Technical Appendix 7.1: Ornithology Surveys 2017 - 2019

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7 7.1 Ornithology

7.1 Introduction

This **Technical Appendix 7.1** details the methods and findings for **Chapter 7** – Ornithology of the Environmental Impact Assessment Report (EIAR) for the Barnesmore Windfarm Repowering (the Development), which is fully set out in the EIAR.

Baseline ornithology monitoring was undertaken by Bird Surveyors Ltd to establish the distribution and abundance of existing ornithological features for the Development. The baseline information provides information used to inform the design of the Development and inform potential impacts of the Development due to collision, disturbance and/or displacement of birds.

The methods utilised have four main aims:

- To provide baseline data on all extant ornithological features to establish the risk posed to birds due to the Development;
- To quantify the risk of collision with turbines to extant bird species flying through the Development area throughout the year;
- To identify locations of priority target species territories to establish risk posed due to Development; and
- To identify mitigatory habitats, options and future monitoring needs, where required, upon assessment of displacement and/or collision risk due to the Development

The objectives of baseline monitoring were to:

- Establish the sensitivities and designated site features within the landscape, in particular to establish and identify any species-specific risk and identify key ornithological receptors;
- Establish the distribution and abundance of nearest known priority species using desk-based studies;
- Establish the spatial distribution and relative abundance of all bird species from primary field surveys during the breeding and wintering season from walkover and vantage point surveys within 500 m of the Development;
- Establish the breeding distribution and abundance of curlew *Numenius arquata* within 800 m of the Development (see Pearce – Higgins et al., 2009)[1];
- Establish the breeding distribution and abundance of snipe *Gallinago gallinago* within 500 m of the Development;
- Establish the breeding distribution and abundance of red grouse *Lagopus lagopus* within 500 m of the Development;
- Establish the distribution and abundance of priority species (specifically waders, raptors, swans and geese) from primary field surveys during both the breeding and wintering season within 2 km, 5 km and 10 km particularly for swans, geese, hen harrier, eagles and designated site feature species; and
- Establish the distribution and abundance of suitable displacement habitats or mitigation options and provide recommendations for management, if necessary.

This Technical Appendix is further analysed and reviewed in **Chapter 7: Ornithology** of the EIAR and should be read in conjunction with that Chapter and also **Volume III: Figures** and **Figures CONFIDENTIAL** (where necessary)**.**

This **Technical Appendix 7.1** includes the following elements:

- Assessment Methodology; and
- Baseline Description.

7.2 Assessment Methodology

A range of guidance, best practice and peer-review methodologies have been utilised in the scoping, preparation and completion of the surveys works undertaken for the Development.

7.2.1 Study Area / Survey Area

The ornithological Survey Area was digitally mapped in ArcGIS 10.5 and defined as the Site Boundary (hereafter Survey Area) buffered by 500 m (hereafter 500 m Survey Area) for breeding and wintering bird surveys and vantage point surveys (**Figure 7.1**) which comprise a range of habitats (**Figure 7.2**). This buffer was selected as recent research has shown the

[1] Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P. & Bullman, R. (2009). The distribution of breeding birds around upland wind farms. *Journal of Applied Ecology* 46: 1323-1331.

majority of wind turbine effects are prevalent up to 500 m (Pearce-Higgins *et al.,* 2009, Ruddock & Reid, 2010[2]; McGuinness *et al.,* 2015[3] **Figure 7.1; Figure 7.2**).

An 800 m buffer (hereafter 800 m Survey Area) defined the Survey Area for curlew during breeding season surveys; as displacement effects on this species are considered up to 800 m (Pearce-Higgins *et al.,* 2009; **Figure 7.1**). The wider priority species Survey Area was defined as the 2 km buffer (hereafter 2 km Survey Area) to search for hen harrier and merlin nest locations and/or breeding territories or wintering locations of species considered vulnerable and/or priority species within Ireland or Northern Ireland (**Table 7.1**).

A wider search area up to 5 km (hereafter 5 km Survey Area) was utilised during priority species searches for swans and geese and hen harrier (**Figure 7.3**) and 10 km and 15 km (hereafter 10 km and 15 km Survey Areas respectively) were utilised during priority species searches for swans and geese and consideration of effects on designated sites.

Specific analyses and mapping of effects were conducted where necessary on the Operational Barnesmore Windfarm turbines and the Development turbines and associated 500 m (500m turbine buffer) and/or 800 m buffers (800m turbine buffer).

Table 7.1: Details of species surveyed during vantage point observations and priority species searches.

Species	Vantage Point (Target 1) *	Vantage Point (Target 2) **	Migration Vantage Point	Priority Species Surveys (2 km)	Priority Species Surveys (5 km)	Priority Species Surveys (10 km)
Hen harrier	•		•	•	•	
Peregrine falcon	•		•	•	•	
Merlin	•		•	•		
White-tailed eagle	•		•	•	•	•
Golden eagle	•		•	•	•	•
Goshawk	•		•	•		
Osprey	•		•	•		
Red kite	•		•	•		
Marsh harrier	•		•	•		
Golden plover	•		•	•		
Whooper swan	•		•	•	•	•
Mute swan	•		•	•		
Chough	•		•	•		
Barn owl	•		•	•		
Short-eared owl	•		•	•		
Long-eared owl	•		•	•		
Red grouse	•		•	(500 m)		
Curlew	•		•	•		
Geese (all species)	•		•	•	•	•
Buzzard		•	•	•		
Kestrel		•	•	•		
Sparrowhawk		•	•	•		
Snipe		•	•	(500 m)		

[2] Ruddock, M. & Reid, N. (2010). Review of windfarms and their impact on biodiversity: guidance for developments in Northern Ireland. *Report by the Natural Heritage Research Partnership, Quercus for the Northern Ireland Environment Agency, Northern Ireland, UK*.
[3] Mc Guinness, S., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland. *BirdWatch Ireland, Kilcoole, Wicklow*.

Species	Vantage Point (Target 1) *	Vantage Point (Target 2) **	Migration Vantage Point	Priority Species Surveys (2 km)	Priority Species Surveys (5 km)	Priority Species Surveys (10 km)
Lapwing		•	•	•		
Raven		•	•	•		
Grey heron		•	•	•		
Cormorant		•	•	•		
Corncrake		•	•	•		
Waders (all species)		•	•	•		
Ducks (all species)		•	•	•		
Grebes (all species)		•	•	•		
Gulls (all species)		•	•	•		
Terns (all species)		•	•	•		
SPA citation species (all)	•	•	•	•	•	•

* Target 1 species are recorded to the nearest minute, and assigned a five-minute interval and the flight route is mapped. Flying height (at 15 second intervals) and flight duration to the nearest second are recorded.
** Target 2 species are recorded to the nearest minute and assigned a five-minute interval and the flight route is mapped. Flying height is recorded at point of detection and an altitudinal range also recorded for the duration of the bout. Flying height and duration recorded additionally at Barnesmore.

7.2.2 Review of Site Sensitivities & Designations

Desktop studies were undertaken including a review of designated site databases to establish local, regional or national importance of the area and especially for designated ornithological receptors up to 20 km from the Site Boundary.

Data searches were conducted for both Ireland and Northern Ireland, given the close proximity of the Site and buffers to the boundary between these two jurisdictions and to allow consideration of trans-boundary designations and/or species occurrence.

Data searches were carried out for Ireland from National Parks & Wildlife Service (NPWS) on www.npws.ie/protected-sites whilst for Northern Ireland these were obtained from Northern Ireland Environment within Department of Agriculture & Rural Affairs (DAERA) www.daera-ni.gov.uk/topics/biodiversity-land-and-landscapes/protected-areas.

For both jurisdictions GIS data (shapefiles) were downloaded and imported into the project GIS and projected accordingly to ensure standard spatial reference of all databases and designated boundaries.
Data for Ireland were reviewed on Natural Heritage Areas (NHA), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Wildfowl Sanctuaries, OSPAR Sites, National Parks and Nature Reserves.

Data for Northern Ireland were reviewed on SAC, SPA, Areas of Special Scientific Interest (ASSI), RAMSAR sites, National Nature Reserves (NNR), Areas of Outstanding Natural Beauty (AONB), World Heritage sites and Landscape Character Areas (LCA).

The size (hectares) and details of these designated sites, including any protected and/or cited ornithological features were also extracted from the site synopsis documents, where available, along with the distance to the nearest Operational Barnesmore Windfarm turbine, Development turbine and the landownership boundary which were calculated in ArcGIS. Potential connectivity with designated sites and site features up to 15 km (as outlined by NPWS) is reviewed in **Chapter 7: Ornithology** in consideration of potentially spatial connectivity for individual species SNH (2016).

7.2.3 Review of published data and data requests

This assessment identified and reviewed external data sources on both general and priority target bird species in order to inform the indicative species risk matrix within the Site and wider area as well as to inform the indicative work programme for bird surveys.

Online and/or hard copy data requests were submitted to establish the types and/or abundance of key bird species in the area in order to understand whether any wider impacts or ornithology issues could arise. These included data obtained at 10 km resolution and/or at tetrad (2 km by 2 km) resolution where available. Data requests were submitted to those bodies in **Table 7.2**. These were mostly available at the 10 km resolution (primarily IH08) but where possible the information requests were extended to include the nearest known historical geese, swan, raptor, wader and/or other priority species locations.

Table 7.2: Data Requests submitted

Database	Abbreviation
National Biodiversity Data Centre	NBDC
National Biodiversity Network	NBN
British Trust for Ornithology	BTO

Published literature were reviewed to identify priority species breeding or wintering areas derived from both data consultation and published reports for wintering whooper swan (Robinson et al., 2004[4]), red grouse (Allen et al., 2004[5]; Cummins et al., 2010[6]) and breeding hen harrier (Sim et al., 2007[7]; Ruddock et al., 2012[8]; Hayhow et al., 2013[9]; Ruddock et al., 2016[10]; Wotton et al., 2018[11]).

Extant ornithological information of ornithology, particularly raptors, from the author's personal knowledge (Dr Marc Ruddock) having personally surveyed in this area for more than a decade, and other project ornithologists with knowledge of the area were also reviewed to identify other key constraints and/or vulnerable target species. Data from nearby adjacent windfarm applications particularly at Meenadreen and Meenbog which occurred at approximately 2 km away (**Appendix 1.2**) were also reviewed (see **Chapter 7: Ornithology**).

In addition an ornithological guidance document for windfarm development in Ireland (McGuinness et al., 2015) was reviewed and associated GIS layers from that project were examined for the Survey Areas particularly within 2-5 km but sensitivity up to 20 km was also reviewed.

7.2.4 Breeding Bird Surveys (BBS)

Breeding bird territories were surveyed using a modified Brown & Shepherd (1993)[12] transect methodology to incorporate passerines and provide breeding estimates and distribution for all bird species within the 500 m turbine buffer and for breeding curlew within 800 m turbine buffers. This survey included an assessment of the abundance of meadow pipits and skylarks, considered to be important prey species for hen harriers and merlin.
To allow for variation in detection of early and late breeding species four surveys were conducted in April, May, June and July respectively. Fieldwork commenced earlier in the day to maximise detection for passerines. Periods of high wind (>Force 4)

[4] Robinson, JA, K Colhoun, JG McElwaine & EC Rees. 2004. Whooper Swan *Cygnus cygnus* (Iceland population) in Britain and Ireland 1960/61 – 1999/2000. Waterbird Review Series. The Wildfowl & Wetlands Trust/Joint Nature. Conservation Committee, Slimbridge.
[5] Allen, D., Mellon, C. Mahwhinney, K. (2004). The status of red grouse in Northern Ireland. Unpublished report to Environment and Heritage Service.
[6] Cummins, S., Bleasdale, A., Douglas, C., Newton, S., O'Halloran, J. & Wilson, H.J. (2010). The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
[7] Sim, I.M.W, Dillon, I.A., Eaton, M.A., Etheridge, B., Lindley, P., Riley, H., Saunders, R., Sharpe, C., Tickner, M. (2007). Status of the Hen harrier Circus cyaneus in the UK and Isle of Man in 2004, and a comparison with the 1988/89 and 1998 surveys. Bird Study 54: 256–267
[8] Ruddock, M. & Dunlop, B.J., O'Toole, L., Mee, A. and Nagle, T. (2012). Republic of Ireland National Hen Harrier Survey 2010. Irish Wildlife Manual, No. 59. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
[9] Hayhow, D.B., Eaton, M.A., Bladwell, S., Etheridge, B., Ewing, S., Ruddock, M., Saunders, R., Sharpe, C., Sim, I.M.W. & Stevenson, A. (2013). The status of the Hen Harrier, Circus cyaneus, in the UK and the Isle of Man in 2010. Bird Study 60: 446-458.
[10] Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). The 2015 National Survey of Breeding Hen Harriers in Ireland. Irish Wildlife Manuals, No. 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.
[11] Wotton, S., Bladwell, S., Morris, N., Raw, D., Ruddock, M., Stevenson, A., Stirling-Aird, P. & Eaton, M. (2018) Status of the Hen Harrier *Circus cyaneus* in the UK and Isle of Man in 2016. Bird Study 65: 145-160.
[12] Brown, A.F. & Shepherd, K.B. (1993). A method for censusing upland breeding waders. Bird Study 40: 189-195.

and low visibility were avoided to maximise visual and auditory detection rates of birds. Equipment used during the surveys included Leica 8-12 x 40 binoculars; Leica APO Televid 70 and a Sony Alpha 77 digital camera with a 100-400 mm lens.

Surveys covered the ground systematically with constant search effort and all points within the Survey Area were closely approached to within 100m depending on accessibility. Improved pasture was scanned with binoculars and observed for short periods to identify foraging areas of detected species. Where accessibility was constrained the surveyor stopped and scanned with binoculars and listened for bird song/calls. Patches of scrub, isolated trees, rocky outcrops, streams, water-bodies, buildings and linear features such as hedge rows and trees were investigated closely. The surveyor paused at regular intervals to scan and listen for calling and singing birds.

Behaviours indicative of breeding were recorded in the field. When individuals or pairs of birds were encountered, efforts were made to establish whether, in the fieldworker's opinion, the birds were different from those previously encountered, and involved attention to the movements of birds, together with birds' sex and plumage characteristics. Where necessary, surveyors retraced their steps in order to check the continued presence of previously recorded birds.

The location and activity of birds were recorded using standard (BTO) codes and the position of each bird was mapped at the point it was first detected. At the end of each visit a summary map was compiled showing the location of each identified territory or breeding pair. Population estimates were derived by comparing the summary maps for the four surveys and identifying distinct territories (Marchant, 1983), plotted centrally by convention and assessing breeding behaviours and spatial locations to establish breeding status.

Based on diagnostic evidence each detected species is categorised as:

- **Confirmed breeding** – single and/or pair of birds exhibiting breeding behaviour or evidence of breeding including i) courtship or territorial display (on multiple visits); ii) alarm calling or agitated behaviour by adult(s) indicating the presence of a nearby nest or young (e.g. repetitive alarm calling, distraction display); iii) territorial dispute; iv) fledged young; v) nest building; vi) active nest or recently used nest; vii) adults removing faecal sac; viii) adult(s) carrying food;
- **Probable breeding** – single or pair of birds occupying suitable breeding habitat and exhibiting breeding behaviour (e.g. singing) **or** pair of birds occupying suitable breeding habitat but not exhibiting breeding behaviour or evidence of breeding;
- **Possible breeding** – single birds occupying suitable breeding habitat and not exhibiting breeding behaviour or evidence of breeding; and
- **Non-breeding** – sightings of birds commuting, foraging or flying above the Site and exhibiting no attachment to the Survey Area.

Each detected species, from breeding surveys were classified according to regional and national conservation status as red, amber or green listed (Colhoun & Cummins, 2013[13]; Eaton et al., 2015[14]).

7.2.5 Wintering Bird Surveys (WBS)

Winter bird surveys were carried out using transects covering the whole Survey Area and 500 m Survey Area during the winter period from September to February. Surveys covered the ground systematically with constant search effort and all points within the Survey Area and 500 m Survey Area were closely approached to within 50-100 m depending on accessibility.

The surveyor paused at regular intervals to scan and listen for calling and singing birds. Where accessibility was constrained the surveyor stopped and scanned with binoculars and listened for bird song/calls. Patches of scrub, isolated trees, rocky outcrops, streams, water-bodies, buildings and linear features such as hedge rows and trees were investigated closely. Improved pasture was scanned with binoculars and observed for short periods to identify foraging areas of extant species.

Species locations, numbers and brief description of behaviours were plotted, at the point they were first detected, using standard BTO codes on hard copy maps and/or by GPS on a recording form. Each detected species from breeding surveys were classified according to regional and national conservation status as red, amber or green listed (Colhoun & Cummins, 2013; Eaton et al., 2015).

