years, it is not appropriate to try to predict any changes longer than those likely within the 35-year time frame covered by this proposal, as they bear no relevance to the assessment of the impacts discussed herein.

8.4.48 The existing turbines currently at the site of the Proposed Development will be removed, and the site will be reinstated except where infrastructure will be used for the repowering. The Proposed Development will make use of existing shared infrastructure (substation, control building and existing onsite temporary borrow pits) and their use will be extended over the life of this Proposed Development. As a repowering of an existing wind farm site, it is considered that the requirement for new site tracks will be greatly reduced, however some additional upgrades of site tracks will be required to transport the new larger turbines to the existing site. The majority of the new turbines will be within the footprint of the original Windy Standard I Wind Farm, though they will not be located in exactly the same locations as some of the existing operational turbines. As such, there will be some loss of habitat for new turbine locations, but also some habitat-gain from restoration of the existing infrastructure which will be decommissioned, in line with an approved decommissioning plan. Embedded mitigation to prevent any adverse effects associated with this is provided in Section 8.7.

8.4.49 It is more difficult to predict changes t that may occur in the longer-term (i.e. over 35 years), especially in the wake of climate change, which is predicted to cause range shifts in some bird species. In addition, climate change may alter habitat types by impacting on the composition and health of the plant communities present, thereby affecting the suitability of the site for some of the species that currently occupy the site. Baseline surveys carried out for the Proposed Development represent a snapshot of the bird community present at the time and cannot be extrapolated to predict future population trends in the event of climate change, or a future change in land use at the site.

8.5 CONSULTATION

8.5.1 A Scoping Report for the Proposed Development was issued to a range of consultees on 21 September 2021 (see Appendix 1.1). This document contained details of the proposed assessment methodology and ornithological features proposed for full EcIA and those to be scoped out of the EcIA. Most ornithological features were proposed to be scoped out on the basis that construction and operation of the Proposed Development would not be likely to result in significant effects. However, the following ornithological features were scoped in:

- Schedule 1 raptor species;
- Black grouse; and
- Wader species.

8.5.2 Details of the responses from consultees on the scoping document and the resulting actions are provided in Table 8.6 and in Appendix 1.2. Only aspects of the scoping responses with relevance to ornithology are included here; other aspects are addressed in the relevant chapters.

Table 8.6: Consultee scoping responses relating to ornithology

Consultee and response date	Consultation response	Applicant action
NatureScot: 8 December 2021	NatureScot stated that they do not advise the need for more bird survey work, and they appreciate that the applicant has made plans to carry out post-construction monitoring (carcass searches) for birds.	Noted
	NatureScot pointed out that the Scoping Report referred to 2014 SNH guidance on repowering bird survey requirements. They clarified that this guidance is not current and standing advice relating to repowering and birds will be produced in the near future.	Noted. This chapter has taken into consideration the draft guidance[38] and further consultation was undertaken with NatureScot with regards to this concern (letter dated 2 February 2022).
	NatureScot accepted that the proposal is unlikely to significantly affect black grouse. Potential enhancement of black grouse habitat by means of native scrub planting, reduction of grazing pressure to promote natural regeneration, the removal of deer fences (and implementing associated deer control) and legal predator control was suggested to be included in the Outline Habitat Management Plan.	Further consultation was undertaken with NatureScot with regards to this advice (letter dated 2 February 2022). Livestock and deer fences are not present on site. Potential of enhancement of black grouse habitat as part of the outline Habitat Management Plan (HMP) is discussed in Section 8.9.
	NatureScot advised that the potential for disturbance to breeding goshawk is addressed within the EIA.	Goshawk and the potential for disturbance to breeding goshawk during construction are considered within this EIAR chapter (see Section 8.7).
RSPB: 26 October 2021	The RSPB agreed in general with the EcIA only concentrating on those receptors which may be subject to significant effects from the Proposed Development (either directly or indirectly).	Noted
	The RSPB expressed the opinion that black grouse should be scoped into the EIAR.	Black grouse is considered within this EIAR chapter (see Section 8.7).

[38] SNH (2018) Assessing the impact of repowered wind farms on nature – Consultation draft.

8.6 BASELINE

Desk study

Data search

8.6.1 RSPB returned data for Schedule 1, BoCC, and SBL species within 10 km of the site boundary of the Proposed Development from 2012 onwards. Records are presented in Table 8.7.

Table 8.7: Number and type of records of target/ notable species within 10 km of the Proposed Development (2012-2021)

Species	Last recorded	Record type			
		Female*	Male*	Displaying male*	Occupied nests**
Black grouse	2021	5 (6)	2 (2)	102 (249)	
Red kite	2018				12 (6)

*Source: RSPB; *No. of records (No. of individuals), **No. of nest records (No. of single nests)*

8.6.2 At the time of writing this report, no response has been received from the DGRSG or SWSEIC in relation to the data request.

Review of existing data

8.6.3 No greater than low magnitude non-significant effects were predicted for any ornithological feature as a result of the construction and operation of any of the Windy Standard Complex wind farms. Population trends may have been impacted in the intervening period by factors beyond the control of the wind farms (impacts from climate change or large-scale impacts as a result of long-term population declines). However, on a site level the forestry management regime has remained similar over the years, so it is considered unlikely that ornithological conditions have changed significantly at the Windy Standard Complex between 1993 and 2022.

Vantage Point Surveys: 2009 and 2010

8.6.4 Baseline VP surveys were carried out for Windy Standard III[28] between April 2009 and August 2010.

8.6.5 The viewsheds for VP1 and VP2 cover part of the Proposed Development Area and overlook the locations of proposed turbines 1, 2, 5 and 7. VP3, VP4, VP5 and VP6 are located to the south-west and west of the Proposed Development Area. Data for VP1 and VP2 was considered relevant to the Proposed Development and VP survey results for these VPs are presented in this section.

8.6.6 Surveys at VP1 and VP2 recorded flight lines from a total of four target species. Table 8.8 summarises levels of flight activity for each species and the level of flight activity in the CRZ at PCH. This shows that peregrine was the most frequently recorded species. The associated flight lines are shown in Figure 8.2.

Table 8.8: Results of VP surveys at VP1 and VP2 between April 2009 and end August 2010 at Windy Standard III

Species	No. of flights (individuals)*	No. of flights (individuals) in the CRZ at PCH	CRM undertaken?
Golden plover	1 (3)	0 (0)	No
Short-eared owl	1 (1)	0 (0)	No
Merlin	2 (2)	0 (0)	No
Peregrine	7 (10)	0 (0)	No

Source: Windy Standard III ES[28]

Breeding raptor surveys: 2012 – 2013

8.6.7 Breeding raptor vantage points were carried out for Windy Standard III[28] in 2012 and 2013. In 2012, raptor VP surveys recorded single flights of individual peregrine, red kite and osprey and eleven merlin flights (six male, one female and one unknown sex). In 2013 single flights of peregrine, hen harrier and merlin were observed and two flights on the same day of a single goshawk. No target raptor species were recorded during the breeding raptor walkover surveys and no evidence of recent breeding was recorded for any target raptor species in both years. However, an old stick nest was identified on 16/07/2013 close to a plucking post. It is unknown what species these field signs related to; the old stick nest is considered likely to have been a buzzard or carrion crow nest. However, the possibility that the nest and/or post may have been used by a Schedule 1 raptor species, such as merlin could not be excluded. Peregrine nest locations provided by DGRSG were surveyed in 2012 with no evidence of breeding observed.

Breeding raptor surveys: 2014 – 2019

8.6.8 Breeding raptor surveys were carried out during the construction and operational phase at Windy Standard II. A summary of records found within the Proposed Development and the 2 km survey buffer of the site boundary are shown in Table 8.9 and findings from 2017 to 2019 presented in Figure 8.3. Full details are provided in Appendix 8.1.

Table 8.9: Summary of raptor survey results for target species from 2014 – 2019 at Windy Standard II

Year	Goshawk		Peregrine	Osprey
	Flight	Nest	Flights	Flights
2014	3	Inactive*	1	
2015	4	Active		
2016	1	Active		1*
2017	5	Active		
2018	3	Inactive	1	
2019	2	Active - failed	1	
Total	**18**		**3**	**1**

*Source: Windy Standard II (Brockloch Rig construction phase ornithology report 2014-2017[39] and operational monitoring reports 2018[40] and 2019[41]); * outwith 2 km survey buffer around Proposed Development Area*

8.6.9 Goshawk were recorded as actively breeding within the site in 2015, 2016 and 2017. A possible (though unconfirmed) nesting area was detected in 2018, and nesting was also attempted in 2019 however observations in later surveys identified that this attempt failed.

Black grouse surveys: 2009 and 2010, 2013 - 2019

8.6.10 Baseline black grouse surveys were carried out in 2009 and 2010 at Windy Standard III[28]. Findings are summarised below and are shown in Figure 8.4.

8.6.11 One black grouse flight was recorded in November 2009 over 5 km to the west of the Proposed Development Area. Two further flights of male individuals were noted in November 2009 over 3 km to the south of the Proposed Development Area. During the 2010 surveys, six active black grouse leks were recorded, three of which were within the 1.5 km survey buffer of the Proposed Development (six males, one female).

8.6.12 Pre-construction and construction black grouse surveys were undertaken at Windy Standard II between 2013 and 2017. A pair was seen in April 2014 around 600 – 750 m south-west of the Proposed Development Area (see Figure 8.4). No black grouse were seen during surveys carried out in 2015, 2016 and 2017.

8.6.13 During a walk-over survey of an alternative access route for Windy Standard III in 2017, a male was displaying 7.5 km from the site boundary of the Proposed Development.

8.6.14 Operational monitoring at Windy Standard II included black grouse surveys from 2018 – 2020. No black grouse were reported during any of these surveys.

Ornithology surveys

Breeding raptor surveys: 2020

8.6.15 The results of the dedicated breeding raptor surveys carried out for the Proposed Development during 2020 are shown in Figure 8.5 and are summarised in Appendix 8.1.

8.6.16 The surveys produced two records of a female hen harrier, presumably the same individual, flying low over open ground in the south-east survey buffer and along the eastern forest edge of Windy Standard I in June. One adult goshawk was flushed from a forestry ride in the west of the Proposed Development Area in July.

8.6.17 Raptor surveys carried out during operational monitoring for Windy Standard II in 2020 recorded one adult osprey and red kite in the area of the Windy Standard II turbines within the 2 km survey buffer of the Proposed Development in June. These species did not show evidence of breeding within the Proposed Development Area and survey buffer, these records were of birds using the Proposed Development Area for foraging and commuting. One adult goshawk was seen outwith the western 2 km survey buffer in March while an immature bird was recorded in June. In addition, two locations with potential raptor pellets and droppings were discovered in the forest to the west of Dun Hill in April.

Black grouse surveys: 2020

8.6.18 No black grouse were recorded during baseline surveys undertaken for the Proposed Development in 2020.

Bird carcass searches: 2020

8.6.19 Carcass searches were carried out at 16 of the 36 turbines (44%) between 7 July and 30 September 2020. No target bird species carcasses were found within the Proposed Development Area during the surveys between July and September 2020. No non-passerine species were recovered during carcass search surveys. Feather spots of a small passerine (likely skylark) were found on three occasions during carcass search surveys.

Bird carcass persistence and searcher efficiency trials: 2020

8.6.20 Eleven bird carcasses (five buzzard, two kestrel, one peregrine and three sparrowhawk) were monitored by trail camera to identify how long they would remain before being predated or decomposing. Carcasses lasted between one and more than 35 days before either decomposition (burying beetles) or predation (fox or pine marten). On average bird carcasses persisted for c. 8.5 days. Results are provided in Appendix 8.1.

8.6.21 During the searcher efficiency trials, 100% of all bird carcasses were retrieved by the dog and handler. Results are provided in Appendix 8.1.

8.6.22 The statistical analysis methodology outlined in Appendix 8.1, with estimated detection probability and various spatial coverage values used, gives the predicted maximum number of bird collisions during the survey period. Values are presented for all non-passerine bird species (i.e. it does not split out detection probabilities for 'large' and 'small' non-passerines), as the number of replications conducted for different size classes did not allow differentiation between these classifications. The result provides a potential value for all collisions that are

[39] Natural Power 2017. Brockloch Rig Ornithology Construction Phase Report (2014-2017) Document reference 1151836

[40] Natural Power December 2018. Brockloch Rig Ornithology First Year of Operation Report (2018) Document reference 1180736

[41] Natural Power December 2019. Brockloch Rig Ornithology Second Year of Operation Report (2019) Document reference 1210465

predicted to occur at the wind farm during the survey period and does not represent numbers from specific species. Predicted collision numbers are assumed to be the maximum worst-case numbers and results should be interpreted with caution.

8.6.23 Modelling has predicted that the maximum number of non-passerine collisions during the breeding season survey period would be 15. Modelling was based on an estimated detection probability of 0.128 (95% confidence intervals of 0.08 – 0.184) and spatial coverage of 0.24.

Collision risk modelling

8.6.24 For the purpose of CRM, data collected at VP1 and VP2 surveys for Windy Standard III between April 2009 and August 2010 inclusive was considered. Sufficient flight activity for inclusion in CRM was defined as three or more flights or more than ten individuals at PCH in the CRZ. None of the recorded flights were in the CRZ and therefore no CRM was conducted.

8.7 ASSESSMENT OF POTENTIAL EFFECTS

8.7.1 The EcIA has been undertaken in accordance with CIEEM guidelines[2] with establishment of baseline ecological conditions within the Proposed Development Area and identification of IEFs through a combination of ecological field surveys and a desk-based review. Each identified IEF is assessed separately, with consideration of impact extent, magnitude, duration, timing, frequency and reversibility, along with assessment of the level of confidence in the impact assessment for the determination of impact significance.

8.7.2 This section outlines the potential impacts during the decommissioning and restoration of Windy Standard I, construction, operation and decommissioning phases of the Proposed Development on birds, prior to the implementation of any further mitigation.

8.7.3 There is no evidence to suggest that high densities of target species are using the habitats within, or airspace over, the Windy Standard Complex and no adverse effects were predicted as a result of the construction and operation of any of the Windy Standard Complex wind farms to date. Following application of embedded mitigation potential impacts on protected bird species will be restricted to the effects discussed in the following sections.

Potential effects during the decommissioning of Windy Standard I

8.7.1 Turbine removal may cause disturbance to birds breeding, foraging or roosting within the site. The level of impact will depend on the bird species present at the time of the decommissioning. However, as decommissioning activities are of a similar type and intensity as construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction. These are therefore not discussed separately within the assessment in this section.

Potential effects during construction

Habitat loss

8.7.2 Felling of trees, and construction of turbine bases, access tracks and other structures will lead to direct habitat loss and without adequate mitigation could also result in destruction or damage to nests, eggs and/or chicks. The effects of habitat loss will depend upon the extent of land-take and the type of habitat affected. Under the WCA 1981 (as amended)[7] it is an offence to kill or injure any wild bird, or to damage or destroy nests and eggs; embedded mitigation measures will be put in place to prevent damage to or destruction of nests, as discussed below in this section.

Disturbance and displacement

8.7.3 The construction phase of the Proposed Development could have potential impacts of associated noise and visual disturbance and if unmitigated could lead to the temporary displacement or disturbance of breeding and foraging birds. The magnitude of the impact depends on the timing of potentially disturbing activities, the extent of displacement (both spatially and temporally), and the availability of suitable habitats in the surrounding area for displaced birds to occupy.

8.7.4 Potential impacts are likely to be greatest during the breeding season (predominantly between March and August, depending on the species under consideration); behavioural sensitivity to the effects will vary between species.

8.7.5 Disturbance of birds due to construction activities of this type have not been sufficiently quantified and the available information is often contradictory. However, it is likely that construction impacts will be greater on species that are intolerant of noise and other sources of disturbance. Larger bird species, those higher up the food chain or those that feed in flocks in the open tend to be more vulnerable to disturbance than small birds living in structurally complex or closed habitats such as woodland[42].

8.7.6 The impacts associated with construction activities are only likely to occur for as long as the construction phase continues. They are thus short-term and can be readily mitigated by avoiding sensitive areas (through the implementation of appropriately defined buffer zones), and by timing construction activities to avoid periods when sensitive species are present (if and where possible), such as the breeding season. The exception to this would be if an adverse effect on the breeding success of a feature were such that the local population becomes extinct and replacement through recruitment or re-colonisation does not occur.

Potential effects during operation

Disturbance and displacement

8.7.7 Research[43,44,45] has identified that the impacts to birds in terms of disturbance/displacement from wind farm developments are greatest during the construction phase, reducing once the wind farm is operational and species habituate to the presence of the turbines.