[13] Colhoun, K. & Cummins, S. (2013). Birds of conservation concern in Ireland 2014 – 2019. Irish Birds 9: 523-544.
[14] Eaton MA, Aebischer NJ., Brown AF., Hearn R., Lock L., Musgrove AJ., Noble DG., Stroud D. and Gregory R.D (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. British Birds 108, pp 708–746[14]

7.2.6 Breeding Vantage Point (BVP) and Wintering Vantage Point (WVP) Surveys

Vantage point surveys were carried out over the breeding period from March to August and over the wintering period from September to February / March) in order to collect information on flying heights, distribution and occurrence of target species (**Table 7.1**; SNH, 2005).

Focal observations from four vantage points over-looking the Site were utilised to assess target species activity, flight height and flight routes in a hierarchical fashion (see **Table 7.1**). Where target species were recorded inside the Survey Area and 500m Survey Area the detection time, flight trajectory, flight duration (to the nearest second) and flight height were assigned within stratified height bands (<10 m, 10 m – 20 m, 20 m – 40 m, 40 m – 60 m, 60 m – 100 m, 100 m – 120 m; 120 m – 180 m; >180 m) to reflect the parameters of the existing and proposed turbines and flying height above ground level was recorded visually at detection and at 15 second intervals using an audible countdown timer.

The breeding and wintering vantage points were located outside the 500 m Survey Area, where possible, to minimise effects of observer disturbance to bird activity and/or behaviour. Based on topographical constraints and in order to ensure clear visibility of key ornithological habitats some of the vantage point locations inside the Survey Area but given existing infrastructure, windfarm operational activities and agricultural activity inside the survey area no key constraints or disturbances are considered to have occurred or been derived due to the location of these vantage points.

Observers scanned a 180° arc (**Figures 7.73 & 7.74**) both visually and with binoculars (Leica 8-12 x 40). Weather conditions were recorded at hourly intervals from the start of the focal observation until the end of the observation period. The weather conditions recorded included cloud cover, cloud height (estimated in metres from height above ground level), wind direction and speed (Beaufort Scale), precipitation and visibility (km). A range of diurnal and crepuscular times and weather conditions were sampled.

7.2.7 Migration Vantage Point (MVP) Surveys

Focal observations of target species were carried out from a single vantage point located to assess the spatial distribution and occurrence of migrating birds over-flying the Development. Bird migration occurs in two distinct seasonal periods' i.e. autumn migration arbitrarily defined from September to November and spring migration arbitrarily defined from late January to late March/early April.

The minimum recommended survey effort is 36 hours for each seasonal period (SNH, 2005) although it is recognised survey scope may be lower for re-powering developments (SNH, 2014). A range of times and weather conditions were sampled although migration surveys were not conducted during periods of high winds or persistent heavy rain. However, when encountered, intermittent periods of poor visibility (i.e. fog) were surveyed using auditory techniques.

The autumn migration vantage point (AMVP) and spring migration vantage point (SMVP) were selected on elevated ground to maximise visibility and covered a viewing arc of 180° facing north (in autumn) and south (in spring) of the Survey Area (**Figure 7.1**) to maximise the detection of arriving and/or localised movements of over-flying migrants.

Target species were defined primarily as the migratory species generally detected in Northern Ireland; (**Table 7.1**) although all vantage point target species were also included (**Table 7.1**). Whilst, preferably, vantage points should not be located outside the development boundary, where possible, to minimise effects of disturbance on bird activity and/or behaviour, due to topographical constraints it was necessary to locate the MVP within the Survey Area (**Figure 7.1**) to facilitate detection of migrant birds over the Survey Area and 500 m Survey Area and track flight(s) when detected.

Weather conditions were recorded at hourly intervals from the start of the focal observation until the end of the observation period. The weather conditions recorded included cloud cover, cloud height (estimated in metres from height above known landscape features), wind direction and speed (Beaufort Scale), precipitation and visibility (km). A range of diurnal and crepuscular times and weather conditions were sampled.

The methodology for the surveys for the MVP are the same as that for the breeding and wintering birds vantage points detailed above.

7.2.8 Breeding Priority Species Surveys (PSS)

Breeding priority species searches were carried out between March and August to establish if suitable habitat(s) contained breeding target species (**Table 7.1**) to identify risk species for turbine collision or displacement. These searches include specific assessments of the suitable habitat(s) to identify nesting distribution and breeding status for species of high

conservation concern notably Annex I (EU Birds Directive; **Technical Appendix 7.2)**, Irish Wildlife Acts 1976 to 2018, Schedule 1 (Wildlife (Northern Ireland) Order 1985) and Birds of Conservation Concern (Colhoun & Cummins, 2013; Eaton *et al.,* 2015; **Table 7.1**) within the 2 km Survey Area.

7.2.9 Raptor surveys

Surveys for breeding raptors specifically followed prescribed methods (Hardey et al., 2006; 2009; 2013; Ruddock et al., 2012; 2016) between March and August. For breeding locations, each detected species is categorised the same as for breeding bird surveys as confirmed, probable or possible. Priority species search effort was primarily undertaken outside the 500 m and 800 m Survey Areas since vantage point and transect breeding bird surveys were concentrated in these areas, and nesting target species would be identified during these surveys.

Specifically for hen harriers, the 5 km Survey Area was thoroughly searched and suitable habitats were identified up to 5 km from the Survey Area (Norriss 2006[15]; **Figures 7.1, 7.2, 7.3**) during the breeding season. This included areas of deep, contiguous heather *Calluna vulgaris* and pre-thicket stage coniferous forest plantations which were surveyed following standardised best practice (Ruddock et al., 2012; Hardey et al., 2013[16], Ruddock et al., 2016). Vantage points were chosen to offer unrestricted views over suitable habitat within these categories to watch for target species. The nearest known territory and/or optimal hen harrier habitat was also surveyed.

Raptor surveys were undertaken for merlin with additional walkover effort along the edges of mature conifer plantations following standardised best practice (Ewing et al., 2011[17], Hardey et al., 2013) to look for signs e.g. prey remains and/or suitable old crow nests occupied by merlin. Surveys were conducted over the course of the breeding season March to August inclusive. All target species seen during vantage points were recorded. Details of search effort, weather conditions and locations of breeding attempts and/or territories were reported and/or mapped where relevant including confidentially where required (Norris, 2006; SNH, 2017).

7.2.10 Red grouse surveys

Additional breeding season surveys were carried out for red grouse in April and August. This method comprised dusk and / or dawn counts for calling grouse to establish the abundance and distribution within the 500 m Survey Area (Natural Research, 2007). Surveys were carried out, from a vantage point, at dusk to familiarise the observer with the area and location of birds and counts were conducted again at dawn the following morning.

The observers were positioned at strategically located vantage points that afforded comprehensive coverage of the 500 m Survey Area. All parts of the 500 m Survey Area were within approximately 1 km of a vantage point. The dusk count commenced one hour before dark and continued until no further cocks were heard. Dawn counts began 30 minutes before first light and continued until one hour after dawn.

Observers listened intently for calling grouse. When a bird was heard, its sex was determined, the time noted, and a compass bearing of its location taken together with an estimate of distance from the observer. This procedure was repeated for each new grouse heard or seen. Observers compared registrations at the end of the survey to establish if any calls were duplicated. In August, an extensive walkover survey was conducted to identify the locations of red grouse coveys, if any, within the Site and 500 m Survey Area.

7.2.11 Wader surveys

Curlew, lapwing and snipe were also specifically targeted during searches between March and August and additional walkover surveys were conducted where required. These included “dusk” surveys during May to look and listen for displaying (‘drumming’ and ‘chipping’) snipe within survey buffers and also locations which were recorded from vantage points.

Curlew were surveyed using vantage point and walkover surveys at suitable habitat and all sightings of curlew were followed up to establish breeding activity. To establish the location of curlew, lapwing and snipe territories; cumulative analyses were

[15]Norriss, D. (2006). Recommended methodology for assessment of impacts of proposed windfarms on breeding hen harrier within the known range of the species in Ireland. Unpublished report

[16] 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.

[17] Ewing, S.R., Rebecca, G.W., Heavisides, A., Court, I.R., Lindley, P., Ruddock, M., Cohen, S. & Eaton, M.A. (2011). Breeding status of Merlins Falco columbarius in the UK in 2008. Bird Study 58: 379-389.

undertaken which integrated observations from the vantage points, breeding bird surveys and priority species searches to identify distinct territories.

7.2.12 Wintering Priority Species Surveys

During the winter, between September and March, surveys were carried out to identify a range of target species (**Table 7.1)** and particularly hen harrier winter roosts and whooper swan roosting and foraging areas and/or commuting routes. Surveys for winter roosting hen harriers were carried out at suitable habitat (Hardey et al., 2009) at dawn and/or dusk.

Whooper swan surveys were carried out within all parts within the 2 km Survey Area during each survey visit. These latter surveys including driving and/or walking all parts of the 2 km Survey Area, with short vantage point or walkover surveys completed at areas not visible from the road. Simultaneously, wider (5-10 km) searches were carried out to identify the nearest whooper swan wintering areas and desktop reviews of published whooper swan wintering areas (Robinson et al., 2004).
During whooper swan surveys, swans (and any other waterbirds or wildfowl) were counted during short vantage point observations with telescope (Leica APO Televid x 20-60) and/or binoculars and the location recorded according to the nearest townland name. Records of swan movements and/or direction of movements were recorded during surveys.

7.2.13 Survey efforts

The extensive suite of surveys undertaken for the Development spanned a two-year period (2017 – 2019) and were undertaken by Bird Surveyors Ltd on behalf of ScottishPower Renewables by experienced and expert ornithologists including Dr Marc Ruddock, Mr Andrew Murray, Mr Douglas Ruddock, Mr Craig Swenarton, Mr Jamie Bailey, Mr Shane O'Neill and Mr Kevin Mawhinney. Several hundred hours were undertaken in survey effort to inform the baseline assessment and ornithological analysis (**Table 7.3**).

Table 7.3: Survey Effort

Survey Type	Survey Season	Timeframe	Hours completed
Breeding Walkover Surveys	Mar – Jul	Mar 2017 – Aug 2017; Mar 2018 – Aug 2018	96 hours 96 hours
Wintering Walkover Surveys	Sep – Feb	Sep 2017 – Feb 2018; Sep 2018 – Feb 2019	46 hours 46 hours
Breeding Vantage Point Surveys	Mar - Aug	5 VPs Mar 2017 – Aug 2017 5 VPs Mar 2018 – Aug 2018	36 hours per VP per season
Wintering Vantage Point Surveys	Sep – Feb / Mar	5 VPs Sep 2017 – Feb 2018 5 VPs Sep 2018 – Mar 2019	36 - 39 hours per VP per season
Spring Migration Vantage Point Surveys	Jan – Apr (spring)	1 VP Jan 2018 – Apr 2018 1 VP Jan 2018 – Apr 2019	36 hours per VP per season
Autumn Migration Vantage Point Surveys	Sep – Nov (autumn)	1 VP Sep 2017 – Nov 2017 1 VP Sep 2018 – Nov 2018	36 hours per VP per season
Breeding Priority Species	Mar - Aug	Mar 2017 – Aug 2017 Mar 2018 – Aug 2018	185 hours 165 hours
Wintering Priority Species	Sep – Feb	Sep 2017 – Feb 2018 Sep 2018 – Feb 2019	127 hours 138 hours

7.3 Baseline conditions

This section details the technical findings from the suite of desktop and literature reviews and field surveys undertaken for the Development. The key parameters at this Site are that the baseline comprises the Operational Barnesmore Windfarm with associated infrastructure and 25 Vestas V42 600 kW turbines which have been in operation since 1997.

7.3.1 Review of Site Sensitivities & Designations

The Site is not located within any nationally or internationally designated sites for ornithological features (see **Figure 7.4**) however the Site is located within a nationally designated Natural Heritage Area (NHA).

There were 13 designated sites within 5 km Survey Area (**Figure 7.4; Technical Appendix 7.2**) and a total of 67 designated sites identified within 20 km of the Site (**Figure 7.3**; **Technical Appendix 7.2**) although some of these were spatially contiguous with one another. These designated sites ranged in size from 0.8 ha to 10,455 ha and were located from 0 m (i.e. within the designation) to 22 km away from the nearest existing turbine (**Technical Appendix 7.2**).

There were 42 designated sites identified in Ireland and included 15 SAC, 5 SPA and five NHA designations and 17 sites were identified as pNHA for which limited spatial or descriptive information was available (**Technical Appendix 7.2**). There were 25 designated sites or site complexes identified within 20 km but spatially located within Northern Ireland including three SAC, one SPA, one RAMSAR, 13 ASSI and two Nature Reserve designations (**Figure 7.4; Technical Appendix 7.2**).

Most pertinent to the Site are those closest to the Operational Barnesmore Windfarm and the wider landownership areas (**Figures 7.1 & 7.3; Technical Appendix 7.2**). Most of the landownership and 22 of the 25 existing turbines are spatially located within the Barnesmore Bog NHA (**Figures 7.1 & 7.3**). There is inconsistent spatial referencing of the existing windfarm turbines and this NHA designation (**Chapter 6: Biodiversity**) which appears to have attempted to exclude the turbines and tracks in the designation, but the boundary does not correspond with actual locations of turbines and/or orthophotography of the track layout.

The basic designation for wildlife in Ireland is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals where habitat needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation. NHAs are not named under the requirement for Appropriate Assessment by NPWS, since they are not European designations.

The designation of Barnesmore Bog NHA was undertaken (2005) after the construction of the windfarm (1997). Each NHA has a conservation management plan and details on the designation process for Barnesmore Bog NHA were available from NPWS (www.npws.ie/sites/default/files/general/Site%20Designation%20Process%2016%20Feb%202012.pdf). The Barnesmore Bog is subject to statutory protection under statutory instrument 450/2005 (www.irishstatutebook.ie/eli/2005/si/450/made/en/print).

The Barnesmore Bog NHA is a national designated site for peatlands (blanket bog and heath habitats). Three bird species, golden plover, peregrine and red grouse, are also recorded in the citation documents (**Table 7.3**; **Technical Appendix 7.2**) which also indicates that peregrine falcons have been known to nest on the steep slopes of Barnesmore Gap.

Immediately adjacent to the Site Boundary, within Northern Ireland, is the Killeter Forest and Bogs and Lakes ASSI designated for blanket bog and oligotrophic lakes but which also indicates that the area provided habitat for hen harrier, red grouse and Greenland white-fronted goose.

Within the suite of designated sites within 20 km of the Site there are 55 bird species (see **Technical Appendix 7.2**) recorded as either designation site features or assemblage species or additional citation species. These include arctic tern, barnacle goose, bar-tailed godwit, Bewick's swan, black-headed gull, black-throated diver, chough, common gull, common scoter, common terns, coot, corncrake, cormorant, curlew, dunlin, eider, great northern diver, Greenland white-fronted goose, greenshank, grey heron, greylag goose, golden plover, goldeneye, hen harrier, herring gull, kestrel, lapwing, lesser black-backed gull, light-bellied brent goose, long-tailed duck, mallard, merlin, mute swan, oystercatcher, peregrine falcon, pochard, raven, red-breasted merganser, red grouse, red-throated diver, redshank, ring ouzel, ringed plover, sanderling, sandwich terns, scaup, shelduck, snipe, stonechat, teal, tufted duck, turnstone, whooper swan, wigeon and woodpigeon.

Within 5 km of the Site Boundary (**Figure 7.1**; **Table 7.4; Technical Appendix 7.2**) only a smaller subset of 18 species are recorded including common gull, curlew, golden plover, Greenland white-fronted goose, goldeneye, greylag goose, hen harrier, herring gull, kestrel, lesser black-backed gull, mallard, merlin, peregrine falcon, red grouse, red-throated diver, ring ouzel, snipe and tufted duck.

Within 15 km (as required by NPWS 2019; scoping response; **Table 7.4**) the key ornithological sites to be considered are Pettigoe Plateau SPA (5-6 km white-fronted goose; 1996), Lough Derg SPA (6-7 km; lesser black-backed gull; herring gull; 1995), Donegal Bay SPA (10-11 km; northern diver, light-bellied brent goose, common scoter, sanderling and wintering waterbird assemblage; 2004), Lough Nillan Bog SPA (14-15 km; merlin, golden plover, white-fronted goose, dunlin; 1996), Pettigoe Plateau SPA (NI) (14-15 km; golden plover, white-fronted goose; 1996). Four of these five SPA sites were designated just prior to the construction of the Operational Barnesmore Windfarm (1995 – 1996) whilst one was after the construction of the windfarm (2004).

There are several other designated sites including NHAs, SACs up to 15 km from the Site Boundary some of which cite ornithology features (see **Table 7.4**). Additionally, baseline surveys and assessment (**Chapter 7: Ornithology**) will consider any flight path connectivity between designated sites. Adjacent windfarms at Meenbog and Meenadreen are located spatially closer to a number of these SPA sites and which have been consented in recent years (see further details in cumulative analysis in **Chapter 7: Ornithology**).

Table 7.4: Details of designated sites within 15 km of the Site (EX = existing turbines; PR = proposed turbines; LAND = landownership)

Site Name	ROI / NI	Designation	EX (km)	PR (km)	LAND (km)	Primary Features	Secondary (vertebrate) features
Barnesmore Bog NHA	ROI	NHA	0.0	0.0	0.0	Peatlands [4]	Irish Hare, Badger, Red Grouse, Golden Plover, Peregrine Falcon, Common Frog
Killeter Forest and Bogs and Lakes	NI	ASSI	0.1	0.2	0.0	Blanket bog, Oligotrophic lakes	Hen harrier, Red grouse, Greenland white-fronted geese
Lough Eske And Ardnamona Wood SAC	ROI	SAC	2.3	2.4	0.1	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110], Petrifying springs with tufa formation (Cratoneurion) [7220], Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0], Margaritifera margaritifera (Freshwater Pearl Mussel) [1029], Salmo salar (Salmon) [1106], Trichomanes speciosum (Killarney Fern) [1421]	Atlantic Salmon, Freshwater Pearl Mussel (Margaritifera margaritifera), Arctic Char (Salvelinus alpinus)
River Foyle and Tributaries	NI	SAC	2.6	2.7	2.4	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (3260), Otter (Lutra lutra) (1355), Atlantic Salmon (Salmo salar) (1106)	Atlantic salmon
River Foyle and Tributaries	NI	ASSI	2.6	2.7	2.4	River	Brown Trout, Atlantic Salmon, Stone Minnow, Eel, 3-spined Stickleback, Brook Lamprey, River Lamprey, Roach, Perch, Common Bream, Pike, Rudd, Sea Lamprey, Gudgeon, Flounder, Allis Shad, Twaite Shad
Killeter Forest	NI	NR	3.3	3.3	3.1	Peatland	Greenland white-fronted geese
Croaghonagh Bog SAC	ROI	SAC	3.4	3.4	3.0	Blanket bogs (Active) [7130]	Greenland White-fronted Goose, Merlin, Red Grouse, Curlew, Kestrel, Deer, Otter, Hare
Cashelnavean Bog NHA	ROI	NHA	3.6	3.6	3.3	Peatlands [4]	Red grouse, fox, snipe

Site Name	ROI / NI	Designation	EX (km)	PR (km)	LAND (km)	Primary Features	Secondary (vertebrate) features
Dunragh Loughs/Pettigo Plateau SAC	ROI	SAC	4.0	3.2	2.3	Northern Atlantic wet heaths with Erica tetralix [4010], Blanket bogs (* if active bog) [7130]	Merlin, Golden Plover, Greenland White-fronted Goose (120 birds in 1994/95), Red-throated Diver, Red Grouse
Lough Hill Bog NHA	ROI	NHA	5.9	5.9	5.5	Peatlands [4]	Hen Harrier, Golden Plover, Red Grouse, Badger
Croagh Bog	NI	ASSI	5.9	5.9	5.5	Blanket Bog	
Pettigo Plateau Nature Reserve SPA	ROI	SPA	6.2	5.4	4.3	Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]	Greenland White-fronted Goose, Merlin, Hen Harrier
Essan Burn and Mullyfamore	NI	ASSI	6.4	6.4	6.0	Blanket bog	Greenland white-fronted geese, Red grouse
River Finn SAC	ROI	SAC	6.7	6.5	4.9	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110], Northern Atlantic wet heaths with Erica tetralix [4010], Blanket bogs (* if active bog) [7130], Transition mires and quaking bogs [7140], Salmo salar (Salmon) [1106], Lutra lutra (Otter) [1355]	Arctic Char (Salvelinus alpinus), Atlantic Salmon (Salmo salar), otter, Badger, Irish Hare, Common Frog, Golden Plover, Peregrine, Merlin, Red Grouse, Ring Ouzel
Meenagarranroe Bog NHA	ROI	NHA	6.8	6.8	6.4	Peatlands [4]	Irish Hare, Hen Harrier, Golden Plover, Merlin, Red Deer
Lough Derg (Donegal) SPA	ROI	SPA	7.1	6.5	5.7	Lesser Black-backed Gull (Larus fuscus) [A183], Herring Gull (Larus argentatus) [A184]	Lesser Black-backed Gull, Herring Gull, Common Gull, Greenland White-fronted Goose, Tufted Duck, Mallard, Goldeneye, Greylag Goose, Arctic Char (Salvelinus alpinus)
Lough Fad Bog NHA	ROI	NHA	10.5	9.7	8.8	Peatlands [4]	Golden Plover, Hen Harrier, Red Grouse, Atlantic Salmon, Otter
Donegal Bay (Murvagh) SAC	ROI	SAC	11.4	10.7	7.7	Mudflats and sandflats not covered by seawater at low tide [1140], Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130], Humid dune slacks [2190], Phoca vitulina (Harbour Seal) [1365]	Common Scoter, Brent Goose, Ringed Plover, Oystercatcher, Dunlin, Greenland White-fronted Goose, Common Seal
Donegal Bay SPA	ROI	SPA	11.4	10.7	7.7	Great Northern Diver (Gavia immer) [A003], Light-bellied Brent Goose (Branta bernicla hrota) [A046], Common Scoter (Melanitta nigra) [A065], Sanderling (Calidris alba)	Great Northern Diver, Light-bellied Brent Goose, Common Scoter, Sanderling, Black-throated Diver, Red-throated Diver, Cormorant, Shelduck, Wigeon, Mallard,

Site Name	ROI / NI	Designation	EX (km)	PR (km)	LAND (km)	Primary Features	Secondary (vertebrate) features
						[A144], Wetland and Waterbirds [A999]	Longtailed Duck, Red-breasted Merganser, Oystercatcher, Ringed Plover, Golden Plover, Lapwing, Dunlin, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Turnstone, Black-headed Gull, Common Gull
Tamur Bog SAC	ROI	SAC	12.5	11.5	10.1	Northern Atlantic wet heaths with Erica tetralix [4010], Blanket bogs (* if active bog) [7130], Depressions on peat substrates of the Rhynchosporion [7150]	Golden Plover, Hen Harrier, Merlin, Greenland White-fronted Goose, Red Grouse, Otter, Irish Hare, Badger, Common Lizard, Common Frog
Meenaguse Scragh SAC	ROI	SAC	12.6	12.8	10.5	Northern Atlantic wet heaths with Erica tetralix [4010]	Peregrine, Common Frog, Irish Hare
Meenaguse / Ardbane Bog SAC	ROI	SAC	12.6	12.8	10.4	Blanket bogs (Active) [7130]	Greenland White-fronted Goose
Lough Nageage SAC	ROI	SAC	14.4	14.4	13.8	Austropotamobius pallipes (White-clawed Crayfish) [1092]	Otter, Irish Hare, Common Frog
Lough Nillan Bog (Carrickatlieve) SAC	ROI	SAC	14.9	15.1	12.8	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110], Blanket bogs (Active) [7130]	Golden Plover, Merlin, Greenland Whitefronted Goose, Badger, Irish Hare
Lough Nillan Bog SPA	ROI	SPA	14.9	15.1	12.8	Merlin (Falco columbarius) [A098], Golden Plover (Pluvialis apricaria) [A140], Greenland White-fronted Goose (Anser albifrons flavirostris) [A395], Dunlin (Calidris alpina schinzii) [A466]	Greenland White-fronted Goose, Merlin, Golden Plover, Dunlin (subsp. schinzii), Red-throated Diver
Pettigoe Plateau RAMSAR Site	NI	RAMSAR	15.8	14.9	13.7	Blanket Bog, Birds	Golden plover, Hen harrier, Merlin, Greenland white-fronted goose
Pettigoe Plateau	NI	SAC	15.8	14.9	13.7	Natural dystrophic lakes and ponds (3160), Blanket bogs (* if active bog) * Priority feature (7130), Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea (3130), Northern Atlantic wet heaths with Erica tetralix (4010), European dry heaths (4030)	
Pettigoe Plateau	NI	SPA	15.8	14.9	13.7	Breeding golden plover, wintering Greenland white-fronted goose	Golden plover, hen harrier, merlin, dunlin, common tern, lapwing, curlew, snipe

Site Name	ROI / NI	Designation	EX (km)	PR (km)	LAND (km)	Primary Features	Secondary (vertebrate) features
Pettigoe Plateau	NI	ASSI	15.8	14.9	13.7	Blanket bog, Dry heath, Dystrophic lakes, Oligotrophic lakes, Wet heath	Golden Plover, Dunlin, Lapwing, Curlew, Snipe, Hen Harrier, Common Tern, Greenland White-fronted Geese
Lough Golagh And Breesy Hill SAC	ROI	SAC	17.1	16.0	14.3	Blanket bogs (* if active bog) [7130]	Badger, Common Tern (40 pairs in 1984, 9 nesting sites in 1992), Black-headed Gull (350 pairs in 1977, 256 nesting sites in 1992), Grey Heron, Kestrel, Raven, Red Grouse, Snipe, Stonechat, Woodpigeon
Ballintra SAC	ROI	SAC	17.2	16.2	13.9	European dry heaths [4030], Limestone pavements [8240]	

7.3.2 Review of published data and data requests

A range of desktop data reviews were undertaken, including during an ornithological scoping exercise by SPR in 2016 to establish and identify the range of target species for surveys and / or assessment of key ornithological receptors and / or pathways for significant effects on ornithology. The Survey Area and associated 500 m buffer, 2 km buffer, 5 km buffer, 10 km buffer and 15 km buffer (**Figures 7.1 & 7.3; Technical Appendix 7.2**) are located within 10 km squares IH08 and also IH07, IG98 and IG97. Data requests and reviews have been undertaken with NBDC, NBN, BTO, personal knowledge of the authors and published literature. Data from NPWS is presented in **Chapter 6: Biodiversity**.

7.3.2.1 National Biodiversity Data Centre (NBDC) & National Biodiversity Network (NBN)

National Biodiversity Data Centre (NBDC) and National Biodiversity Network (NBN) provide an extensive database of species occurrence within UK & Ireland.

Data reviews for NDBC for the 10 km squares within and surrounding the Survey Area and associated buffers (**Figure 7.1**; H08, H07, G98 and G97) revealed that there were 82 species recorded in H08, 95 species in H07, 91 species in G98 and 122 species in G97 (**Table 7.5; Technical Appendix 7.2; TA7.5**). Within H08, which contains the Survey Area and associated buffers (**Figure 7.1; Technical Appendix 7.2**), there were 15 red-listed and 27 amber-listed species recorded of conservation priority in Ireland (Colhoun & Cummins, 2013).

Data reviews for NBN for the 10 km squares within and surrounding the survey buffers (**Figure 7.1**; H08, H07, G98 and G97) revealed that there were 75 species recorded in H08, 77 species in H07, 83 species in G98 and 103 species in G97 (**Table 7.5; Technical Appendix 7.2**). Within H08, which contains the core Site and buffers (**Figure 7.1; Technical Appendix 7.2**), there were 15 red-listed and 25 amber-listed species recorded of conservation priority in Ireland (Colhoun & Cummins, 2013).

Table 7.5: Details of bird species detected within 10 km squares IH08; IH07; IG98; IG97 from NBDC and NBN

Database	No. of species	Red-listed species	Amber-listed species	Green-listed species	NA
National Biodiversity Data Centre	140	22	48	69	1
National Biodiversity Network	117	22	42	53	0

7.3.2.2 Bird Atlas (BTO & BWI)

The Bird Atlas 2007 – 2011 (Balmer *et al.,* 2013[18]) is the key resource for the UK & Ireland for understanding bird distribution, breeding / wintering status and abundance. All these data are published based on 10 km grid resolution, but some records are resolved to tetrad (2 km x 2 km) and these are described where available (**Technical Appendix 7.2**).

Key data were obtained for 10 km square H08 which showed 62 species were recorded (**Technical Appendix 7.2**) of which 54 species were recorded breeding and the remainder (8 species) were recorded only in the wintering season. Not all of these species will be breeding or wintering on the specific sites but it is shown that a wide range of bird species occur in the area.

Based on Irish conservation status (Colhoun & Cummins, 2013) there were five red-listed and 20 amber-listed species (**Technical Appendix 7.2**) and there were 14 red-listed and 12 amber-listed species recorded of conservation priority in the UK (Eaton et al., 2015). There were five raptor species recorded (buzzard, hen harrier, kestrel, peregrine and sparrowhawk; **Technical Appendix 7.2; TA7.5**). There were three wader species recorded common sandpiper, golden plover and woodcock (**Technical Appendix 7.2; TA7.5**). No curlew or snipe were recorded in H08 and no swan or geese species either during 2007 – 2011 surveys.

Extending out into the 2 km buffer (**Figures 7.1**) in H07 the BTO data (**Technical Appendix 7.2**) recorded 60 bird species with six red-listed and 20 amber-listed species in Ireland (Colhoun & Cummins, 2013) and there were 12 red-listed and 16 amber-listed species recorded of conservation priority in the UK (Eaton et al., 2015). Similarly in G98, which also encompasses part of the 2 km Survey Area there were 58 species recorded (**Technical Appendix 7.2**) of which five were red-listed and 18 were amber-listed species (Colhoun & Cummins, 2013) and there were 11 red-listed and 13 amber-listed species recorded of conservation priority in the UK (Eaton et al., 2015).

A confidential database from the BTO confirmed that buzzard, golden plover, hen harrier and peregrine were recorded in H08 whilst buzzard, hen harrier, golden eagle and whinchat were recorded in H07 and buzzard and ring ouzel were recorded in G98 (**Technical Appendix 7.2; TA7.5**).

7.3.2.3 Raptor review

Based on historical surveys the author (Dr Marc Ruddock) records the presence of five different raptor species at the 10 km square resolution within H08, namely; buzzard, hen harrier, kestrel, peregrine and sparrowhawk (**Table 7.6**). In the nearby H07 there were seven species recorded (**Table 7.7**) namely; buzzard, hen harrier, golden eagle, kestrel, sparrowhawk and snowy owl, although the latter was not known to breed.

Hen harriers in this area are primarily located in young forest plantations and/or heather lacunas within the forest plantations (M. Ruddock, personal observation) rather than on open moorland and are not known to occur within the Site or within 500 m, but certainly occur within 2 – 5 km including in recent years (M. Ruddock, personal observation).

A review of published data for hen harrier is available from recent national hen harrier surveys (Ruddock et al., 2012; 2016). In 2010, there were two pairs of hen harrier recorded in H08 in Ireland plus an additional two pairs in Tyrone (Northern Ireland; Hayhow et al., 2013) and 1-2 pairs recorded in H07 (Ruddock et al., 2012) whilst none were apparently recorded in G97 or G98. The most recent population estimate for Ireland is 108 – 157 hen harrier territories (Ruddock et al., 2016).

In 2015, there was one pair of hen harriers recorded in H08 (excluding Northern Ireland) and 2-3 pairs in H07 (excluding Northern Ireland; Ruddock et al., 2016). In 2015, there were also other raptors and priority species recorded including buzzard (G97, H07 & H08), curlew (H08), golden eagle (G98), kestrel (H07) and merlin (H07). In 2016 UK national hen harrier surveys (Wotton et al., 2018) there were 1-2 pairs in H07 and one pair in H08 (M. Ruddock, personal observation). The most recent population estimate for Northern Ireland is 30 – 46 territorial pairs (Wotton et al., 2018).

Collectively then through various data sources 4-6 pairs of hen harrier may occur within 10 km and breeding golden eagle are known to occur within 10 – 20 km of the existing windfarm at Barnesmore (**Figure 7.3**). SPR site staff at Barnesmore (G. Walsh & A. Totten, personal communication) have also reported recent sightings of golden eagles including in and around the windfarm.

[18] Balmer, D., Gillings, S., Caffrey, B., Swan, B., Downie, I. & Fuller, R. (2013). Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland. British Trust for Ornithology.

The historical knowledge from this area of Dr Marc Ruddock and the various data reviews (NBDC; NBN; BTO; NIRSG) records the presence of eight different raptor species at the 10 km square resolution within IH08; IH07; IG98 and IG97 namely; barn owl, buzzard, golden eagle, hen harrier, kestrel, merlin, long-eared owl, peregrine, snowy owl and sparrowhawk (**Table 7.6; Technical Appendix 7.2; TA7.5**).