8.7.8 Since the proposed turbines will be located within the footprint of the current Windy Standard I Wind Farm and no protected bird species have shown evidence of breeding for many years, further displacement and/or disturbance is not considered to be a likely impact as a result of the repower, and so is not considered any further in this EIAR.

Collision with turbines

8.7.9 Collision of a bird with turbine rotors or towers is almost certain to result in the death of the bird. In low density populations (e.g. raptors) this could have a more adverse effect on the local population than in higher density populations (e.g. skylark), because a higher proportion of the local population would be affected in a low-density population. The frequency and likelihood of a collision occurring depends on a number of factors. These include aspects of the size and behaviour of the bird (including their use of a development site), the nature of the surrounding environment, and the structure and layout of the turbines.

8.7.10 Collision risk is perceived to be higher for birds that spend much of the time in the air, such as foraging raptors and those that have regular flight paths between feeding and breeding/roosting grounds (e.g. geese). The risk of

[42] Hill, D.A. Hockin, D. Price, D. Tucker, G. Morris, R. and Treweek, J. (1997) *Bird Disturbance: Improving the Quality of Disturbance research.* Journal of Applied Ecology 34, 275-288.

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

[44] Douglas, D., Bellamy, P. & Pearce-Higgins, J. (2011) Changes in the abundance and distribution of upland breeding birds at an operational wind farm. Bird Study 58, Issue 1, 2011

[45] Fielding, A. H. and Haworth, P. F. 2015. Farr wind farm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2015. Haworth Conservation, Mull.

bird collisions at wind farms is greatest in areas where large concentrations of birds are present (such as on major migration routes), and in poor flying conditions, such as rain, fog, strong winds, that affect birds' ability to control flight manoeuvres, or on dark nights when visibility is reduced[46],[47]. Birds may also be more susceptible if the wind farm is located in an area of high prey density.

8.7.11 A literature review funded by the German Agency for Nature Conservation[48] looking at the impact of repowering of wind farms on birds used data from 45 wind farms to model the extent to which the danger for birds caused by wind turbines is expected to change due to repowering. The results of the modelling showed that in general larger turbines have higher collision rates than smaller ones. However, although replacing smaller, older turbines with newer but larger turbines increases the turbine tower heights and rotor swept zones, therefore the dangerous areas for birds, peer-reviewed research[49,50] shows that there is a reduction in bird deaths when there are fewer, larger turbines present in the same comparable area. Hötker *et al*. (2005)[48] state that repowering would have a positive effect if fewer, larger turbines replace more numerous smaller turbines, without change in overall wind farm capacity, by means of reduction in "scarecrow effect". Therefore, although collision rates may increase with larger turbines, the reduction in turbine numbers would balance out displacement/disturbance effects.

Potential effects during decommissioning of Windy Standard Repower

8.7.12 Turbine removal may cause disturbance to birds breeding, foraging or roosting within the site. The level of impact will depend on the bird species present at the time of the decommissioning. However, as decommissioning activities are of a similar type and intensity as construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction, with the exception that habitat is likely to be restored and displaced birds will be able to return to abandoned territories. These are therefore not discussed separately within the assessment in this section.

Embedded mitigation

8.7.1 Embedded mitigation is built into the Proposed Development to avoid or reduce any negative effects associated with the Proposed Development, and to ensure compliance with the WCA (1981)[7] as amended, as well as potentially providing positive effects in the longer term. Various mitigation measures will be implemented to provide compliance with legislation, and to follow good practice guidance and consultation recommendations with regard to breeding birds. Where experience of developing projects of this nature has shown that embedded mitigation is sufficient to prevent significant adverse impacts on IOFs, this has been built into the assessment in order to produce an EcIA which is proportionate to the risks posed by the Proposed Development. These embedded mitigation measures are outlined below and potential effects are assessed against the final design.

Decommissioning of Windy Standard I

8.7.2 The project design has assumed that the decommissioning of Windy Standard I will be undertaken at the same time as the construction of Windy Standard Repower. As these will be undertaken in conjunction this reduces the disturbance impacts to IEFs compared to if both phases were to be undertaken separately.

8.7.3 The decommissioning of Windy Standard I will be undertaken alongside the construction of Windy Standard Repower. As such, the embedded mitigation of decommissioning activities will follow that proposed for the embedded mitigation of construction activities, including pre-decommissioning surveys and ecological supervision of activities.

Construction phase

8.7.4 All relevant construction phase embedded mitigation measures, such as appointment of an Environmental Clerk of Works (ECoW) and monitoring and protection for species, will be implemented through a Construction Environmental Management Plan (CEMP), which will be agreed with the local planning authority in consultation with NatureScot and Scottish Environment Protection Agency (SEPA). The Construction Method Statement (CMS) incorporating a CEMP are described setting out in detail the individual items of works associated with the construction of the Proposed Development (see Chapter 10: Hydrology, Geology & Hydrogeology for further detail on the CMS related to hydrological impacts and see Chapter 5: Project Description for more detail on the CEMP).

8.7.5 In line with good practice, an independent ECoW will be appointed prior to the commencement of construction and will be present on site during enabling works and throughout the construction and deconstruction phases. They will be a suitably experienced individual, whose role will be to oversee that all works are carried out in accordance with environmental legislation and good practice, and with agreed construction phase management plans such as the CEMP.

8.7.6 Prior to the start of the construction phase during the bird breeding season, contractors will be made aware of the ornithological sensitivities within the site (particularly with regard to the potential presence of Schedule 1 breeding species). The ECoW will give regular Toolbox Talks to contractors regarding the status and locations of protected and sensitive species at the Proposed Development.

8.7.7 The ECoW will carry out pre-construction survey checks during the bird breeding season (March to August, inclusive) in advance of felling, vegetation stripping or excavation works to check for the presence of any breeding birds (nesting birds plus lekking black grouse). Any active nests found will be cordoned off to a suitable distance for the species concerned (in line with appropriate guidance[21]) and construction operations delayed within the cordon until the young have fledged and/or the nest becomes vacant naturally. There will be a clear line of responsibility for establishing that these measures are adhered to. This will reduce the possibility of illegal damage, destruction or disturbance to occupied bird nests during the construction phase. Full details of the ECoW's role and responsibilities will be provided in the CEMP and secured through appropriate planning condition.

Legal compliance regarding breeding birds

8.7.8 Under the WCA (1981) as amended[7], it is an offence, with only limited exceptions, to:

- Intentionally or recklessly take, interfere with, damage of destroy the nest of any wild bird whilst it is in use of being built (applies year-round for nests of birds included in Schedule 1A);
- Obstruct or prevent any wild bird from using its nest;
- Intentionally or recklessly take, interfere with or destroy the egg of any wild bird;
- Intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building, or at (or near) a nest containing eggs or young, or disturb the dependent young of such a bird;
- Intentionally or recklessly harass any wild bird included in Schedule 1A; and
- Knowingly cause or permit any of the above acts.

[46] Langston, R.H.W. and Pullan, J.D. (2003) *Windfarms and Birds: an Analysis of the Effects of Wind Farms on Birds, and Guidance on Environmental Assessment Criteria and Site Selection Issues*. Report T-PVS/Inf. 2003. 12, by BirdLife International to the Council of Europe, Bern Convention on the Conservation of European Wildlife and Natural Habitats. RSPB/BirdLife in the UK.

[47] Drewitt, A.L. & Langston, R.H.W. (2006) *Assessing the impacts of wind farms on birds*. Ibis, 148: 29-42.

[48] Hötker, H., Thomsen K.-M., Köster, H. (2005) Auswirkungen regenerativer Energiegewinnung auf die biologische Vielfalt am Beispiel der Vögel und der Fledermäuse. BfN, Bonn.

[49] Smallwood, K.S., Karas, B. (2009) *Avian and Bat Fatality Rates at Old-Generation and Repowered Wind Turbines in California*. Journal of Wildlife Management 73(7), 1062-1071.

[50] Barclay, R.M.R., Baerwald, E.F., Gruver, J.C. (2007) Variation in bat and bird fatalities at wind energy facilities: assessing the effects of rotor size and tower height. Canadian Journal of Zoology 85(3), 381-387.

8.7.9 Good practice via timing of works and pre-construction surveys will be necessary to reduce the possibility of illegal damage, destruction or disturbance to occupied bird nests during the construction phase. Adherence to this will be overseen by the ECoW.