Table 7.6. Details of raptor species known to occur within adjacent 10 km squares

Latin name	Common name	Species	IH08	IH07	IG98	IG97
Tyto alba	Barn owl	BO	-	Present	Present	Present
Buteo buteo	Buzzard	BZ	Present	Present	Present	Present
Aquila chrysaetos	Golden Eagle	EA	-	Present	Present	-
Accipiter gentilis	Goshawk	GI	-	-	-	-
Circus cyaneus	Hen harrier	HH	Present	Present	-	Present
Falco subbuteo	Hobby	HY	-	-	-	-
Pernis apivorous	Honey Buzzard	HZ	-	-	-	-
Falco tinnunculus	Kestrel	K.	Present	Present	Present	Present
Asio otus	Long-eared owl	LE	-	-	-	Present
Circus aeruginosus	Marsh harrier	MR	-	-	-	-
Falco columbarius	Merlin	ML	-	-	Present	-
Pandion halietus	Osprey	OP	-	-	-	-
Falco peregrinus	Peregrine	PE	Present	Present	Present	Present
Milvus milvus	Red Kite	KT	-	-	-	-
Milvus migrans	Black kite	KB	-	-	-	-
Asio flammeus	Short-eared owl	SE	-	-	-	-
Accipiter nisus	Sparrowhawk	SH	SH	SH	SH	SH
Haliaeetus albicilla	White-tailed eagle	WE	-	-	-	-
Bubo scandiacus	Snowy owl	SO		Sightings only		

7.3.2.4 Swans & geese

Both mute and whooper swans are recorded in various data sources including in square H08. Robinson et al., (2004) published All-Ireland whooper swan wintering sites and more recently whooper swan have been recorded breeding in Ireland (including in Donegal; see Balmer et al., 2013). Based on these published data wintering whooper swan are known to occur closest at 13.4 km from the Site but ranged between 13.4 km and 36.2 km (**Figure 7.5**) away from the Site and were 16.9 km and 16.1 km away from existing and proposed turbines respectively.

Other data sources collated here have recorded whooper swans in other areas including all four 10 km squares (H08; H07; G98; G97; **Technical Appendix 7.2; TA7.5**) and some were recorded in these primary scoping surveys in November 2016 during migration season including during dawn roost watches. Recent Bird Atlas data (Balmer et al., 2013) recorded none in H08, but there were two records in G98 (including tetrad N; **Technical Appendix 7.2; TA7.5**) and one in each of H07 and H18 (P. Lack, personal communication).

Therefore cumulatively, whooper swan are recorded to occur in other 10 km squares over a much wider area including the Site (**Technical Appendix 7.2; TA7.5**) and there are numerous potential suitable stop-over or roosting loughs (**Figure 7.5**) although this prediction was examined during more extensive bird surveys.

Data reviews identified greylag geese, light-bellied Brent geese, Canada geese and white-fronted geese (greater and Greenland) with the latter historically recorded in both H07 and H08 the former which includes the designated sites for the

species. There are numerous potential suitable stop-over or roosting loughs (**Figure 7.2**) although this prediction was examined during more extensive bird surveys.

7.3.2.5 Waders & red grouse

The biodiversity databases record several waders including bar-tailed godwit, curlew, snipe, dunlin, dotterel, greenshank, knot, woodcock, golden plover, common sandpiper, greenshank, lapwing, oystercatcher, redshank, ringed plover, turnstone and woodcock (**Technical Appendix 7.2**) although no time frame (or season) of sightings is provided in those databases. Many of these species are associated with G97 (**Technical Appendix 7.2**) which has an extensive area of coastal habitat rather than indicative of upland breeding sites. Within H08 (the core square which covers the site) then seven species were recorded including curlew, dunlin, common sandpiper, golden plover, lapwing, snipe and woodcock.

In recent surveys (Balmer et al., 2013) there were only three species; common sandpiper, golden plover and woodcock recorded. The 10 km square H08 does not record any curlew or snipe in recent surveys (2007 – 2011; Balmer et al., 2013). This area, including within the landownership, is known to historically have held curlew in the previous Bird Atlas (1988 – 1991; Gibbons et al., 1994[19]) (**Technical Appendix 7.2; TA7.5**) although snipe were not recorded then (P. Lack, personal communication). The original EIS for the Barnesmore project (FEL; 1995) also cites high numbers of snipe as present in the Site / area but no spatial information was reported. Curlew were reported as potentially present in that study.

Golden plover, curlew and snipe appear to be the most likely priority breeding wader species based on these data and habitat is eminently suitable in and around the windfarm and landownership areas. Dunlin and woodcock may potentially occur although habitat may be largely unsuitable in the Survey Area for woodcock with an absence of woodland over most parts of the Survey Area (**Figure 7.2**).

Snipe, clearly do occur in the area as confirmed by scoping field surveys in 2016 and data reviews (NBDC and NBN) and extensive suitable habitat and it would be expected that these three species would occur during breeding bird surveys and field surveys shall confirm distribution and abundance, including within the Survey Area and in the wider 500 m and 800 m buffer area.

Red grouse surveys conducted by Allen et al., (2004) did not survey H08, nor G97, G98 or H07 and nearest records were from 10-15 km to the east but Cummins et al., (2010) do report red grouse occurrence in all four of these 10 km squares (their Figure 4). All aggregated data sources including NBN and BTO data requests confirm the presence of this species in the locality and field surveys shall confirm red grouse distribution and abundance, including within the Survey Area and in the wider 500 m Survey Area (**Figures 7.6**; **Technical Appendix 7.2; TA7.5**). The original EIS for the Barnesmore project (FEL, 1995[20]) also cites red grouse as potentially present in the Site but no spatial information was reported.

7.3.3 Field Surveys 2017 - 2018

The results of the range of surveys undertaken between 2017 and 2018 are described in further details here and then further analysis and interpretation is undertaken in **Chapter 7: Ornithology** of the EIAR.

The suite of surveys carried out during 2017 included breeding bird surveys, winter walkover surveys, breeding and wintering vantage point surveys, migration vantage point surveys and breeding and wintering priority species surveys. This suite of surveys was conducted over a 13-month period between January 2017 and February 2018.

7.3.3.1 Breeding Bird Surveys

Breeding season transect surveys were carried out between during April and July 2017 (**Table 7.7**). There were 96 hours and 35 minutes of transect surveys undertaken, covering the Survey Area and both the 500 m Survey Area, for all species, and the 800 m Survey Area, for priority species (curlew). All parts of the Survey Area were accessible (**Figure 7.7**) for walkover surveys although one part of the Site Boundary was revised but there were not considered to be any constraints to species detection (see also **Chapter 7: Ornithology**). Survey times ranged from 05.35 hrs to 18.10 hrs (**Table 7.7**) and covered a wide range of weather conditions.

[19] Gibbons, D.W., Reid, J.B. & Chapman, R.A. (1993). *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991.* London: Poyser.

[20] Forest Enterprise Ltd (FEL) (1995). Environmental Assessment of proposed windfarm at Barnesmore Gap County Donegal for ScottishPower. Final EIA May 1995.

Table 7.7 Summary of survey effort and weather during breeding bird surveys

Month	Day	Year	Obs	Start	End	Dur	Cloud Cover	Cloud Height (m)	Wind - Dir & Speed	Precip	Vis (km)
3	29	2017	AM	11:30	15:35	04:05	10	500	S3	NIL	5
3	30	2017	AM	08:45	11:45	03:00	10	550	S2	NIL	5
3	30	2017	MR	05:35	13:25	07:50	10	550	S2	NIL	5
4	20	2017	DR	13:35	17:05	03:30	10	600	W2-3	ILM-NIL	3-5
4	20	2017	CS	13:30	16:30	03:00	10	500	W4	NIL-ILR	5
4	20	2017	AM	13:35	16:35	03:00	10	500	W4	NIL	5
4	21	2017	AM	07:00	10:00	03:00	10	500	W3	ILR-NIL	4-5
4	21	2017	DR	07:15	09:45	02:30	10	500	W3	ILR-NIL	4-5
4	21	2017	MR	07:00	10:00	03:00	10	500	W3	ILR-NIL	4-5
4	21	2017	CS	07:00	10:00	03:00	10	500	W3	ILR-NIL	4-5
5	24	2017	MR	09:45	17:05	07:20	10	650	W2	NIL	5
5	24	2017	CS	09:30	16:40	07:10	10	650	W2	NIL	5
5	24	2017	DR	09:30	15:10	05:40	10	650	W2	NIL	5
6	23	2017	DR	11:10	18:10	07:00	8-10	800-600	W3	NIL-ILR	5
6	23	2017	CS	10:50	18:00	07:10	8-10	800-600	W3	NIL-ILR	5
6	23	2017	MR	10:50	16:10	05:20	8-10	800-600	W3	NIL-ILR	5
7	6	2017	CS	08:20	11:20	03:00	4-7	600	S1	NIL	5
7	22	2017	CS	09:30	11:30	02:00	6-8	600-700	E2	NIL	5
7	22	2017	MR	08:15	12:15	04:00	6-8	600-700	E2	NIL	5
7	25	2017	CS	12:20	15:20	03:00	10-3	600-750	E2-1	NIL	5
7	26	2017	CS	09:15	12:15	03:00	10-8	400-700	W3	ILR	5
7	27	2017	CS	08:15	12:15	04:00	10-9	500-650	SW3	ILR-NIL	5
7	28	2017	CS	10:20	12:20	02:00	10	500-700	SW3	ILR	5

There were 33 species recorded (**Table 7.7**) within the 500 m Survey Area (**Figure 7.1**) of which only five were red-listed species in Ireland (grey wagtail; golden plover; meadow pipit; ring ouzel and red grouse; Colhoun & Cummins, 2013) and seven UK red-listed species (Eaton et al., 2014; cuckoo; grey wagtail, linnet; mistle thrush; ring ouzel, skylark and song thrush). There were two key breeding species recorded beyond the 500 m Survey Area namely curlew and golden plover (**Figure 7.7**).

There were fewer species (26) recorded within the existing 500 m turbine buffer (**Table 7.8**) including four red-listed species (Colhoun & Cummins, 2013; grey wagtail, golden plover, meadow pipit, and red grouse) and four UK red-listed species (Eaton et al., 2014; grey wagtail; linnet; skylark and song thrush). There were 24 species recorded within the proposed 500 m turbine buffer including four red-listed species (Colhoun & Cummins, 2013; grey wagtail, golden plover, meadow pipit, and red grouse) and four UK red-listed species (Eaton et al., 2014; grey wagtail; linnet; skylark and song thrush). Ring ouzel were more than 500 m away from both existing and proposed turbines.

Behavioural analysis for all the species within the 500 m Survey Area indicates that there were 44 extant species recorded and/or exhibiting breeding behaviours. There were 8 confirmed breeding species and 14 probable and 11 possible breeding species respectively (**Table 7.8**; **Figures 7.8; 7.9; 7.10**). Seven species did not exhibit breeding behaviours within the 500 m Survey Area (**Figure 7.9**). There were fewer confirmed breeding species in the existing (n = 5) and proposed (n = 6) 500 m turbine buffers; and an additional 10 and 9 respectively probable and four and two possible breeding species.

Meadow pipits and skylarks were widespread across parts of the Survey Area although the latter were more restricted in their range and more typically clustered (**Figure 7.12**) and the habitat associations of these species were evident from the distribution (**Figure 7.12**) with a scarcity in areas of improved pasture and / or afforested habitats and wider presence on the semi-improved / semi-natural habitats. A relatively smaller number of territories were recorded at parts of the area where turf extraction activities were recorded and many of these areas had birds present during early surveys but were absent from later season surveys (**Figure 7.12**).

Analyses of breeding bird transect surveys for waders indicates that there was evidence of 13 snipe territories within the Survey Area and 500 m Survey Area of which eight and nine respectively were located within either the 500 m existing or 500 m proposed turbine buffers. Additional territories were detected during other surveys where cumulative analyses are undertaken of all snipe (and red grouse). There were three common sandpiper territories recorded within 500 m Survey Area and the same three were recorded within both the 500 m buffers of existing and proposed turbines.

There were no curlew territories inside the Survey Area and 500 m Survey Area or within the 800 m Survey Area and beyond 500 m and 800 m from any existing or proposed turbines. Curlew were recorded circa 1 km away from nearest existing and / or proposed turbines.

There was one red grouse territory recorded during breeding bird surveys within the Survey Area and the 500 m Survey Area and two additional territories within the 800 m Survey Area but further priority species surveys were undertaken to identify the full distribution and abundance of these species in the Survey Areas (see **Section 7.3.3.6**). The one territory identified during walkover surveys was within 500 m of existing turbines and also within 500 m of the proposed turbines.

One raptor species was recorded breeding within the 500 m Survey Area but was more than 500 m away from both existing and proposed turbines (**Figure 7.8**). One other raptor sparrowhawk were recorded in the Survey Area, but exhibited no evidence of breeding and wider raptor analyses are conducted in priority species survey analysis.

Table 7.8 – Summary of numbers of territories of each species detected during breeding bird surveys inside the 500 m Survey Area including conservation status

Species	Confirmed	Probable	Possible	Non-breeding	TOTAL	BOCCI3	BOCC4
BT		10			10	GREEN	GREEN
CA				6	6	AMBER	GREEN
CH		28	14		42	GREEN	GREEN
CK			1		1	GREEN	RED
CS	1	1	1		3	AMBER	AMBER
CT			1		1	GREEN	GREEN
GC			1		1	AMBER	GREEN
GL			1		1	RED	RED
GP				4	4	RED	GREEN
GR			1		1	AMBER	GREEN
H.				1	1	GREEN	GREEN
HC		1		4	5	GREEN	GREEN
K.	1			6	7	AMBER	AMBER
LI		1			1	AMBER	RED
M.			1		1	AMBER	RED
MA				2	2	GREEN	AMBER
MG		1	1		2	GREEN	GREEN
MP	21	507	316		844	RED	AMBER

Species	Confirmed	Probable	Possible	Non-breeding	TOTAL	BOCCI3	BOCC4
R.		12	4		16	AMBER	GREEN
RG	5	1	19		25	RED	AMBER
RN				13	13	GREEN	GREEN
RZ	1				1	RED	RED
S.		123	6		129	AMBER	RED
SC	4	1	3		8	AMBER	GREEN
SH				1	1	AMBER	GREEN
SL			1	1	2	AMBER	GREEN
SN	7		6		13	AMBER	AMBER
ST		8			8	GREEN	RED
T.				2	2	AMBER	AMBER
W.	4		3		7	AMBER	GREEN
WP		2			2	GREEN	GREEN
WR		11	6		17	GREEN	GREEN
WW		6			6	GREEN	AMBER
Total	44	713	386	40	1183		

Table 7.9 – Summary of numbers of territories of each species detected during breeding bird surveys inside the existing 500 m turbine area including conservation status.

Species	Confirmed	Probable	Possible	Non-breeding	TOTAL	BOCCI3	BOCC4
BT		3			3	GREEN	GREEN
CA				5	5	AMBER	GREEN
CH		2			2	GREEN	GREEN
CS	1	1	1		3	AMBER	AMBER
GL			1		1	RED	RED
GP				2	2	RED	GREEN
HC		1			1	GREEN	GREEN
K.				5	5	AMBER	AMBER
LI		1			1	AMBER	RED
MA				1	1	GREEN	AMBER
MG			1		1	GREEN	GREEN
MP	16	290	178		484	RED	AMBER
R.		1			1	AMBER	GREEN
RG	4	1	15		20	RED	AMBER
RN				12	12	GREEN	GREEN
S.		75	2		77	AMBER	RED
SC			2		2	AMBER	GREEN
SH				1	1	AMBER	GREEN

Species	Confirmed	Probable	Possible	Non-breeding	TOTAL	BOCCI3	BOCC4
SL			1	1	2	AMBER	GREEN
SN	5		3		8	AMBER	AMBER
ST		1			1	GREEN	RED
T.				2	2	AMBER	AMBER
W.	3		2		5	AMBER	GREEN
WP		1			1	GREEN	GREEN
WR		2	2		4	GREEN	GREEN
WW		2			2	GREEN	AMBER
Total	29	381	208	29	647		

Table 7.10 – Summary of numbers of territories of each species detected during breeding bird surveys inside the proposed 500 m turbine area including conservation status

Species	Confirmed	Probable	Possible	Non-breeding	TOTAL	BOCCI3	BOCC4
BT		3			3	GREEN	GREEN
CA				5	5	AMBER	GREEN
CH		6	3		9	GREEN	GREEN
CS	1	1	1		3	AMBER	AMBER
GL			1		1	RED	RED
GP				4	4	RED	GREEN
HC		1		1	2	GREEN	GREEN
K.				6	6	AMBER	AMBER
LI		1			1	AMBER	RED
MA				1	1	GREEN	AMBER
MP	16	321	208		545	RED	AMBER
RG	5	1	14		20	RED	AMBER
RN				11	11	GREEN	GREEN
S.		85	4		89	AMBER	RED
SC	3	1	2		6	AMBER	GREEN
SH				1	1	AMBER	GREEN
SL			1	1	2	AMBER	GREEN
SN	5		4		9	AMBER	AMBER
ST		2			2	GREEN	RED
T.				2	2	AMBER	AMBER
W.	3		1		4	AMBER	GREEN
WP		1			1	GREEN	GREEN
WR		4	2		6	GREEN	GREEN
WW		2			2	GREEN	AMBER
Total	33	429	241	32	735		

7.3.3.2 Wintering Bird Surveys

Wintering season transect surveys were carried out between September 2017 and February 2018 inclusive (**Table 7.11**). There were 46 hours and 35 minutes completed in wintering walkover surveys. Survey times ranged from 06.50 hrs to 16.15 hrs (**Table 7.11**) and covered a wide range of weather conditions (**Table 7.11**).

Table 7.11 Summary of survey effort and weather during wintering bird surveys

Month	Day	Year	Obs	Start	End	Dur	Cloud Cover	Cloud Height (m)	Wind - Dir & Speed	Precip	Vis (km)
9	20	2017	CS	10:35	14:55	04:20	10	500	N2	NIL	5
9	27	2017	CS	15:15	16:15	01:00	10	370-380	SE3	CHR	1.5
10	15	2017	CS	11:55	15:50	03:55	10	300	S2	ILM-NIL	2
10	24	2017	CS	10:15	11:15	01:00	10	600	SW5-4	NIL	5
10	24	2017	CS	14:15	16:15	02:00	10	600	SW4	NIL	5
11	15	2017	CS	10:40	14:30	03:50	10	700	S3	NIL	5
11	17	2017	DR	06:50	09:50	03:00	10	600-1000	SW3	NIL-ILR	5
11	22	2017	CS	09:35	11:05	01:30	10	400	N3-2	CHS-CLR	2
11	30	2017	CS	08:05	10:05	02:00	10	650-700	N2	NIL-ILR	5
11	30	2017	CS	13:05	15:35	02:30	10	700	N2	NIL	5
12	20	2017	DR	12:50	15:50	03:00	10	500-1000	SW2	CHM-NIL	0.5-5
12	28	2017	MR	08:55	13:05	04:10	9-7	340-500	S1	IHF-ILF	0.5-2
1	12	2018	CS	11:45	15:45	04:00	10	600	SE5-4	NIL	5
1	23	2018	CS	08:45	11:45	03:00	10	600	SW4	NIL	5
2	21	2018	CS	08:45	12:05	03:20	2	1000	SE1	NIL	5
2	26	2018	CS	08:55	12:55	04:00	7-8	700	SE3	NIL	5

There were 148 observation of 299 individuals from 19 species recorded (**Tables 7.12; Figure 7.13)** within the 500 m Survey Area (**Figure 7.1**) of which five were red-listed species in Ireland (golden eagle, golden plover, meadow pipit, red grouse and white-tailed eagle; Colhoun & Cummins, 2013) and two UK red-listed species (skylark and white-tailed eagle; Eaton et al., 2014).

There were fewer species (80 observations of 167 individuals from 15 species) recorded within the 500 m existing turbine buffer (**Tables 7.13**) including three red-listed species (Colhoun & Cummins, 2013; golden plover, meadow pipit and red grouse) and one UK red-listed species (Eaton et al., 2014; skylark).

Whilst within the proposed turbine 500 m buffer there were 92 detections of 184 individuals from 15 species (**Table 7.13**) including three red-listed species (Colhoun & Cummins, 2013; golden plover, meadow pipit and red grouse) and one UK red-listed species (Eaton et al., 2014; skylark).

Table 7.12. Summary of numbers of each species detected during wintering bird surveys inside the 500 m Survey Area including conservation status

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
BT	4	8	GREEN	GREEN
CA	2	2	AMBER	GREEN
CH	14	14	GREEN	GREEN
EA	1	1	RED	GREEN

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
GC	2	2	AMBER	GREEN
GP	5	117	RED	GREEN
HC	14	20	GREEN	GREEN
MP	52	59	RED	AMBER
R.	6	8	AMBER	GREEN
RG	15	23	RED	AMBER
RN	13	20	GREEN	GREEN
S.	1	1	AMBER	RED
SB	2	2	GREEN	AMBER
SC	2	2	AMBER	GREEN
SL	1	2	AMBER	GREEN
SN	9	9	AMBER	AMBER
WE	1	1	RED	RED
WR	2	2	GREEN	GREEN
WS	2	6	AMBER	AMBER
Total	148	299		

Table 7.13 – Summary of numbers of each species detected during wintering bird surveys inside the existing 500 m turbine area including conservation status

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
CA	2	2	AMBER	GREEN
CH	1	1	GREEN	GREEN
GP	4	67	RED	GREEN
HC	9	13	GREEN	GREEN
MP	23	28	RED	AMBER
R.	1	1	AMBER	GREEN
RG	14	21	RED	AMBER
RN	8	13	GREEN	GREEN
S.	1	1	AMBER	RED
SB	2	2	GREEN	AMBER
SC	2	2	AMBER	GREEN
SL	1	2	AMBER	GREEN
SN	9	9	AMBER	AMBER
WR	2	2	GREEN	GREEN
WS	1	3	AMBER	AMBER
Total	80	167		

Table 7.14 – Summary of numbers of each species detected during wintering bird surveys inside the proposed 500 m turbine area including conservation status

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
CA	2	2	AMBER	GREEN
CH	3	3	GREEN	GREEN
GC	1	1	AMBER	GREEN
GP	4	67	RED	GREEN
HC	11	15	GREEN	GREEN
MP	25	30	RED	AMBER
R.	3	5	AMBER	GREEN
RG	15	23	RED	AMBER
RN	10	16	GREEN	GREEN
S.	1	1	AMBER	RED
SB	2	2	GREEN	AMBER
SC	2	2	AMBER	GREEN
SN	9	9	AMBER	AMBER
WR	2	2	GREEN	GREEN
WS	2	6	AMBER	AMBER
Total	92	184		

7.3.3.3 Breeding Vantage Point Surveys

There were 36 hours observation completed at each of the five vantage points between March 2017 and August 2017 (**Tables 7.14 & 7.15**). Cumulative observation time from all vantage points over the Survey Area was 180 hours during the study period (**Table 7.15**). Survey times ranged from 06.05 hrs to 22.05 hrs (**Table 7.14**) and covered a wide range of weather conditions (**Table 7.16**).

Table 7.14 – Breeding vantage point survey effort

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
BVP	5	CS	3	22	2017	16:10	19:10	03:00
BVP	3	CS	3	23	2017	14:15	17:15	03:00
BVP	2	CS	3	23	2017	11:00	14:00	03:00
BVP	1	AM	3	23	2017	14:20	17:20	03:00
BVP	4	CS	3	29	2017	11:20	14:20	03:00
BVP	2	AM	3	29	2017	15:35	18:35	03:00
BVP	1	CS	3	29	2017	16:10	19:10	03:00
BVP	4	CS	3	30	2017	08:40	11:40	03:00
BVP	3	AM	3	30	2017	12:10	15:10	03:00
BVP	5	CS	3	30	2017	12:30	15:30	03:00
BVP	3	AM	4	6	2017	09:05	12:05	03:00
BVP	4	CS	4	6	2017	09:05	12:05	03:00
BVP	2	AM	4	13	2017	09:10	12:10	03:00

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
BVP	5	DR	4	13	2017	08:50	11:50	03:00
BVP	1	DR	4	21	2017	09:45	12:45	03:00
BVP	2	DR	4	20	2017	19:00	22:00	03:00
BVP	3	AM	4	20	2017	09:55	12:55	03:00
BVP	4	CS	4	20	2017	19:00	22:00	03:00
BVP	5	CS	4	20	2017	09:30	12:30	03:00
BVP	1	MR	4	26	2017	06:15	09:15	03:00
BVP	5	CS	5	5	2017	13:00	16:00	03:00
BVP	3	MR	5	6	2017	19:05	22:05	03:00
BVP	1	MR	5	7	2017	06:05	09:05	03:00
BVP	4	CS	5	19	2017	14:15	17:15	03:00
BVP	2	CS	5	19	2017	17:25	20:25	03:00
BVP	5	CS	5	22	2017	14:00	17:00	03:00
BVP	3	CS	5	22	2017	17:30	20:30	03:00
BVP	4	DR	5	24	2017	15:20	18:20	03:00
BVP	1	CS	5	30	2017	11:00	14:00	03:00
BVP	2	CS	5	30	2017	14:05	17:05	03:00
BVP	5	CS	6	7	2017	11:40	14:40	03:00
BVP	1	DR	6	7	2017	11:50	14:50	03:00
BVP	2	CS	6	16	2017	13:25	16:25	03:00
BVP	3	CS	6	16	2017	16:35	19:35	03:00
BVP	4	DR	6	23	2017	18:10	21:10	03:00
BVP	3	MR	6	23	2017	18:25	21:25	03:00
BVP	5	DR	6	28	2017	06:45	09:45	03:00
BVP	1	DR	6	28	2017	09:55	12:55	03:00
BVP	4	DR	6	29	2017	07:25	10:25	03:00
BVP	2	DR	6	29	2017	10:35	13:35	03:00
BVP	1	DR	7	9	2017	06:45	09:45	03:00
BVP	5	DR	7	9	2017	09:55	12:55	03:00
BVP	4	DR	7	20	2017	07:40	10:40	03:00
BVP	2	DR	7	20	2017	10:45	13:45	03:00
BVP	3	CS	7	22	2017	11:30	14:30	03:00
BVP	3	CS	7	27	2017	12:50	15:50	03:00
BVP	1	CS	7	28	2017	12:25	15:25	03:00
BVP	2	CS	7	31	2017	10:50	13:50	03:00
BVP	5	DR	7	31	2017	08:15	11:15	03:00
BVP	4	DR	7	31	2017	11:30	14:30	03:00

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
BVP	5	DR	8	9	2017	08:55	11:55	03:00
BVP	1	DR	8	9	2017	12:10	15:10	03:00
BVP	3	CS	8	9	2017	08:45	11:45	03:00
BVP	4	CS	8	9	2017	12:50	15:50	03:00
BVP	2	CS	8	18	2017	08:25	11:25	03:00
BVP	4	DR	8	18	2017	08:30	11:30	03:00
BVP	3	DR	8	18	2017	11:35	14:35	03:00
BVP	1	DR	8	22	2017	06:45	09:45	03:00
BVP	5	DR	8	22	2017	10:05	13:05	03:00
BVP	2	DR	8	31	2017	07:45	10:45	03:00

Table 7.15 – Breeding vantage point survey effort by month (hours)

VP No.	Mar	Apr	May	Jun	Jul	Aug	TOTAL
1	6	6	6	6	6	6	36
2	6	6	6	6	6	6	36
3	6	6	6	6	6	6	36
4	6	6	6	6	6	6	36
5	6	6	6	6	6	6	36
TOTAL	30	30	30	30	30	30	180

Table 7.16 – Breeding vantage point weather conditions

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2
5	3	22	4	6	7	8	500	450	400	400	N4	N3	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
3	3	23	10	10	10	6	550	600	700	700	N3	N3	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
2	3	23	10	10	10	10	500	500	500	500	N4	N4	N4	N4	NIL	NIL	NIL	NIL	5	5	5	5
1	3	23	10	10	10	8	600	600	700	700	NE3	N4	N4	N4	NIL	NIL	NIL	NIL	5	5	5	5
2	3	29	10	10	10	10	600	500	500	500	SW4	SW4	SW4	SW4	NIL	NIL	ILR	ILR	5	5	5	5
1	3	29	10	10	10	10	700	700	700	450	S2	S3	S3	S2	NIL	NIL	ILR	NIL	5	5	5	5
4	3	29	10	10	10	9	500	550	600	650	S3	S4	S3	S3	NIL	NIL	NIL	NIL	5	5	5	5
5	3	30	10	10	9	9	600	600	600	600	S2	S2	S2	S2	NIL	NIL	NIL	ILR	5	5	5	5
4	3	30	9	10	10	10	475	550	600	600	S3	S4	S3	S4	NIL	NIL	NIL	NIL	5	5	5	5
3	3	30	10	10	10	10	800	800	800	800	S4	S4	S4	S4	NIL	NIL	NIL	NIL	5	5	5	5
3	4	6	10	10	10	10	460	500	450	450	SW3	SW3	SW3	SW3	NIL	ILR	ILR	ILR	2	3	1	1
4	4	6	10	10	10	10	400	450	450	450	W3	W3	W3	W3	NIL	CLR	CLR	CLR	5	5	5	5
2	4	13	10	10	10	10	600	600	600	600	W4	W4	W4	W4	NIL	ILR	ILR	ILR	5	3	3	3
5	4	13	10	10	10	10	500	600	500	600	W2	W2	W3	W3	NIL	NIL	NIL	NIL	2.5	2.5	2.5	2.5
1	4	21	10	10	10	10	300	300	300	600	SW2	SW2	SW2	S2	CHM	CHM	CHM	IHM	0.4	0.4	0.6	3

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
2	4	20	10	10	10	10	800	600	600	600	W3	W3	W3	W3	NIL	NIL	NIL	NIL	5	5	5	1
3	4	20	10	10	10	10	260	260	260	300	W3	W4	W4	W4	CHM	CHM	CHM	CHM	0.3	0.5	0.5	0.5
4	4	20	10	10	10	10	500	500	500	500	W4	W3	W3	W3	NIL	NIL	NIL	NIL	5	5	5	5
5	4	20	10	10	10	10	280	270	280	300	S2	S1	S2	S2	ILR	ILR	NIL	NIL	3	3	3	3
1	4	26	8	6	4	3	800	700	800	1000	W1	W1	W2	W1	NIL	NIL	ILR	NIL	5	5	5	5
5	5	5	1	2	1	1	700	700	700	700	NE3	NE3	NE3	NE3	NIL	NIL	NIL	NIL	5	5	5	5
3	5	6	2	2	2	2	3000	3000	3000	3000	NE2	NE2	NE2	NE3	NIL	NIL	NIL	NIL	5	5	5	5
1	5	7	0	0	0	0	NIL	NIL	NIL	NIL	SW1	SW1	SW1	SW1	NIL	NIL	NIL	NIL	5	5	5	5
4	5	19	10	10	10	10	600	600	600	600	W3	W3	W3	W3	ILR	NIL	ILR	ILR	5	5	5	5
2	5	19	10	10	10	10	600	600	600	600	W3	W3	W3	W3	ILR	NIL	NIL	NIL	5	5	5	5
5	5	22	10	10	9	8	450	500	550	600	SW2	SW2	SW2	SW2	CLR	ILR	NIL	NIL	3	5	5	5
3	5	22	9	9	10	9	600	600	550	500	SW3	SW3	SW3	SW3	NIL	NIL	ILR	ILR	5	5	5	5
4	5	24	10	10	9	7	800	800	800	800	SW3	SW3	SW3	SW2	NIL	NIL	NIL	NIL	5	5	5	5
1	5	30	10	9	9	9	600	650	700	700	N3	N3	N3	N3	ILR	NIL	NIL	NIL	5	5	5	5
2	5	30	10	9	8	8	700	700	700	700	N3	N3	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
5	6	7	9	10	10	9	650	700	700	700	SW1	SW1	SW1	SW1	NIL	NIL	NIL	NIL	5	5	5	5
1	6	7	8	10	10	10	600	800	800	800	W2	SW2	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
2	6	16	10	10	10	10	350	400	350	350	W4	W4	W4	W4	NIL	NIL	NIL	ILR	0.5	0.5	0.5	0.5
3	6	16	10	10	10	10	350	350	350	650	SW4	SW4	SW4	SW4	NIL	NIL	NIL	NIL	0.2	0.2	0.2	5
4	6	23	7	8	8	8	800	800	800	600	W3	W4	W4	W4	NIL	NIL	NIL	NIL	5	5	5	5
3	6	23	8	8	8	8	900	900	900	900	W4	W4	W4	W4	NIL	NIL	NIL	NIL	5	5	5	5
5	6	28	10	10	10	10	600	600	600	600	E2	E2	E3	E3	NIL	NIL	NIL	NIL	2.5	2.5	2.5	2.5
1	6	28	10	10	10	10	600	600	800	800	E3	E3	E3	E3	NIL	ILR	NIL	NIL	5	5	5	5
4	6	29	10	10	10	10	600	600	600	600	NW4	NW4	N4	N4	NIL	NIL	NIL	NIL	5	5	5	5
2	6	29	10	10	10	10	600	800	800	600	N4	N4	N4	N4	NIL	NIL	NIL	NIL	5	5	5	5
1	7	9	10	10	10	10	350	400	300	300	SW2	SW2	SW2	SW2	CHM	CHM	CHM	CHM	1.5	1.5	1.5	1.5
5	7	9	10	10	10	10	200	300	300	300	SW3	SW3	SW2	SW2	CHM	CHM	CHM	CHM	1	0.5	1.5	0.5
4	7	20	5	8	6	8	600	450	600	600	SW3	SW3	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
2	7	20	6	7	9	8	600	800	800	800	SW3	SW3	SW2	SW2	NIL	ILR	CLR	NIL	5	5	3	5
3	7	22	8	9	8	9	700	700	750	750	E2	E2	E2	E3	NIL	NIL	NIL	NIL	5	5	5	5
3	7	27	9	10	10	10	650	650	500	600	SW5	SW5	SW4	SW4	NIL	NIL	IHR	ILR	5	5	5	5
1	7	28	10	10	10	9	700	700	650	700	SW2	SW3	SW3	SW3	NIL	NIL	ILR	NIL	5	5	5	5
2	7	31	10	10	10	10	500	500	500	500	SW3	SW3	SW3	SW3	IHR	IHR	IHR	ILR	5	5	5	5
5	7	31	10	10	10	10	500	500	500	400	SW2	SW3	SW2	SW2	CHR	NIL	ILR	CHR	2.5	2.5	2.5	2.5
4	7	31	10	10	10	6	500	400	400	600	SW4	SW4	SW4	SW4	NIL	IHR	IHR	NIL	5	5	5	5
5	8	9	8	8	6	5	600	600	600	600	NE3	NE3	NE3	NE3	NIL	NIL	NIL	NIL	5	5	5	5