Operational phase

8.7.10 With the exception of the operation and general maintenance of the wind turbines, there will be little on-site activity during the operational phase, and therefore levels of disturbance will be considerably reduced relative to the construction phase.

Decommissioning

8.7.11 Embedded mitigation of decommissioning activities will follow that proposed for the embedded mitigation of construction activities, including pre-decommissioning surveys and ecological supervision of activities.

Features brought forward for assessment

8.7.12 The baseline survey results outlined in Section 8.6 were used to inform the identification of ornithological features of relevance to the Proposed Development and have been assigned assessment values in Table 8.10 below. Regional population and Scottish context estimates are given in the context of NHZ 19. The Proposed Development lies in the Dumfries and Galloway area in the context of Scottish Ornithologists' Club (SOC) bird recording. In the context of Scottish Raptor Monitoring Scheme (SRMS) references, the Proposed Development is located in the Dumfries and Galloway area. Therefore, the local context for raptor species has been given for Dumfries and Galloway.

Table 8.10: Determination of Important Ornithological Features (IOFs) occurring at the Proposed Development

Species	Conservation designation[51]	Value	Population estimate[37, 52, 22]	Scottish context[52] (unless referenced within)	Baseline	IOF	Justification
Black grouse	SBL, LBAP, Red	Regional	UK*: 4,850 males (breeding season) Scotland**: 3,344 displaying males NHZ 19†: 121 displaying males	Two thirds of the UK birds are now found in Scotland and here numbers declined by 29 % between 1995/96 and 2005 (Sim *et al*., 2008[53]). (A repeat national survey has not been undertaken since this one.) Scottish population size is estimated at 3,550-5,750 lekking males of which 807 lekking males were estimated to be in south-west Scotland (2005). The wintering population size in Scotland is 7,500-19,000.	The last time lekking black grouse were recorded at the Windy Standard Complex was in 2010 during baseline survey work for Windy Standard III Wind Farm (six active leks, three present within 1.5 km). One pair was recorded 600 – 750 m south-west of the site boundary of the Proposed Development in 2014 during surveys for Windy Standard II. No black grouse were recorded during species-specific surveys for the Windy Standard Complex between 2015 – 2020.	Yes	The UK biodiversity Action Plan for black grouse states that in recent decades, there has been a substantial reduction in numbers of black grouse in Dumfries and Galloway due to changes in their moorland habitat, through overgrazing and lack of moorland management, and the maturation of conifer plantations. Combined with other factors, such as collisions with fences and predation, the remaining populations have become fragmented and isolated. Black grouse have only ever been recorded in low numbers at the Windy Standard Complex and no adverse impacts on black grouse have been predicted from any of the developments in the Windy Standard Complex. Evidence from other operational wind farms suggests that black grouse are not displaced from sites by the presence of turbines, and disturbance to this species during construction is easily mitigated via embedded mitigation. However, this species is of regional value as a target species of high conservation concern (LBAP species and species on the UK BoCC Red List) that has been present in regionally important numbers but is not a qualifying feature of any designated sites within 10 km of the Proposed Development. Given the high conservation status of black grouse in the region and established historic presence of lekking sites within the survey buffer of the Proposed Development, this species is considered to be an IOF and is taken forward for a full EcIA.
Golden plover	Ann I, SBL, LBAP	Local	UK*: 32,500 – 50,500 breeding pairs UK*: 410,000 wintering individuals	Numbers of golden plover in Scotland have experienced mixed fortunes in recent decades with significant declines in southern Scotland and significant increases in north-west Scotland and the Outer Hebrides[54].	There was one flight (three individuals) recorded during VP surveys carried out for Windy Standard III in 2009. The flight was 2 km from the closest proposed turbine location, within the turbine area of Windy Standard II, therefore outwith the CRZ.	No	This species is of local value as a target species of high conservation concern (Annex I, SBL and LBAP species) but is not a qualifying feature of any statutory sites within 10 km of the Proposed Development and it was present very infrequently during surveys for any of the wind farms of the Windy Standard Complex. Only one flock was recorded during VP surveys in 2009.Given the very low flight activity at the Windy Standard Complex there is

[51] Sch1.1 = Schedule 1 part 1 of the Wildlife & Countryside Act 1981 (as amended); Ann I = Annex I of the EC Birds Directive; SBL = Scottish Biodiversity List; LBAP = Local Biodiversity Action Plan (Dumfries and Galloway) priority species; Red = UK BoCC Red-listed species; Amber = UK BoCC Amber-listed species

[52] 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

[53] Sim, I.M., Eaton, M., Setchfield, R.P., Warren, P., & Lindley, P. (2008) Abundance of male Black Grouse Tetrao tetrix in Britain in 2005, and change since 1995–96. Bird Study, 55, 304 - 313.

[54] Sim, I.M.W., Gregory, R.D., Hancock, M.H. and Brown, A.F. (2005) *Recent changes in the abundance of British upland breeding birds*. Bird Study, 52, 261-275.

Species	Conservation designation[51]	Value	Population estimate[37, 52, 22]	Scottish context[52] (unless referenced within)	Baseline	IOF	Justification
			Scotland**: 15,000 breeding pairs; 25,000 – 35,000 wintering birds NHZ 19†: 778 breeding pairs	The recent long-term data from Scotland show that Scottish breeding population of golden plover is steady although slightly declining (by 7% between 1995 and 2018[55]). In Dumfries and Galloway golden plover is an uncommon winter visitor to inland farmland and a scarce summer visitor to upland areas[56].	Hence, CRM was not undertaken for golden plover. No golden plovers were recorded breeding within the Windy Standard Complex during 1993 – 2020.		little opportunity for collision impact, and it is unlikely to have an effect on the local population. As no golden plover breed within the Windy Standard Complex, displacement due to disturbance is not likely to occur during construction or operation of the Proposed Development. As such golden plover is not considered to be an IOF.
Goshawk	Sch 1.1	Regional	UK*: 620 pairs in the breeding season (minimum – underreporting considered likely) NHZ 19†: 31 breeding pairs	The Scottish goshawk population was estimated at 130 pairs between 2000 and 2004; the most recent estimations are for 103 pairs in 2019, of which 26 were located in Dumfries and Galloway[57]. Being a secretive species and remaining inconspicuous for much of the year, goshawk is notoriously difficult to monitor and likely under reported, thus any population estimates are probably highly conservative.	No goshawk flights were recorded during VP surveys carried out for Windy Standard III in 2009 and 2010 within the survey buffer of the Proposed Development. Therefore, no CRM was carried out for goshawk. Several goshawk flights were recorded within the Proposed Development Area and survey buffer during operational raptor surveys in 2018 and 2019 for Windy Standard II (one flight over Proposed Development Area) and raptor surveys carried out for the Proposed Development in 2020 (one flight within forest of developable area). Breeding activity has been found around the survey buffer edge (2.5 km to closest proposed turbine) with the last active nest reported in 2017, for Windy Standard II. An immature bird was seen just outside the north-western survey buffer in 2020 during Windy Standard II operational monitoring.	Yes	This species is of regional value as a target species that is afforded special protection (Schedule 1) but is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. Recent and regular flights have been recorded during surveys in 2018 – 2019 of a species that is known to be secretive and have previously bred within the survey buffer and wider area of the Windy Standard Complex. Although the NHZ population is likely to be under-estimated, goshawk is considered to be of regional importance. Given its conservation status, small size of the regional population and the potential to disturbance/displacement of the species due to the Proposed Development, goshawk is considered to important in a regional context, is retained as an IOF and is taken forward for a full EcIA.
Short-eared owl	Ann I, SBL, Amber	Local	UK*: 620 – 2,200 breeding pairs Scotland**: 125 – 1,250 breeding pairs NHZ 19†: 35 breeding pairs	Short-eared owl is a restricted resident breeder in Scotland, with birds moving between breeding and wintering areas. Many Scottish birds move south to winter in England, making the species a scarce migrant and winter visitor. In 2019, Scottish raptor workers located 25 pairs, of which none were located in Dumfries and Galloway[57]. However, this species is under-recorded and population estimates	There was one flight (one individual) recorded during VP surveys carried out for Windy Standard III in 2010. The flight was c. 350 m from the closest proposed turbine location, along the forest edge of Windy Standard II, therefore outwith the CRZ. Hence, CRM was not undertaken for short-eared owl. Short-eared owl was also mentioned in baseline results for Windy Standard I as hunting along forest edge but no evidence of breeding behaviour has been recorded during the period 1993 – 2020 for the Windy Standard Complex.	No	This species is of local value as a target species that is afforded special protection (Annex I, SBL species, and species on the UK BoCC Amber List) and that was recorded very infrequently during surveys for the wind farms of the Windy Standard Complex. It is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. With low flight activity recorded and no evidence of breeding within the Windy Standard Complex, significant effects to short-eared owl due to collision risk and/or displacement/disturbance posed by the Proposed Development are unlikely and therefore this species is not considered to be an IOF.