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
1	8	9	3	5	8	8	600	600	600	600	N3	N3	NW3	NW3	NIL	NIL	NIL	NIL	5	5	5	5
3	8	9	10	9	8	7	650	700	700	750	N4	N3	N3	N3	ILR	NIL	NIL	NIL	5	5	5	5
4	8	9	7	8	8	7	750	800	800	800	N3	N3	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
2	8	18	10	10	10	9	450	550	550	600	SW2	SW2	SW3	SW3	ILR	IHR	IHR	NIL	5	5	5	5
4	8	18	10	8	10	8	500	400	500	600	SW4	SW4	SW4	SW5	NIL	IHR	IHR	NIL	5	5	5	5
3	8	18	8	10	10	6	600	500	600	600	SW5	SW4	SW4	SW4	NIL	IHR	NIL	NIL	5	5	5	5
1	8	22	8	10	10	10	500	400	500	500	SE3	SE3	SE3	SE3	NIL	IHM	CHM	NIL	5	1	0.5	5
5	8	22	10	10	8	6	600	600	600	600	SE2	SE2	SE2	SE2	NIL	ILR	NIL	NIL	3	3	3	3
2	8	31	4	4	4	8	1000	1000	1000	800	SW2	SW2	W2	NW2	ILM	NIL	NIL	NIL	5	5	5	5

There were 14 target species (**Table 7.1**) recorded inside the 500 m turbine buffers; cormorant, common sandpiper, golden eagle, golden plover, heron, kestrel, mallard, peregrine, red grouse, raven, sparrowhawk, snipe, teal and white-tailed eagle (**Tables 7.17 & 7.18**). The occurrence rate of the detected species was less than 2% of total observation time for six species, and greater than 2% for eight species (**Table 7.18**) with most frequently recorded were raven, golden plover and kestrel accounting for 64% of the observation duration. Secondary species were additionally mapped to show areas of activity (**Figures 7.14; 7.15 & 7.16**) and varied seasonally (**Table 7.19**).

Beyond the 500 m turbines buffers for either Operational Barnesmore Windfarm turbines and/or Development turbines there were additional flights recorded (also included on **Figures 7.14; 7.15 & 7.16**) including buzzard (1); golden eagle (7); heron (1); kestrel (2); peregrine (3); red grouse (1) and raven (18).

Table 7.17 – Breeding vantage point sightings records recorded within the 500 m turbine buffers.

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
2	03	23	2017	1	GP	8	11:30	1	Flying low	IN	IN
2	03	23	2017	1	GP	4	13:25	1	Flying low, over and around lake	IN	IN
2	03	23	2017	1	GP	3	14:00	1	Flock split, 1 bird flew to ground	IN	IN
2	03	23	2017	1	GP	1	14:00	1	Flock split, 1 bird flew to ground	IN	IN
3	03	23	2017	2	RG	2	15:50	1	From mound near VP	IN	IN
1	03	23	2017	2	RN	2	15:15	1		IN	IN
4	03	29	2017	2	RG	1	13:20	1	Landed close to VP	IN	IN
2	03	29	2017	2	RN	1	15:45	1		IN	IN
1	03	29	2017	2	RN	1	16:45	1	Flying, calling	OUT	IN
1	03	29	2017	2	RN	1	17:00	1	Flying, calling	IN	IN
4	03	29	2017	2	SN	1	12:20	1	Flying	IN	IN
3	03	30	2017	1	EA	1	14:10	2	Hovering along ridgeline west	IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
									of VP then flew west circling		
3	03	30	2017	1	GP	30	12:45	1		IN	IN
3	03	30	2017	1	GP	40	13:25	2		IN	IN
3	03	30	2017	1	GP	40	13:50	1	Lost in distance low to ground	OUT	IN
3	03	30	2017	2	K.	1	12:45	1	Male	IN	IN
3	03	30	2017	2	K.	1	13:40	1	Quick prey strike then flew away	IN	IN
3	03	30	2017	2	K.	1	14:55	1	Flew very close to turbines with no reaction	IN	IN
3	03	30	2017	2	RN	1	13:20	1		IN	IN
3	03	30	2017	2	RN	1	14:40	1		IN	IN
3	03	30	2017	2	RN	6	14:45	1		IN	IN
3	03	30	2017	2	SH	1	13:05	1		IN	IN
3	04	06	2017	2	RN	1	09:55	1		IN	IN
2	04	13	2017	1	GP	15	11:15	1		IN	IN
2	04	13	2017	2	RN	1	10:45	1		IN	IN
2	04	20	2017	1	GP	25	19:15	1	Flock which split into 3 groups	IN	IN
2	04	20	2017	1	GP	9	19:15	1	Flock which split into 3 groups	IN	IN
2	04	20	2017	1	GP	15	19:15	1	Flock which split into 3 groups	IN	IN
2	04	20	2017	1	GP	15	20:25	1	Flock which split into 3 groups	IN	IN
2	04	20	2017	1	GP	9	20:45	1	Flock which split into 3 groups	IN	IN
2	04	20	2017	2	MA	1	19:05	1	On lough	IN	IN
1	04	20	2017	2	RG	2	11:40	1	Calling	OUT	IN
1	04	20	2017	2	RG	2	12:00	1	Calling	OUT	IN
2	04	20	2017	2	RG	1	21:25	1	Flew from ground	IN	IN
2	04	20	2017	2	RG	1	21:30	1	Displaying	IN	IN
4	04	20	2017	2	RG	1	21:20	1	Calling near VP	IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
4	04	20	2017	2	RG	2	21:30	1	Calling	IN	IN
2	04	20	2017	2	SN	1	21:15	1	Chipping	IN	IN
1	04	26	2017	2	RN	1	06:25	1		IN	IN
1	04	26	2017	2	RN	1	06:30	1		IN	IN
1	04	26	2017	2	RN	2	07:45	1		IN	IN
1	04	26	2017	2	RN	4	07:50	1		IN	IN
1	04	26	2017	2	RN	2	08:05	1	Perched on pylons	IN	IN
3	05	06	2017	2	RG	3	21:55	1	Calling	IN	IN
3	05	06	2017	2	SN	2	20:25	1		IN	IN
1	05	07	2017	2	H.	1	07:50	1		IN	IN
1	05	07	2017	2	RN	1	08:35	1		IN	IN
1	05	07	2017	2	RN	1	08:35	1		IN	IN
1	05	07	2017	2	RN	1	08:40	1		OUT	IN
1	05	07	2017	2	RN	1	08:40	1	Near turbines - avoidance	IN	IN
1	05	07	2017	2	SN	1	07:05	1	Chipping	OUT	IN
1	05	07	2017	2	T.	1	08:05	1	Male	OUT	IN
2	05	19	2017	2	MA	1	18:10	1	Female lifted from lough	IN	IN
4	05	19	2017	2	RN	1	15:00	1	Flew through Site	IN	IN
4	05	19	2017	2	RN	2	15:05	1	Flew from Site	IN	IN
3	05	22	2017	2	H.	2	20:25	1	Flying together around lake before separating and landing	IN	IN
5	05	22	2017	2	RN	1	14:30	1		IN	IN
3	05	22	2017	2	RN	2	18:10	1	Flying around base of turbine	IN	IN
4	05	24	2017	2	K.	1	17:05	1		IN	IN
4	05	24	2017	2	T.	3	15:25	1	Into Lough Golagh	IN	IN
2	05	30	2017	2	CS	1	15:50	1	Along edge of lough	IN	IN
1	05	30	2017	2	SN	1	11:05	1	Calling near lake	OUT	IN
1	06	07	2017	2	K.	1	12:15	1		IN	IN
5	06	07	2017	2	RN	1	12:00	1		IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
2	06	16	2017	2	CS	1	15:30	1	Short flight from lough edge	IN	IN
2	06	16	2017	2	CS	1	15:50	1	Flew back to original location	IN	IN
3	06	16	2017	2	K.	1	19:10	1	Hunting along lough	IN	IN
3	06	16	2017	2	K.	1	19:15	1	Came back up at other side of lough and flew back where it came from	IN	IN
3	06	16	2017	2	SN	1	17:15	1	Chipping	IN	IN
4	06	23	2017	2	K.	1	18:25	1		IN	IN
3	06	23	2017	2	K.	1	20:50	3	Male hunting under turbine blades	IN	IN
4	06	23	2017	2	RN	1	18:40	1		IN	IN
3	06	23	2017	2	T.	2	20:15	1	One adult and one juvenile on Lough Golagh	IN	IN
2	06	29	2017	1	GP	2	12:05	1		IN	IN
2	06	29	2017	2	K.	1	11:40	1		IN	IN
4	06	29	2017	1	PE	1	08:50	1		IN	IN
4	06	29	2017	2	RN	1	08:25	1		IN	IN
1	07	09	2017	2	SN	1	08:40	1		OUT	IN
2	07	20	2017	2	CA	1	11:35	1		IN	IN
4	07	20	2017	2	K.	1	09:25	1		IN	IN
4	07	20	2017	2	K.	1	09:50	1		IN	IN
4	07	20	2017	2	RN	5	08:35	1		IN	IN
2	07	20	2017	2	RN	2	13:10	1		IN	IN
3	07	22	2017	2	K.	2	12:35	1	Pair mobbing WE	IN	IN
3	07	22	2017	2	K.	1	14:20	1	Male hunting	IN	IN
3	07	22	2017	1	WE	1	12:35	1	Immature bird with wing tags, with satellite tag. Mobbed by K.(2)	IN	IN
3	07	27	2017	2	RN	1	15:25	1		IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
3	07	27	2017	2	SH	1	13:50	1	Female hunting MP near VP	IN	IN
4	07	31	2017	2	RG	1	11:35	1	From near VP	IN	IN
4	07	31	2017	2	RN	1	12:45	1		IN	OUT
2	07	31	2017	2	T.	1	11:40	1	Landed on lough near VP	IN	IN
1	08	09	2017	2	CA	1	12:15	1		IN	IN
1	08	09	2017	2	CA	1	13:05	1		IN	IN
3	08	09	2017	2	CA	1	09:15	1	Flying into Lough Nabrackboy	IN	IN
3	08	09	2017	2	RN	2	11:15	1	Low near turbines	IN	IN
3	08	18	2017	2	CA	1	11:40	1	Over lough	IN	IN
4	08	18	2017	2	K.	1	10:20	1	Male hover hunting	IN	IN
4	08	18	2017	2	RG	1	08:35	1	From near VP	IN	IN
4	08	18	2017	2	RN	1	09:45	1		IN	IN
3	08	18	2017	2	RN	2	12:20	1	Flying through turbines	IN	IN
3	08	18	2017	2	RN	1	13:15	1		IN	IN
3	08	18	2017	2	SN	1	11:40	1	Flew from ground	IN	IN
4	08	21	2017	2	RN	3	12:25	1		IN	IN
4	08	21	2017	2	RN	2	12:25	1		IN	IN
2	08	31	2017	2	CA	1	09:30	1		IN	IN
2	08	31	2017	2	K.	1	08:00	1		IN	IN

Table 7.18 – Breeding vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers.

Species	Number of detections	%	Number of five minute intervals	%
CA	6	5.7	6	5.7
CS	3	2.8	3	2.8
EA	1	0.9	2	1.9
GP	14	13.2	15	14.2
H.	2	1.9	2	1.9
K.	16	15.1	18	17.0

Species	Number of detections	%	Number of five minute intervals	%
MA	2	1.9	2	1.9
PE	1	0.9	1	0.9
RG	11	10.4	11	10.4
RN	35	33.0	35	33.0
SH	2	1.9	2	1.9
SN	8	7.5	8	7.5
T.	4	3.8	4	3.8
WE	1	0.9	1	0.9
Total	106		110	

Table 7.19 – Breeding vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers by month.

Species	Mar	Apr	May	Jun	Jul	Aug	TOTAL
CA					1	5	6
CS			1	2			3
EA	1						1
GP	7	6		1			14
H.			2				2
K.	3		1	6	4	2	16
MA		1	1				2
PE				1			1
RG	2	6	1		1	1	11
RN	7	7	8	3	4	6	35
SH	1				1		2
SN	1	1	3	1	1	1	8
T.			2	1	1		4
WE					1		1
Total	22	21	19	15	14	15	106

Four target 1 species (**Table 7.18**) were recorded (**Tables 7.18 & 7.19**); golden eagle (1), golden plover (14), peregrine (1) and white-tailed eagle (1) had flying height(s) recorded (**Table 7.20**) and were mapped (**Figure 7.17**). There were seven additional golden eagle flights recorded beyond the 500 m turbine buffer and three peregrine flights also recorded beyond the 500 m turbine buffers (**Figure 7.17**). Most frequently recorded target 1 species flights were golden plover (**Table 7.19; Figure 7.17**), which were observed in the spring period (March to April 2017).

Golden plover were mostly migrant birds in the spring and late over-wintering birds on the Site and more latterly during the breeding season birds from a nearby territory. Peregrine and golden eagle flights (**Figure 7.17**) all originated from known breeding sites nearby and white-tailed eagle observed were immature non-breeding birds (**Tables 7.17 & 7.19**). Both eagles were identifiable (by wing tag / satellite tag) as originating from the respective reintroduction projects for these two species.

There were 347 seconds of white-tailed eagle flights. All of these were within rotor swept height (25 - 180 m) and therefore within potential collision risk. There were 67 seconds of peregrine flights. All of these were within rotor swept height (20 - 180

m) and therefore within potential collision risk. There were 239 seconds of golden eagle flight recorded within the 500 m turbine buffers (**Table 7.20**). There were 179 seconds (75%) above indicative rotor height (>180 m) and 60 seconds (25%) at collision risk height (20 m – 180 m). Golden plover flights within the 500 m turbine buffers were 997 seconds in duration with 298 seconds (30%) outside potential collision height (PCH; <10 – 20 m; 180 m) with 699 seconds (70%) within PCH.