[55] Harris, S.J., Massimino, D., Balmer, D.E., Eaton, M.A., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P. & Gillings, S. (2020) *The Breeding Bird Survey 2019*. BTO Research Report 726. British Trust for Ornithology, Thetford.

[56] Chambers, G. & Henderson, B.D. (2018) *Birds in Dumfries and Galloway*. Dumfries and Galloway Bird Report. No. 29. Scottish Ornithologists Club.

[57] Challis, A., Wilson, M.W., Schönberg, N., Eaton, M.A., Stevenson, A. & Stirling-Aird, P. (2020) *Scottish Raptor Monitoring Scheme Report 2019*. BTO Scotland, Stirling.

Species	Conservation designation[51]	Value	Population estimate[37, 52, 22]	Scottish context[52] (unless referenced within)	Baseline	IOF	Justification
				and distribution maps have low confidence.			
Merlin	Sch 1.1, Ann I, SBL, LBAP, Red	Local	UK*: 1,150 breeding pairs NHZ 19†: 12 breeding pairs	Merlin is a scarce resident breeder on upland heather moors, and a passage and winter visitor mainly to coastal and low-lying areas. In Scotland this species occurs thinly, but widely, in suitable habitats as a breeding bird. In 2019, Scottish raptor workers located 161 territories occupied by pairs (with total Scottish population estimated at 733 pairs), of which eight were located in Dumfries and Galloway[57].	There were two flights (two individuals) recorded during VP surveys carried out for Windy Standard III in 2009. These flights were over 500 m from proposed infrastructure and outwith the CRZ. Hence, CRM was not undertaken for merlin. One unidentified stick nest that may either have been buzzard, crow or merlin was identified 3.5 km to the west of the Proposed Development in 2013. No confirmed nests or evidence of breeding behaviour has been recorded between 1993 – 2020 for the Windy Standard Complex.	No	This species is of local value as a species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species, and species on the UK BoCC Red List) that is not considered to be present in locally important numbers and is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. With low flight activity recorded and no evidence of breeding within the Windy Standard Complex, significant effects to merlin due to collision risk and/or displacement/disturbance posed by the Proposed Development are unlikely and therefore this species is not considered to be an IOF.
Peregrine	Sch 1.1, Ann I, SBL, LBAP	Local	UK*: 1,750 breeding pairs NHZ 19†: 34 breeding pairs	Peregrine is a scarce, though widespread, resident breeder and winter visitor in Scotland, mostly found in open, upland habitats but also in lowlands and cities. Some birds move locally outside the breeding season. Although numbers, distribution and breeding performance of the UK peregrine population have all largely recovered from declines caused by the detrimental effects of organochlorine pesticides in the 1950s and 1960s[58], populations and breeding performance have since declined in northwest Scotland and the Northern Isles[59]. In 2019, Scottish raptor workers located 260 territories occupied by pairs (with total Scottish population estimated at 523 pairs), of which 54 were located in Dumfries and Galloway[57].	There were four flights/individuals recorded during the VP surveys carried out for Windy Standard III in 2009. The flights were located within the survey buffer of the Proposed Development but over 750 m from proposed turbine locations or infrastructure, outwith the CRZ. Hence, no CRM was carried out for peregrine. In 2009, an area close to VP2 had evidence of a calling pair and a juvenile bird was seen in July. During operational raptor surveys for Windy Standard II between 2018 – 2020, one flight was recorded in 2018 and two in 2019. All three flights were in the survey buffer of the Proposed Development. There was no evidence of breeding within the Proposed Development Area or the surrounding buffer.	No	This species is of local value as a target species that is afforded special protection (Schedule 1, Annex I, SBL and LBAP species) but is not a qualifying feature of any statutory sites within 10 km of the Proposed Development. CRM criteria were not met and the collision risk for this species is considered to be negligible. No confirmed records were found of peregrine using the site or the surrounding surveyed area to breed, meaning that the Proposed Development would have only low adverse disturbance and displacement effects on this species. As disturbance, displacement and collision effects on peregrine are not considered to be significant, it is not considered to be an IOF.

** Woodward et al. (2020a), ** Forrester et al. (2007), † Wilson et al. (2015)*

[58] Eaton, M. A., Aebischer N.J., Brown A.F., Hearn R.D., Lock L., Musgrove A.J., Noble D.G., Stroud D.A. and Gregory R.D. (2015) *Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man.* British Birds 108, 708–746.

[59] Crick, H.Q.P. and Ratcliffe, D.A. (1995) *The Peregrine* (Falco peregrinus) *breeding population of the United Kingdom in 1991*. Bird Study 42, 1-19.

Impact Assessment

8.7.13 No sites designated for ornithological interests were identified within 10 km of the Proposed Development Area. The species considered to be IOFs in the context of the Proposed Development, and therefore considered further in this EcIA are:

- Black grouse; and
- Goshawk.

8.7.14 Impact assessment for each of these species is provided below.

Black grouse

Introduction

8.7.15 Black grouse is an LBAP priority species and is included on the SBL. The species is also Red-listed due to both historical and recent population declines[58].The National Survey carried out in 2005 estimated the Scottish population of displaying male black grouse at 3,344[53] (7,500-19,000 winter population) although it is not widespread in southern Scotland where in the 2011-2015 period it was estimated to be 581 males[60]. The population in NHZ 19 is estimated at 121 displaying black grouse males.

8.7.16 In Dumfries and Galloway black grouse is a scarce and localised resident breeder. Between 1968-72 and 2007-2011, the range of black grouse population in southern Scotland contracted by 48%[61], and now it appears to be isolated from populations to the north (in the Scottish Highlands) and to the south (in northern England). A reported 34 km gap exists between population in southern Scotland and England[62]. The reasons for the decline in southern Scotland are linked to either the direct loss of moorland fringe habitats, or their degradation and fragmentation through agricultural intensification[63] and/or commercial afforestation[64].

8.7.17 No black grouse are known to breed at the Proposed Development, however historic leks were located within the survey buffer and site boundary of Windy Standard II and the wider area.

Baseline

8.7.18 Three black grouse lekking sites were recorded within the 1.5 km survey buffer around the Proposed Development during baseline surveys for Windy Standard III in 2010. In addition, a pair was seen within the 1.5 km survey buffer during surveys carried out for Windy Standard II (see Figure 8.4). Three flights were recorded in November 2009 which were located three to five km from the Proposed Development and are assumed to be related to further leks in that area. No black grouse flights were recorded during VP surveys at Windy Standard III in 2009 and 2010 within the Proposed Development Area or survey buffer. Flight activity was therefore not sufficient to conduct CRM for this species. No leks have been found within the Proposed Development Area in the last ten years and the last pair recorded within the survey buffer was recorded eight years ago.

Potential collision risk impacts

8.7.19 It is acknowledged that theoretical risk of collision does exist for black grouse, however grouse species are known to collide with deer fences, power lines or turbine towers, rather than turbine blades. A study conducted at four black grouse lek sites in Scotland[65], monitoring flight heights for 144 hours, concluded that mean flight height was 3 m, with no flights over 15 m being recorded. This suggests that black grouse are not likely to be at risk of collision with turbine blades. The risk of collision with turbine towers cannot be quantified using standard collision risk assessment methods but is unlikely to be as high as the risk of colliding with objects which are harder to see such as fences. Additionally, such collisions are not necessarily always fatal. In addition, the presence of fewer but larger turbines would result in the reduction of an already low potential collision risk than there is currently at the site.

8.7.20 No black grouse flights were recorded during VP surveys for Windy Standard III in 2009 and 2010, or during other species-specific surveys for the Windy Standard Complex. In addition, species specific black grouse surveys conducted until 2020 have identified very infrequent use of the site by this species, and as such this situation is unlikely to have changed in the interim time. Given the lack of flight and other activity recorded within the Proposed Development Area, it is considered that collision effects will be of **negligible magnitude** and **not significant.**

Potential disturbance/displacement impacts

8.7.21 No black grouse were recorded during surveys at the proposed development in 2020. The last time lekking black grouse were recorded at the Windy Standard Complex was in 2010 during baseline survey work for Windy Standard III Wind Farm. Black grouse were not recorded during the baseline for Windy Standard II but were anecdotally reported to use the wider area. The UK biodiversity Action Plan for black grouse states that in recent decades, there has been a substantial reduction in numbers of black grouse in Dumfries and Galloway due to changes in their moorland habitat, through overgrazing and lack of moorland management, and the maturation of conifer plantations. Combined with other factors, such as collisions with fences and predation, the remaining populations have become fragmented and isolated[66]. Black grouse declined by 29% between the two national surveys in 1995/96 and 2005, but this decline was even more pronounced in south west Scotland with a population decline of 49% and a range contraction of 48%[67]. The Dumfries and Galloway/Natural Heritage Zone (NHZ) 19 population is now estimated to be 121 displaying males.

8.7.22 Black grouse have only ever been recorded in low numbers at the Windy Standard Complex and no adverse impacts on black grouse have been predicted from any of the developments in the Windy Standard Complex. Evidence from other operational wind farms suggests that black grouse are not displaced from sites by the presence of turbines, and disturbance to this species during construction is easily mitigated via embedded mitigation. Given the wider regional decline in populations of this species, and the lack of field evidence that this species has been present for the past ten years, it is considered that there will be no impacts on black grouse populations from the Proposed Development. As such, we propose that impacts on black grouse are scoped out of the EIAR.

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[60] Warren, P (2016) Black grouse conservation in southern Scotland - Phase 2 Development of a regional strategic conservation plan. GWCT.

[61] Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J. (2013) Bird Atlas 2007-11: The Breeding and Wintering Birds of Britain and Ireland. BTO, Thetford.

[62] Warren, P. Atterton, F., Baines, D., Viel, M., Deal, Z., Richardson, M. & Newborn, D. 2015. Numbers and distribution of Black Grouse Tetrao tetrix males in England: results from the fourth survey in 2014. Bird Study, 62: 202-207.

[63] Fuller, R., & Gough, S. (1999) Changes in sheep numbers in Britain: implications for bird populations. Biological Conservation, 91, 73-89.

[64] Pearce-Higgins, J.W., Grant, M., Robinson, M., & Haysom, S.L. (2006) The role of forest maturation in causing the decline of Black Grouse Tetrao tetrix. Ibis, 149, 143-155.

[65] Wright, J. (2007) Black Grouse (Tetrao tetrix) flight patterns and possible interactions with wind turbines. Masters thesis, University of Edinburgh.

[66] https://www.gsabiosphere.org.uk/wp-content/uploads/2014/11/4.1-Black-Grouse-301215.pdf (Last accessed 16/03/2022)

[67] https://www.gwct.org.uk/media/641731/black-grouse-in-southern-Scotland.pdf#page=4&zoom=100,92,97 (Last accessed 16/03/2022)

8.7.23 Given the distance between the proposed infrastructure and the historic lek locations (more than 1 km), construction activity for the Proposed Development has the potential to disturb both lekking and nesting black grouse, with nests generally within 1.5 km of the lek site. NatureScot currently recommends that no construction work takes place within 750 m of lekking black grouse and the previously recorded lek sites, although historic, lie within this buffer distance. If construction works were to take place within this buffer distance during the lekking period, then without protection measures there is potential for some short term (construction phase) disturbance/displacement impacts. Although absent in recent years, small numbers of males (1-7) have historically been recorded during this period. This would represent up to 5.8% of the population of NHZ 19, and as such would be a moderate, potentially significant short-term adverse impact. However, the exact location of birds displaying at a given lek can vary considerably between years and there is alternative suitable habitat for this species in the wider area. Moreover, as recent survey results indicate no activity or leks present within the Proposed Development Area or survey buffer within the last 10 years, such an assessment can be regarded as very precautionary.

8.7.24 Disturbance can be reduced if operations are restricted, particularly in relation to timing of construction works, in the areas closest to a lek. With application of protection measures via embedded mitigation, black grouse are expected to continue to use the wider area, meaning that any displacement will be localised and temporary and therefore not be significant at a regional level in the longer term. With the application of embedded mitigation measures outlined previously in this section, construction phase disturbance/displacement effect on this species is predicted to be of no more than short-term, **low magnitude** and **not significant**.

8.7.25 Disturbance to lekking and nesting birds is expected to be of highest significance during construction and less significant during the operation of the Proposed Development. Recent research by Zwart *et al.* (2015)[68] found that leks more than 500 m from a proposed turbine did not move after wind farm construction. However, leks present in 2010 and 2014 within the footprint of Windy Standard II, which lies within the survey buffer of the Proposed Development, have not been occupied in recent years. Given that there is suitable habitat available in the immediate area further away from turbines and that turbines have been present at the Proposed Development for many years, potential disturbance/displacement effects on black grouse during the operational phase are considered to be **negligible** and **not significant**.

Goshawk

Introduction

8.7.26 Goshawk is a scarce breeding bird, mostly found in large coniferous forests where birds are least vulnerable to disturbance. Following historical population demise as a result of habitat loss and persecution, goshawk numbers and range are slowly expanding, although the species remains a scarce breeding bird in Scotland. Being a secretive species and remaining inconspicuous for much of the year, goshawk is notoriously difficult to monitor and likely under reported, thus any population estimates are probably highly conservative. The most recent SRMS report states that in 2019 Scottish raptor workers located 103 pairs, of which 26 were located in Dumfries and Galloway[57]. These totals are related to observer effort rather than actual population size, however, with the number of monitored nests estimated as being 10-50% of the true figure.

Baseline

8.7.27 No goshawk flights were observed during VP survey carried out for Windy Standard III in 2009 and 2010 over the Proposed Development Area or in the survey buffer. Flight activity was therefore not sufficient to conduct CRM for this species.

8.7.28 Numerous raptor surveys have been conducted within the Windy Standard Complex between 2010 and 2020. Breeding activity was found around the survey buffer with a nest reported active last in 2017 for Windy Standard II. This nest location was checked in the following years but not found to be active, although unidentified raptor species pellets and droppings were found in this area in 2018 and 2020.

8.7.29 One adult goshawk was flushed from a forestry ride in the west of the Proposed Development Area in July 2020 during raptor surveys for the Proposed Development. One flight was recorded in the same area in 2018 during operational raptor surveys for Windy Standard II. Flight activity was also recorded within the survey buffer during Windy Standard II operational raptor surveys from 2017-2019. Whilst breeding has not been confirmed since 2017, an immature bird was seen to the west of the site in 2020, though it is unknown over what distance it may have dispersed.

Potential collision risk impacts

8.7.30 Although flights were recorded there were too few within the CRZ to undertake CRM for goshawk.

8.7.31 Raptors are susceptible to collision with turbines due to their morphology (i.e. heavy wing loading) and foraging behaviour (i.e. focussing on distant prey)[69]. However, goshawk is a species which is generally at low risk of collision due to their foraging behaviour being at low level and mostly being within and adjacent to woodland cover. Goshawks are more likely to fly at PCH during their display period and such flights are likely to occur in the vicinity of the nest. It is likely that goshawk are already avoiding the Proposed Development Area due to the presence of Windy Standard I and will continue to do so following construction of the Proposed Development. Indeed, studies suggest that raptors are likely to decline in general abundance in a given area due to avoidance of the wind farm[70]. Such avoidance means that flight activity within the Proposed Development is already low, and it follows that the likelihood of collision will also be lower. In addition, the presence of fewer but larger turbines would result in the reduction of an already low potential collision risk than there is currently at the site.

8.7.32 As such, the potential effect as a result of collision risk is considered to be of **low magnitude** and **not significant** for goshawk.

Potential disturbance/displacement impacts

8.7.33 Goshawks are particularly vulnerable to disturbance in the early part of the breeding season during the nest building and early incubation stages (mid-March to mid-May). Some pairs are prone to deserting nests, particularly if they are first-time breeders or in years when prey availability is low[71,21]. The type of disturbance most likely to affect goshawks is when a sudden change occurs in the nesting environment, such as commencement of harvesting operations or a sudden increase in traffic volume[71]. Thus, there is potential for breeding birds to be disturbed, particularly during construction activities. However, goshawks can become conditioned to some types of regular disturbance, such as road traffic, if the disturbance is present from the start of nesting[71]. It is considered unlikely that goshawks will be disturbed by turbine operation, although some operational wind farm activities (e.g. track maintenance, cable repairs, etc.) have the potential to disturb breeding goshawks.