A range of secondary species flights were also documented (**Table 7.20b**; excluding raven **Table 7.17**) and mapped (**Figure 7.14 – 7.16**)

Table 7.20a – Breeding vantage point flying height and duration of Target 1 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
2	03	23	2017	GP	8	11:27	14	IN	IN	14							
2	03	23	2017	GP	4	13:23	22	IN	IN	22							
2	03	23	2017	GP	3	13:59	158	IN	IN	15	30	83	30				
2	03	23	2017	GP	1	13:59	158	IN	IN	15	30	83	30				
3	03	30	2017	EA	1	14:08	239	IN	IN				30	30			179
3	03	30	2017	GP	30	12:43	46	IN	IN		1	30	15				
3	03	30	2017	GP*	40	13:22	169	OUT	IN		4	30	15		30	15	75
3	03	30	2017	GP	40	13:49	183	IN	IN		18	15	45		60	15	30
2	04	13	2017	GP	15	11:13	32	IN	IN			2	30				
2	04	20	2017	GP	25	19:13	19	IN	IN			4		15			
2	04	20	2017	GP	9	19:13	6	IN	IN		6						
2	04	20	2017	GP	15	19:13	12	IN	IN	12							
2	04	20	2017	GP	15	20:23	29	IN	IN	14			15				
2	04	20	2017	GP	9	20:44	12	IN	IN	12							
2	06	29	2017	GP	2	12:03	137	IN	IN			17	75	45			
4	06	29	2017	PE	1	08:48	67	IN	IN			7	60				
3	07	22	2017	WE	1	12:35	347	IN	IN				315	30	2		

Table 7.20b – Breeding vantage point flying height and duration of Target 2 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
3	03	23	2017	RG	2	15:50	3	IN	IN	3							
4	03	29	2017	RG	1	13:20	43	IN	IN	43							
4	03	29	2017	SN	1	12:20	12	IN	IN	12							
3	03	30	2017	K.	1	12:45	84	IN	IN			40	44				
3	03	30	2017	K.	1	13:40	145	IN	IN			75	70				
3	03	30	2017	K.	1	14:55	344	IN	IN		70	100	174				
3	03	30	2017	SH	1	13:05	41	IN	IN	41							
2	04	20	2017	MA	1	19:05	2	IN	IN		2						
1	04	20	2017	RG	2	11:40	4	OUT	IN	4							

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	04	20	2017	RG	2	12:00	4	OUT	IN	4							
2	04	20	2017	RG	1	21:25	13	IN	IN	13							
2	04	20	2017	RG	1	21:30	42	IN	IN	42							
4	04	20	2017	RG	1	21:20	7	IN	IN	7							
4	04	20	2017	RG	2	21:30	4	IN	IN	4							
2	04	20	2017	SN	1	21:15	1	IN	IN	1							
3	05	06	2017	RG	3	21:55	4	IN	IN	4							
3	05	06	2017	SN	2	20:25	9	IN	IN	9							
1	05	07	2017	H.	1	07:50	99	IN	IN	99							
1	05	07	2017	SN	1	07:05	10	OUT	IN	10							
1	05	07	2017	T.	1	08:05	12	OUT	IN	12							
2	05	19	2017	MA	1	18:10	28	IN	IN	28							
3	05	22	2017	H.	2	20:25	96	IN	IN	96							
4	05	24	2017	K.	1	17:05	36	IN	IN			36					
4	05	24	2017	T.	3	15:25	2	IN	IN	2							
2	05	30	2017	CS	1	15:50	12	IN	IN	12							
1	05	30	2017	SN	1	11:05	2	OUT	IN	2							
1	06	07	2017	K.	1	12:15	117	IN	IN		60	57					
2	06	16	2017	CS	1	15:30	9	IN	IN	9							
2	06	16	2017	CS	1	15:50	8	IN	IN	8							
3	06	16	2017	K.	1	19:10	63	IN	IN		20	20	23				
3	06	16	2017	K.	1	19:15	82	IN	IN		20	40	22				
3	06	16	2017	SN	1	17:15	2	IN	IN	2							
4	06	23	2017	K.	1	18:25	79	IN	IN		79						
3	06	23	2017	K.	1	20:50	140	IN	IN	70	70						
3	06	23	2017	T.	2	20:15	2	IN	IN		2						
2	06	29	2017	K.	1	11:40	76	IN	IN				76				
1	07	09	2017	SN	1	08:40	25	OUT	IN	15	10						
2	07	20	2017	CA	1	11:35	45	IN	IN		25	20					
4	07	20	2017	K.	1	09:25	71	IN	IN			71					
4	07	20	2017	K.	1	09:50	35	IN	IN			35					
3	07	22	2017	K.	2	12:35	115	IN	IN		15	50	50				
3	07	22	2017	K.	1	14:20	58	IN	IN					20	20	18	
3	07	27	2017	SH	1	13:50	13	IN	IN	13							
4	07	31	2017	RG	1	11:35	20	IN	IN	20							
2	07	31	2017	T.	1	11:40	14	IN	IN	14							

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	08	09	2017	CA	1	12:15	102	IN	IN				102				
1	08	09	2017	CA	1	13:05	148	IN	IN				148				
3	08	09	2017	CA	1	09:15	36	IN	IN	36							
3	08	18	2017	CA	1	11:40	25	IN	IN	25							
4	08	18	2017	K.	1	10:20	39	IN	IN		39						
4	08	18	2017	RG	1	08:35	18	IN	IN	18							
3	08	18	2017	SN	1	11:40	11	IN	IN	11							
2	08	31	2017	CA	1	09:30	73	IN	IN		50	23					
2	08	31	2017	K.	1	08:00	63	IN	IN			63					

7.3.3.4 Wintering Vantage Point Surveys

There were 36 hours observation completed at each of the five vantage points between September 2017 and February 2018 (**Tables 7.21 & 7.22**). Cumulative observation time from all vantage points over the Survey Area was 180 hours during the study period (**Table 7.22**). Survey times ranged from 06.40hrs to 17.45hrs (**Table 7.21**) and covered a wide range of weather conditions (**Table 7.23**).

Table 7.21 – Wintering vantage point survey effort

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
WVP	5	DR	9	5	2017	07:10	10:10	03:00
WVP	1	DR	9	5	2017	10:20	13:20	03:00
WVP	2	DR	9	19	2017	10:25	13:25	03:00
WVP	4	CS	9	19	2017	14:45	17:45	03:00
WVP	3	CS	9	20	2017	07:25	10:25	03:00
WVP	2	CS	9	27	2017	09:05	12:05	03:00
WVP	3	CS	9	27	2017	12:10	15:10	03:00
WVP	4	CS	9	28	2017	13:45	16:45	03:00
WVP	1	DR	9	29	2017	06:40	09:40	03:00
WVP	5	DR	9	29	2017	09:55	12:55	03:00
WVP	5	DR	10	5	2017	13:25	16:25	03:00
WVP	3	CS	10	11	2017	10:30	13:30	03:00
WVP	4	CS	10	11	2017	13:40	16:40	03:00
WVP	2	DR	10	12	2017	09:45	12:45	03:00
WVP	1	DR	10	12	2017	13:00	16:00	03:00
WVP	1	DR	10	19	2017	07:15	10:15	03:00
WVP	5	DR	10	19	2017	10:25	13:25	03:00
WVP	4	DR	10	27	2017	07:40	10:40	03:00
WVP	5	DR	11	8	2017	10:20	13:20	03:00
WVP	1	DR	11	17	2017	09:50	12:50	03:00

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
WVP	3	CS	11	22	2017	11:10	14:10	03:00
WVP	2	CS	11	27	2017	08:10	11:10	03:00
WVP	4	CS	11	27	2017	11:15	14:15	03:00
WVP	1	DR	11	28	2017	09:05	12:05	03:00
WVP	5	DR	11	28	2017	12:15	15:15	03:00
WVP	4	DR	11	30	2017	09:20	12:20	03:00
WVP	2	CS	11	30	2017	10:05	13:05	03:00
WVP	3	DR	11	30	2017	12:25	15:25	03:00
WVP	1	DR	12	6	2017	08:15	11:15	03:00
WVP	5	DR	12	6	2017	11:30	14:30	03:00
WVP	3	CS	12	20	2017	09:35	12:35	03:00
WVP	2	DR	12	20	2017	09:45	12:45	03:00
WVP	4	CS	12	20	2017	12:40	15:40	03:00
WVP	2	CS	12	21	2017	07:50	10:50	03:00
WVP	3	CS	12	21	2017	14:00	17:00	03:00
WVP	4	CS	12	21	2017	10:55	13:55	03:00
WVP	5	DR	12	27	2017	08:20	11:20	03:00
WVP	3	MR	12	28	2017	13:05	16:05	03:00
WVP	1	DR	12	28	2017	09:50	12:50	03:00
WVP	2	DR	12	28	2017	13:05	16:05	03:00
WVP	5	DR	1	6	2018	13:10	16:10	03:00
WVP	1	DR	1	11	2018	10:25	13:25	03:00
WVP	2	CS	1	12	2018	08:45	11:45	03:00
WVP	4	DR	1	12	2018	08:50	11:50	03:00
WVP	3	DR	1	12	2018	11:55	14:55	03:00
WVP	5	DR	1	18	2018	11:40	14:40	03:00
WVP	4	CS	1	23	2018	11:50	14:50	03:00
WVP	1	DR	1	25	2018	07:40	10:40	03:00
WVP	2	DR	1	25	2018	10:50	13:50	03:00
WVP	3	CS	1	31	2018	12:10	15:10	03:00
WVP	5	DR	2	6	2018	13:15	16:15	03:00
WVP	1	DR	2	13	2018	14:40	17:40	03:00
WVP	2	DR	2	14	2018	10:00	13:00	03:00
WVP	4	DR	2	14	2018	13:10	16:10	03:00
WVP	5	DR	2	15	2018	06:55	09:55	03:00
WVP	3	DR	2	15	2018	10:15	13:15	03:00
WVP	4	DR	2	21	2018	12:05	15:05	03:00

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
WVP	3	CS	2	26	2018	12:55	15:55	03:00
WVP	1	CS	2	27	2018	09:20	12:20	03:00
WVP	2	CS	2	27	2018	12:30	15:30	03:00

Table 7.22 – Wintering vantage point survey effort by month (hours)

VP No.	Sep	Oct	Nov	Dec	Jan	Feb	TOTAL
1	6	6	6	6	6	6	39
2	6	3	6	9	6	6	39
3	6	3	6	9	6	6	39
4	6	6	6	6	6	6	39
5	6	6	6	6	6	6	
TOTAL	30	24	30	36	30	30	180

Table 7.23 – Wintering vantage point weather conditions

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
5	9	5	10	10	10	10	600	600	800	600	W3	W3	W3	W3	NIL	ILM	NIL	NIL	2.5	2.5	2.5	2.5
1	9	5	10	10	8	8	600	500	600	800	W3	W4	W3	W3	NIL	CLM	ILM	NIL	5	1.5	3	5
2	9	19	10	10	8	10	300	350	600	600	SE1	S1	S1	S1	CHM	ILM	NIL	ILR	0.5	1.5	5	5
4	9	19	10	10	10	10	600	600	580	580	S2	S2	S2	S3	NIL	NIL	ILR	ILR	5	5	3	3
3	9	20	10	10	10	10	360	380	430	500	SW2	W2	N2	N2	CLR	CLR	NIL	NIL	0.2	0.5	2	5
2	9	27	10	10	10	10	420	450	410	390	SE3	SE3	SE3	SE3	CHR	CHR	CHR	CHR	2	2	2	1
3	9	27	10	10	10	10	390	390	390	390	SE3	SE4	SE4	SE4	CHR	CHR	CHR	CHR	1	1	1	0.5
4	9	28	10	10	10	10	650	550	500	500	S3	S3	S3	S3	CHR	CHR	CLR	CLR	5	5	5	5
1	9	29	8	10	10	10	800	600	600	600	S4	SW4	SW4	SW4	NIL	NIL	ILR	NIL	3	5	5	5
5	9	29	10	8	10	10	600	600	400	400	SW3	SW3	SW3	SW3	NIL	NIL	IHR	NIL	2.5	2.5	2.5	2.5
5	10	5	6	10	10	8	800	600	500	500	NW3	NW2	NW2	NW2	NIL	ILR	ILR	NIL	2.5	2.5	2.5	2.5
3	10	11	10	9	9	10	420	500	550	600	SW3	SW3	SW3	SW3	NIL	ILR	NIL	IHR	5	5	5	5
4	10	11	10	10	10	9	600	500	550	600	SW3	SW4	W4	NW4	IHR	ILR	ILR	ILR	5	5	5	5
2	10	12	9	6	10	10	600	600	600	600	SW4	SW4	S3	S4	NIL	NIL	NIL	NIL	5	5	5	5
1	10	12	10	10	10	10	500	500	500	500	S3	S4	S4	S4	NIL	ILR	ILR	ILR	5	5	5	5
1	10	19	10	10	10	10	350	350	350	400	S4	S4	S4	S4	ILM	ILR	CHR	CHR	1.5	5	5	5
5	10	19	10	10	10	10	400	350	400	400	S3	S2	S2	S2	ILR	CLR	CHR	NIL	2.5	2.5	1.5	2.5
4	10	27	10	9	9	10	600	600	500	450	SE1	SE1	SE1	SE2	NIL	NIL	NIL	NIL	5	5	5	5
5	11	8	10	10	10	10	800	400	400	600	SW2	SW2	SW2	SW2	NIL	ILR	NIL	ILR	2.5	2.5	2.5	2.5
1	11	17	10	10	10	10	400	500	500	500	SW3	SW3	SW3	SW3	CLR	ILR	CHR	ILR	5	5	2	2.5
3	11	22	10	10	10	10	450	500	600	600	N3	N2	N1	N1	CLR	ILR	NIL	NIL	2	5	5	5

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
2	11	27	10	10	10	9	700	650	650	600	W3	W3	W3	NW3	IHR	IHR	ILR	IHR	5	5	5	5
4	11	27	7	10	9	10	600	600	700	600	NW4	NW4	W4	NW4	ILR	IHR	ILR	IHR	5	5	5	5
1	11	28	10	10	8	8	600	800	800	800	N3	N4	N4	N4	ILR	IHS	NIL	ILR	2.5	5	5	0.5
5	11	28	8	10	10	9	800	450	600	800	N2	N2	N3	N2	NIL	ILM	ILM	NIL	2.5	1.5	1.5	2.5
4	11	30	6	10	8	10	500	500	400	400	N3	N4	N4	N4	NIL	ILM	NIL	HIS	5	5	5	5
2	11	30	9	9	8	8	700	650	700	700	N3	N3	N3	N3	ILR	ILR	ILR	ILR	5	5	5	5
3	11	30	10	10	9	9	600	600	600	600	N3	N3	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
1	12	6	10	10	10	10	400	400	400	400	SW3	SW4	SW4	SW4	NIL	ILR	NIL	NIL	5	5	5	5
5	12	6	10	10	10	10	400	350	400	400	SW3	SW3	SW3	SW3	ILM	ILM	NIL	NIL	3	3	3	3
3	12	20	10	10	10	10	650	600	280	280	W2	W2	W2	W2	NIL	NIL	NIL	ILR	5	5	0.2	0.2
2	12	20	10	10	10	10	800	400	400	400	W3	W3	SW3	SW3	NIL	ILM	CHM	CHM	5	5	0.5	0.5
4	12	20	10	10	10	10	280	280	250	250	W2	W2	W2	W2	CLR	CLR	CHM	CHM	0.2	0.2	0.2	0.2
2	12	21	10	10	10	10	290	290	290	290	NE1	NE1	E1	E1	CLR	CLR	NIL	NIL	0.2	0.3	0.3	0.3
3	12	21	10	10	10	10	250	250	250	250	SW2	SW2	SW2	SW2	CLR	CLR	CLR	CLR	0.2	0.2	0.2	0.2
4	12	21	10	10	10	10	250	250	250	250	S1	S1	SW2	SW2	NIL	NIL	CLR	CLR	0.5	0.5	0.2	0.2
5	12	27	8	10	10	10	600	400	400	400	NW2	NW3	NW3	NW3	NIL	CHS	ILS	ILS	2.5	1	2	2.5
3	12	28	5	4	3	3	1200	1200	1200	1200	S1	S1	0	S1	NIL	NIL	NIL	NIL	2	2	2	2
1	12	28	10	10	10	10	200	200	200	200	S1	S1	S1	S1	IHM	IHM	IHM	IHM	0.5	1	0.5	0.5
2	12	28	10	5	5	5	200	1000	1000	1000	S2	SW2	SW2	SW2	CHM	NIL	NIL	NIL	0.5	5	5	5
5	1	6	3	3	5	5	800	800	800	800	NE2	NE2	N2	N2	NIL	NIL	NIL	NIL	3	3	3	3
1	1	11	2	4	4	4	1000	1000	1000	1000	SE2	SE2	S2	S2	NIL	NIL	NIL	NIL	5	5	5	5
2	1	12	10	10	10	10	400	400	500	600	SE5	SE5	SE5	SE5	NIL	NIL	NIL	NIL	5	5	5	5
4	1	12	10	10	10	10	500	450	500	600	SE3	SE4	SE4	SE4	NIL	ILM	NIL	NIL	5	5	5	5
3	1	12	10	10	10	10	600	500	400	400	SE5	SE5	SE5	SE4	NIL	NIL	IHR	ILR	5	5	3	5
5	1	18	10	8	8	10	600	400	400	400	W3	W3	W3	W3	NIL	ILS	IHS	NIL	5	5	5	0.5
4	1	23	10	10	10	10	500	500	450	300	SW4	SW5	SW6	SW5	NIL	NIL	CHR	ILR	5	5	5	0.5
1	1	25	10	10	10	10	600	600	450	350	SW2	SW2	W3	W3	NIL	CLR	CHR	CLR	1.5	5	2.5	3
2	1	25	10	8	10	10	350	600	450	450	W3	W3	W3	NW3	CHR	NIL	IHR	IHR	0.5	5	5	5
3	1	31	10	9	9	9	550	550	600	600	NW3	W3	W3	W3	CHS	NIL	NIL	NIL	0.3	5	5	5
5	2	6	3	3	3	5	800	800	800	800	NW2	NW2	NW2	NW2	NIL	NIL	NIL	NIL	2.5	2.5	2.5	2.5
1	2	13	4	4	4	4	800	800	600	600	SW2	SW2	S2	S2	NIL	NIL	NIL	NIL	5	5	5	5
2	2	14	10	10	10	10	400	600	500	400	S4	SW3	SW4	SW4	CLM	NIL	ILR	CLM	1.5	5	3	1.5
4	2	14	10	5	6	6	400	500	600	800	SW4	SW4	SW4	SW3	CLM	NIL	ILM	NIL	1.5	5	5	5
5	2	15	10	10	10	10	600	400	400	600	SW3	SW4	SW4	SW3	NIL	IHR	ILR	NIL	1	2	2.5	2.5
3	2	15	8	6	10	9	800	800	800	800	SW4	SW4	SW4	SW4	NIL	NIL	CHS	NIL	5	5	2	5

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
4	2	21	3	3	3	3	800	1000	1000	1000	SE2	SE2	SE2	SE2	NIL	NIL	NIL	NIL	5	5	5	5
3	2	26	10	10	10	9	700	700	700	700	SE4	SE4	SE4	SE4	NIL	NIL	NIL	NIL	5	5	5	5
1	2	27	3	3	6	9	900	800	800	800	N3	N3	N3	N3	NIL	NIL	NIL	ILS	5	5	5	5
2	2	27	9	9	8	9	800	800	800	800	N3	N4	N4	N4	ILS	NIL	ILH	ILH	5	5	5	5

There were 12 target species (**Table 7.24**) recorded inside the 500 m turbine buffers during the wintering period; cormorant, curlew, golden eagle, golden plover, heron, kestrel, red grouse, raven, teal, white-tailed eagle, wigeon and whooper swan.