8.7.34 In 2017 an active goshawk nest was found outside the Proposed Development Area, 2.8 km from the nearest turbine. A pair was seen in this area and although there was evidence that the birds had 'refurbished' the old nest, the pair did not go on to breed there. This nest was found inactive in the following years, however goshawks can have up to four different nesting areas within their range and may move up to 2.5 km to another nest site[52].

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[68] Zwart, M.C., Robson, P., Rankin, S., Whittingham, M.J. & McGowan, P.J.K. (2015) *Using Environmental Impact Assessment and post-construction monitoring data to inform wind energy developments*. Ecosphere 6(2), article 26.

[69] Kikuchi, R. (2008) *Adverse impacts of wind power generation on collision behaviour of birds and anti-predator behaviour of squirrels*. Journal for Nature Conservation 16: 44-55.

[70] Garvin, J. C., Jennelle, C. S., Drake, D. and Grodsky, S. M. (2011) *Response of raptors to a windfarm*. Journal of Applied Ecology, 48: 199-209.

[71] Petty, S.J. (1996) *Reducing disturbance to goshawks during the breeding season*. Forestry Commission Research Information Note 267.

Evidence suggests that goshawks can be disturbed at distances of between 300 m and 500 m[38,72]. Embedded mitigation measures to prevent or minimise any disturbance to breeding goshawks, whilst maintaining access to the wind farm, will be implemented. This will include pre-construction nest monitoring for breeding activity, implementing and maintaining an appropriate exclusion zone around any active nests, monitoring for disturbance and controlling the construction traffic. Any tree felling which may be necessary in the exclusion zone will be delayed until the nest is confirmed by the ECoW as being inactive. Alternative forestry stands exist to the north, east and west of the Proposed Development providing topographical variety and habitat richness that attracts goshawk. With extensive alternative breeding habitat present in the surrounding area any potential effects on goshawk as a result of the Proposed Development should be considered within this context (habitat suitability for goshawk within commercial conifer plantations is subject to constant change due to the nature of rotational harvesting).

8.7.35 Given the extensive alternative breeding habitat in the surrounding area and with the application of embedded mitigation measures, potential impacts due to disturbance and displacement during construction and operation are considered to be of no more than **low magnitude** and **not significant**.

8.8 CUMULATIVE EFFECTS

8.8.1 The following section assesses the predicted cumulative effects on IOFs from the Proposed Development along with all other developments within an appropriate ZoI and against the relevant NHZ population estimates, following NatureScot guidance[11].

8.8.2 In line with this guidance, any wind farm developments of fewer than three turbines (small scale wind energy proposals[73]) were excluded from the cumulative impact assessment (CIA), due to the problems associated with finding appropriate data for developments of this size. 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. All existing, consented and submitted developments (of three or more turbines) within 10 km of the Proposed Development, were considered as part of the assessment of cumulative impacts.

8.8.3 Within this search area there are a total of 18 developments that have been included in the CIA which include:

- Six operational wind farms;
- Nine consented wind farms; and
- Three wind farms at the application/appeal stage.

8.8.4 8.8.4 It should be noted that cumulative assessments may be complicated by availability of EcIA/EIAR chapters and appraisals for consented developments and, where this information is available, survey periods and methods may differ between sites. Furthermore, some wind farms may have been in existence for many years, and thus contemporary data may not be available. Information for informing the CIA was available from the three projects at application/appeal stage, all nine consented projects and three of the operational wind farms. No EIARs were available for a further two wind farms (Hare Hill and Sanquhar) o and one consented wind farm (Auchingee Hill Farm); thus cumulative totals reflect minimum values only (see Table 9.17). The locations of all wind farms within a 60 km radius are show on Figure 6.14a.

8.8.5 The IOFs for which cumulative effects may occur are as follows:

- Black grouse: disturbance/displacement effects; and
- Goshawk: disturbance/displacement and collision effects.

8.8.5 8.8.6 The residual effect of the individual operational, constructed, consented and submitted developments for which information was available and the cumulative residual effect on each of the target species most likely to be affected by cumulative effects (as listed above) is described in Table 8.11.

8.8.7 No significant cumulative disturbance/displacement or collision effects were concluded for any IOFs.

[72] Whitfield, D.P., Ruddock, M. & Bullman, R. (2008) *Expert opinion as a tool for quantifying bird tolerance to human disturbance*. Biological Conservation 141, 2708-2717.

[73] SNH (2016) Assessing the impact of small-scale wind energy proposals on the natural heritage (Guidance note). Scottish Natural Heritage.

Table 8.11: Cumulative Impact Assessment

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline surveys undertaken	Goshawk Assessment	Black Grouse Assessment
Proposed Development	8	N/A	EcIA	2020	One adult goshawk was flushed from a forestry ride in the west of the Proposed Development Area in July 2020 during raptor surveys for the Proposed Development. Both collision and disturbance/displacement impacts considered to be of low magnitude and not significant during both construction and operation.	No lekking males were found within the Survey Area during baseline surveys. No leks have been found within the Proposed Development Area in the last ten years and the last pair recorded within the survey buffer was recorded eight years ago. Disturbance/displacement impacts considered to be of low magnitude and not significant.
Windy Standard II	30	Adjacent	Operational	NA	No data available for goshawk within the ES.	One pair observed within the 1.5 km survey buffer during surveys carried out for Windy Standard II. The ES assessed the magnitude of impact as negligible and therefore not significant for black grouse during both construction and operation.
Windy Rig	12	< 1.25	Consented	2014	Two flights of single birds recorded during VP watches during breeding season 2014; no evidence of breeding within the survey area. The ES assessed the magnitude of impact as negligible and therefore not significant for goshawk.	Four flights (1-5 birds) recorded during VP surveys, and three leks identified with a maximum of eight males and three females recorded across all leks during a single survey visit. The ES assessed the magnitude of impact as medium and therefore significant for black grouse in the absence of mitigation; following implementation of mitigation reduced to not significant during both construction and operation.
Afton	25	< 1.5	Operational	ES submitted 2004	No flight records or evidence of breeding or roosting within the survey area. The ES assessed the magnitude of impact as negligible and therefore not significant for goshawk during both construction and operation.	No black grouse or leks identified during black grouse survey, however two flights (6 birds) recorded in the survey area during winter which, following CRM resulted in a predicted mortality of 0.07 birds per year. Impact predicted to be of minor significance. The ES assessed the magnitude of impact as low and therefore not significant for black grouse during both construction and operation.
Windy Standard III	20	<1.5	Consented	2012	A female bird was recorded during a VP survey in 2010, and two flights (presumed to be the same bird) were recorded during a breeding raptor survey in April 2013. No evidence of any breeding within survey area. The ES assessed the magnitude of impact as negligible and therefore not significant for goshawk during both construction and operation.	Two active black grouse lekking sites with small number (1-2 birds) recorded within the 1.5 km survey buffer, and small numbers of black grouse were recorded during VP surveys (two flights of single males during the non-breeding season) during baseline surveys. During construction and operation, the effects were assessed to be of a low magnitude and of short duration and therefore not significant for black grouse.
Pencloe Forest Resubmission	19	< 1.5	Consented	2013	No flight records or evidence of breeding within the survey area, no assessment provided for this species within the ES.	A single male black grouse was observed lekking at three different locations during the species-specific surveys. One female black grouse was recorded outwith the black grouse surveys. The ES assessed the magnitude of impact as low and therefore not significant for black grouse during both construction and operation.
South Kyle	50	< 3	Consented	2010, 2012	Occasional flights between 2009 and 2012, but no evidence of breeding within the survey area. The collision risk analysis concluded that a reasonable and precautionary estimate of annual collision mortality for goshawk was 0.01 which equates to one bird strike every 100 years. This is considered highly unlikely to have a material adverse effect on overall survival rates of the goshawk population within the local area.	No black grouse flights recorded, or evidence of breeding within the survey area. CRM not undertaken. However, historical leks present outside development area. Impacts for black grouse considered to be of minor significance during both construction and operation. Habitat management plan developed in consultation with consultees.

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline surveys undertaken	Goshawk Assessment	Black Grouse Assessment
					The ES assessed the magnitude of impact as low resulting in a minor impact which is not considered significant for goshawk during both construction and operation.	
Enoch Hill	16	< 4	Consented	2012, 2013, 2014	A total of three goshawk flights were recorded during winter 2011/12 VP surveys. A single goshawk was recorded during the 2013 breeding season, outwith the Development Site. No evidence of any breeding within survey area. All predicted effects on birds resulting from the Proposed Development in isolation for goshawk were considered to be either 'Slight' or 'Negligible' during both construction and operation.	Four flights (nine individuals) recorded during winter 2012/13 and one flight (four individuals) during winter 2013/14. No flights at PCH. CRM not undertaken and no significant effect predicted Single lek (peak count of three males and two females in March 2013) and three satellite leks also identified. Mitigation included exclusion zones during core lekking period and revision of site layout. The ES assessed the magnitude of impact as low and therefore not significant for black grouse during both construction and operation.
Shepherd's Rig	17	< 6	Application	2018	Goshawk was recorded twice in 2013 and throughout the year in 2017/18 within the survey area. Goshawk was considered to have probably bred on or near to the Site in 2017; however, no nesting sites were located. Ten flights by goshawk were recorded within 500 m of the Proposed Development – CRA was undertaken resulting in the potential loss of one goshawk every 47 years. Mitigation included restricting timing of works during construction. The ES assessed the magnitude of impact as negligible and therefore not significant for goshawk during both construction and operation.	There was no evidence of lekking black grouse within the survey area, no assessment undertaken
Benbrack Variation	18	< 6.5	Consented	2011, 2013	Three goshawk flights were recorded during VPs in winter 2011-2012, and a single flight during the breeding season 2012. No evidence of any breeding within survey area. CRM was undertaken resulting in the potential loss of 13 birds over 30 year lifetime, and when assessed against regional breeding population and natural mortality development would be of negligible magnitude and therefore not significant for goshawk during both construction and operation.	Two leks (each of 1 or 2 birds) were identified approximately 1.4 - 2 km from turbines. Mitigation included exclusion zones during core lekking period. The ES assessed the magnitude of impact as negligible and therefore not significant for black grouse during both construction and operation.
Lorg	9	< 6.5	Consented	2012, 2013	Five goshawk flights were recorded during baseline surveys. No evidence of any breeding within survey area. The development site was assumed to be of negligible importance for goshawk, and no further assessment was carried out.	One lek identified approximately 1.4 km from turbines. During construction and operation, the effects were assessed to be of a low magnitude and of short duration and therefore not significant for black grouse.
Sanquhar II Community Wind Farm	7	< 7	Application	2015, 2020	Flights recorded during VPs conducted in 2016. CRM was undertaken resulting in a potential loss of 0.734 birds over the 35 year lifetime of the wind farm. Breeding goshawk were confirmed, with one definite and one potential territory. The ES assessed the magnitude of impact as low resulting in a minor impact in the short-term which is not considered significant for goshawk during both construction and operation.	Two leks were recorded on site and one additional one within the survey area. Mitigation included exclusion zones during core lekking period and revision of site layout. Following mitigation, the ES assessed the magnitude of impact as low and therefore not significant for black grouse during both construction and operation.
Hare Hill	20	< 7	Operational	1999	No information available.	No information available.

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline surveys undertaken	Goshawk Assessment	Black Grouse Assessment
Hare Hill Extension	35	< 7	Operational	2014	One goshawk flight was recorded during baseline surveys in 2005. No evidence of any breeding within survey area. The development site was assumed to be of negligible importance for goshawk, and no further assessment was carried out.	Baseline surveys identified a small breeding population of black grouse (at least four males) associated with forest habitats adjacent to the proposed development. Mitigation included habitat enhancement in alternative areas away from construction and operation. Following mitigation, the ES assessed the magnitude of impact as low and therefore not significant for black grouse during both construction and operation.
Sanquhar	4 (of 9) within 10 km	< 9	Operational	2018	No information available.	No information available.
Auchingee Farm	3	< 9	Consented	N/A	No ES was submitted for this application.	No ES was submitted for this application.
Cornharrow	8	< 9	Appeal	2016, 2017	Occasional flights during 18 month survey period, no known territories within vicinity of site boundary, with both disturbance and displacement impacts and collision risk impacts assessed as likely to be of slight adverse and therefore non–significant.	Surveys undertaken but no activity observed.
Greenburn	1 (of 16) within 10 km	< 10	Application	2017, 2018	A single displaying goshawk flight was recorded in March 2017. No evidence of any breeding within survey area in 2017 or 2018. The ES assessed the potential effect of construction and operational disturbance / displacement on goshawk to be low, resulting in an effect significance level of minor, which is not significant in the long-term.	A male black grouse was seen within the survey area, in May 2017 but, no lekking behaviour was recorded during surveys in spring 2017 nor 2018. The ES assessed the construction and operational displacement effects on black grouse on a precautionary basis to be low, resulting in an effect significance level of minor, which is not significant.
Whiteside Hill	4 (of 10 within 10 km	< 10	Operational	2018	No information available.	Single bird recorded; no evidence of a lek on site. No assessment provided.
Cumulative residual effects	306				Whilst it is acknowledged within a number of the wind farms that goshawk are a secretive species and can often be overlooked during surveys, this assessment takes into account sixteen wind farms, with only low numbers of flights and occasional nests identified. Four of the wind farms considered in this assessment had enough data to undertake CRM, giving a total of 0.485 collisions per year. This represents 0.78% of the NHZ 19 breeding population. Collision risk was not calculated at the Proposed Development due to the low level of flight activity recorded. In addition, replacing numerous smaller, older turbines with fewer larger turbines would result in a reduction in potential collision risk. Therefore, for the Proposed Development mortality as a result of collision is not predicted to be significant at the regional population level. As such, **no significant cumulative effect is predicted for collision effects.** **Of the additional projects looked at (not including the Windy Standard Complex) only one site had a pair of goshawk confirmed as breeding. At the Proposed Development disturbance/displacement impacts are predicted to be low magnitude and short-term during construction, and during the operational phase disturbance/displacement is likely to be less than currently due to fewer turbines being present. Therefore, disturbance/displacement is predicted to have no significant cumulative effect.**	Low numbers of grouse and occasional small leks have been recorded within and adjacent to eleven of the wind farms considered in this assessment. Most of these relate to older records, with a known decline in population size and range attributed to factors other than wind farm construction[66,67]. Black grouse primarily have the potential to be disturbed during the construction period, however embedded mitigation to prevent disturbance to this species (e.g. restrictions on location and timing of works during the lekking period) is easily introduced at this phase to avoid disturbance at leks. Evidence from other operational wind farms suggests that black grouse are not displaced from sites by the presence of turbines, though they may make localised movements, breeding black grouse are known to persist at wind farms after construction[74]. **The cumulative disturbance/displacement effect is predicted to be not significant.**

[74] Pearce-Higgins, J.W., Grant, M., Robinson, M., & Haysom, S.L. (2006) The role of forest maturation in causing the decline of Black Grouse Tetrao tetrix. Ibis, 149, 143-155.

Source: Natural Power

8.9 HABITAT ENHANCEMENT

Habitat Management Plan

8.9.1 There is a historic presence of black grouse in the wider area around the Proposed Development, however there are not suitable opportunities present within the Proposed Development Area to provide enhancements for this species. The site does not have the potential for broad-leaved woodland planting, and there are no fences or alternative changes in land use that would be appropriate and that would be likely to result in a net gain for this species. However, consultation responses to the Scoping Report by NatureScot and RSPB have both outlined the need for positive measures to support black grouse in the local area. In lieu of suitable opportunities within the Proposed Development Area, it is proposed that post-consent and as part of the proposal, funding is provided by the client to support appropriate off-site mitigation project for this species in agreement by stakeholders. Discussions have been undertaken with the Galloway and Southern Ayrshire Biosphere (Andrew Tait and Ed Forest, pers. comm 31 March 2022) as to the potential for suitable opportunities and this proposal has been verbally agreed by the RSPB (Ed Tooth, pers. comm. 4 April 2022). Funding will be provided to the Biosphere to support projects such as habitat enhancements for black grouse and bog restoration in appropriate locations where they will have a larger net benefit for this species.