The occurrence rate of the detected species ranged from 1% - 51% with five species which were recorded more than 3% of total observation time namely cormorant (4.4%), golden plover (18.7%), kestrel (4.4%), red grouse (12.1%) and raven (61.1%) (**Tables 7.24 & 7.25**) and detection rates varied across the season (**Table 7.26**). Secondary species were additionally mapped to show areas of activity (**Figures 7.14; 7.15 & 7.16**) and varied seasonally (**Table 7.26**).

Beyond the 500 m turbines buffers for either Operational Barnesmore Windfarm turbines and/or Development turbines there were additional flights recorded (also included on **Figures 7.14; 7.15, 7.16 & 7.18**) including golden eagle (2); greylag goose (1), heron (2); hen harrier (1), kestrel (4); peregrine (4); raven (17); sparrowhawk (1) and whooper swan (3).

Table 7.24 – Wintering vantage point sightings records recorded within the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments
1	09	05	2017	2	CA	1	10:25	1	On lough
1	09	05	2017	2	K.	1	11:35	1	Male
2	09	19	2017	2	CA	1	11:20	1	
4	09	19	2017	2	RN	1	15:35	1	Flying near turbines
3	09	20	2017	2	RG	3	07:30	1	3 females on track
3	09	20	2017	2	RG	1	07:30	1	Male seen from ground
1	09	29	2017	2	K.	1	08:05	1	Male
1	09	29	2017	2	RN	1	08:30	1	
1	09	29	2017	2	RN	1	09:15	1	
3	10	11	2017	2	RN	1	10:35	1	Flying together
3	10	11	2017	2	RN	2	10:50	1	
3	10	11	2017	2	RN	3	12:10	1	Flying together past VP
2	10	12	2017	2	CA	1	09:50	1	Then loafing on lough
2	10	12	2017	1	GP	30	10:25	1	
2	10	12	2017	1	GP	13	10:30	1	
2	10	12	2017	2	RN	1	11:15	1	
2	10	12	2017	2	RN	1	11:55	1	
1	10	12	2017	2	RN	1	13:20	1	

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments
1	10	12	2017	2	RN	1	13:30	1	
1	10	12	2017	2	RN	1	13:55	1	
1	10	12	2017	2	RN	1	14:30	1	
1	10	12	2017	2	RN	1	14:35	1	
1	10	19	2017	2	RN	5	09:35	1	
4	10	27	2017	2	RN	2	08:30	1	
3	11	22	2017	2	RN	1	13:15	1	Calling
3	11	22	2017	2	RN	1	13:40	1	Flying west
2	11	27	2017	2	RN	2	09:25	1	Flying together
2	11	27	2017	2	RN	2	09:30	1	Same RN(2)
2	11	27	2017	2	RN	1	10:25	1	
4	11	27	2017	1	GP	35	13:40	1	
1	11	28	2017	2	RN	1	09:40	1	
1	11	28	2017	2	RN	1	09:40	1	
4	11	30	2017	2	RN	1	09:30	1	
4	11	30	2017	1	GP	15	10:10	1	
4	11	30	2017	1	GP	15	10:20	1	
4	11	30	2017	2	RN	1	10:25	1	
4	11	30	2017	1	GP	12	10:30	1	
4	11	30	2017	2	RN	1	12:00	1	
2	11	30	2017	1	GP	15	10:25	1	
2	11	30	2017	1	GP	8	11:30	1	
2	11	30	2017	1	GP	43	11:55	1	
3	11	30	2017	2	RN	1	13:00	1	
3	11	30	2017	1	WS	3	14:50	1	1 adult and 2 juvenile. Flew in low, landed on lough, remained for rest of VP and remainder of the day including during walkover survey
1	12	06	2017	2	RN	2	09:40	1	
3	12	20	2017	1	WS	3	09:40	1	1 adult and 2 juvenile. On lough on arrival

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments
									(presume roosted overnight), departed
3	12	20	2017	2	CA	1	09:40	1	On lough initially
3	12	20	2017	2	RN	1	09:55	1	Flying west over lough
3	12	20	2017	2	T.	12	10:25	1	Flock seen at edge of lough at distance
2	12	20	2017	2	RG	1	11:40	1	
2	12	21	2017	1	GP	1	08:45	1	Calling
2	12	21	2017	2	RG	1	09:10	1	Calling near lake
4	12	21	2017	2	RG	1	11:25	1	Calling
4	12	21	2017	2	RG	1	11:30	1	Flying & calling, landed near turbine
3	12	28	2017	2	WN	2	13:15	1	Then loafing on Lough Golagh
3	12	28	2017	2	RN	2	14:55	1	Snow bunting seen beside VP at 13:55
3	12	28	2017	2	RG	1	15:50	1	
1	12	28	2017	2	RN	1	10:45	1	Heard calling
1	12	28	2017	2	RN	1	11:20	1	Heard calling
2	12	28	2017	2	RN	1	13:35	1	Heard calling
2	12	28	2017	2	RN	2	13:50	1	
2	12	28	2017	2	RN	1	14:00	1	
2	12	28	2017	2	RN	2	14:40	1	
2	12	28	2017	1	GP	28	15:15	1	
2	12	28	2017	1	GP	8	15:20	1	
1	01	11	2018	2	RN	2	11:00	1	
1	01	11	2018	2	K.	1	12:50	1	
2	01	12	2018	2	H.	1	09:45	1	
2	01	12	2018	1	GP	6	09:45	1	Flushed by H.
2	01	12	2018	2	RN	1	11:15	1	
4	01	12	2018	2	RN	1	09:20	1	
4	01	12	2018	2	RG	1	09:30	1	Flushed from ground

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments
4	01	12	2018	1	EA	1	11:35	1	
4	01	12	2018	1	EA	1	11:45	1	
4	01	12	2018	1	WE	1	11:45	1	
4	01	12	2018	1	GP	8	11:50	1	
3	01	12	2018	2	RN	1	12:10	1	
1	01	25	2018	2	RN	1	08:50	1	
1	01	25	2018	2	RG	1	09:30	1	Flushed from ground
2	01	25	2018	1	GP	13	12:10	1	
2	01	25	2018	1	CU	1	12:55	1	Heard calling initially
2	01	25	2018	2	RN	2	13:10	1	
1	02	13	2018	2	RN	1	16:05	1	
2	02	14	2018	2	RN	1	11:25	1	
2	02	14	2018	1	GP	11	12:10	1	
2	02	14	2018	1	GP	7	12:20	1	
4	02	14	2018	2	RG	1	14:15	1	Flushed from ground
3	02	26	2018	2	RG	1	15:25	1	Flying low calling
1	02	27	2018	2	RN	1	10:40	1	Flying together over VP, calling
1	02	27	2018	2	K.	1	12:05	1	Male hunting
2	02	27	2018	2	RN	1	13:30	1	Flying together then separated
2	02	27	2018	2	RN	1	13:30	1	Flying together then separated

Table 7.25 – Wintering vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers.

Species	Number of detections	%	Number of five minute intervals	%
CA	4	4.4	4	4.4
CU	1	1.1	1	1.1
EA	2	2.2	2	2.2
GP	17	18.7	17	18.7
H.	1	1.1	1	1.1
K.	4	4.4	4	4.4
RG	11	12.1	11	12.1

Species	Number of detections	%	Number of five minute intervals	%
RN	46	50.5	46	50.5
T.	1	1.1	1	1.1
WE	1	1.1	1	1.1
WN	1	1.1	1	1.1
WS	2	2.2	2	2.2
Total	91		91	

Table 7.26 – Wintering vantage point aggregated species sightings records within the Survey Area and 500 m buffer by month

Species	Sep	Oct	Nov	Dec	Jan	Feb	TOTAL
CA	2	1		1			4
CU					1		1
EA					2		2
GP		2	7	3	3	2	17
H.					1		1
K.	2				1	1	4
RG	2			5	2	2	11
RN	3	12	11	9	6	5	46
T.				1			1
WE					1		1
WN				1			1
WS			1	1			2
Total	9	15	19	21	17	10	91

Five target 1 species flights (**Table 7.1**) were recorded (**Table 7.26**); curlew (n = 1), golden plover (n = 17), golden eagle (n = 2), white-tailed eagle (n = 1) and whooper swan (n = 2) and had flying height(s) recorded (**Table 7.27**) and were mapped (**Figures 7.18**).

The curlew flight was detected in the later part of the winter towards the summer breeding site and golden plover were observed over-wintering within the Operational Barnesmore Windfarm and during autumn / spring migration seasons. The golden eagle and white-tailed eagles were recorded to the north and eastern sides. A family party of whooper swans were recorded utilising Lough Golagh and also roosting there, whilst other swans were recorded on migration through the Barnesmore Gap but these were beyond the 500 m turbine buffers (**Figure 7.18**)

Curlew were recorded below potential collision risk height for 21 seconds. The two eagle species were recorded for 61 and 38 seconds respectively within potential collision risk height. The golden plover were recorded for 711 seconds with 340 seconds (48%) within potential collision risk height bands and remainder (52%) below collision risk height. Whooper swan flights, comprised 180 seconds of flight with all flights recorded below potential collision risk height (<20m).

Table 7.27a – Wintering vantage point flying height and duration of Target 1 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
2	10	12	2017	GP	30	10:23	IN	IN	47		32		15				
2	10	12	2017	GP	13	10:26	IN	IN	28	13	15						
4	11	27	2017	GP	35	13:37	IN	IN	41		30	11					
4	11	30	2017	GP	15	10:09	IN	IN	28				15	13			
4	11	30	2017	GP	15	10:18	IN	IN	23			8	15				
4	11	30	2017	GP	12	10:27	IN	IN	16			1	15				
2	11	30	2017	GP	15	10:24	IN	IN	295		200	45	20	30			
2	11	30	2017	GP	8	11:30	IN	IN	34	34							
2	11	30	2017	GP	43	11:51	IN	IN	31		15			16			
3	11	30	2017	WS	3	14:48	IN	IN	105	15	90						
3	12	20	2017	WS	3	09:39	IN	IN	75	45	30						
2	12	21	2017	GP	1	08:44	IN	IN	3	3							
2	12	28	2017	GP	28	15:14	IN	IN	21	6			15				
2	12	28	2017	GP	8	15:15	IN	IN	12	12							
2	01	12	2018	GP	6	09:43	IN	IN	8	8							
4	01	12	2018	EA	1	11:35	IN	IN	23				8	15			
4	01	12	2018	EA	1	11:45	IN	IN	38			23	15				
4	01	12	2018	WE	1	11:45	IN	IN	38			23	15				
4	01	12	2018	GP	8	11:50	IN	IN	17					2	15		
2	01	25	2018	GP	13	12:08	IN	IN	48		3		30	15			
2	01	25	2018	CU	1	12:53	IN	IN	21	6	15						
2	02	14	2018	GP	11	12:08	IN	IN	23			8	15				
2	02	14	2018	GP	7	12:20	IN	IN	36			15	15	6			

Table 7.27b – Wintering vantage point flying height and duration of Target 2 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	09	05	2017	CA	1	10:25	OUT	IN	11	11							
1	09	05	2017	K.	1	11:35	OUT	IN	95		50	45					
2	09	19	2017	CA	1	11:20	IN	IN	9			9					
4	09	19	2017	RN	1	15:35	IN	IN	36				36				
3	09	20	2017	RG	3	07:30	OUT	IN	15	15							
3	09	20	2017	RG	1	07:30	IN	IN	18	18							
1	09	29	2017	K.	1	08:05	IN	IN	86	20	30	36					
1	09	29	2017	RN	1	08:30	OUT	IN	23	23							

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	09	29	2017	RN	1	09:15	OUT	IN	36		36						
3	10	11	2017	RN	1	10:35	IN	IN	83			83					
3	10	11	2017	RN	2	10:50	IN	IN	22				22				
3	10	11	2017	RN	3	12:10	IN	IN	65		65						
2	10	12	2017	CA	1	09:50	IN	IN	6	6							
2	10	12	2017	RN	1	11:15	IN	IN	16		16						
2	10	12	2017	RN	1	11:55	IN	IN	49				49				
1	10	12	2017	RN	1	13:20	IN	IN	22			22					
1	10	12	2017	RN	1	13:30	IN	IN	23			23					
1	10	12	2017	RN	1	13:55	IN	IN	40		40						
1	10	12	2017	RN	1	14:30	IN	IN	19		19						
1	10	12	2017	RN	1	14:35	OUT	IN	25				25				
1	10	19	2017	RN	5	09:35	OUT	IN	51		51						
4	10	27	2017	RN	2	08:30	IN	IN	42		42						
3	11	22	2017	RN	1	13:15	IN	IN	102	52	50						
3	11	22	2017	RN	1	13:40	IN	IN	8			8					
2	11	27	2017	RN	2	09:25	IN	IN	119			30	30	59			
2	11	27	2017	RN	2	09:30	IN	IN	117			30	57	30			
2	11	27	2017	RN	1	10:25	IN	IN	89				40	49			
1	11	28	2017	RN	1	09:40	IN	IN	133			133					
1	11	28	2017	RN	1	09:40	IN	IN	69			69					
4	11	30	2017	RN	1	09:30	IN	IN	70		70						
4	11	30	2017	RN	1	10:25	IN	IN	39		39						
4	11	30	2017	RN	1	12:00	IN	IN	74			74					
3	11	30	2017	RN	1	13:00	IN	IN	35		35						
1	12	06	2017	RN	2	09:40	IN	IN	101			101					
3	12	20	2017	CA	1	09:40	IN	IN	12	12							
3	12	20	2017	RN	1	09:55	IN	IN	47		47						
3	12	20	2017	T.	12	10:25	IN	IN	10	10							
2	12	20	2017	RG	1	11:40	IN	IN	12	12							
2	12	21	2017	RG	1	09:10	IN	IN	5	5							
4	12	21	2017	RG	1	11:25	IN	IN	12	12							
4	12	21	2017	RG	1	11:30	IN	IN	7	7							
3	12	28	2017	WN	2	13:15	IN	IN	3	3							
3	12	28	2017	RN	2	14:55	IN	OUT	101		50	51					
3	12	28	2017	RG	1	15:50	IN	IN	42	42							

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	12	28	2017	RN	1	10:45	OUT	IN	12		12						
1	12	28	2017	RN	1	11:20	OUT	IN	14			14					
2	12	28	2017	RN	1	13:35	IN	IN	7			7					
2	12	28	2017	RN	2	13:50	IN	IN	76		76						
2	12	28	2017	RN	1	14:00	IN	IN	59			59					
2	12	28	2017	RN	2	14:40	IN	IN	55			55					
1	01	11	2018	RN	2	11:00	OUT	IN	69		69						
1	01	11	2018	K.	1	12:50	OUT	IN	80			80					
2	01	12	2018	H.	1	09:45	IN	IN	84		84						
2	01	12	2018	RN	1	11:15	IN	IN	97			30	67				
4	01	12	2018	RN	1	09:20	IN	IN	57			57					
4	01	12	2018	RG	1	09:30	IN	IN	48	48							
3	01	12	2018	RN	1	12:10	IN	IN	75		75						
1	01	25	2018	RN	1	08:50	IN	IN	56			56					
1	01	25	2018	RG	1	09:30	OUT	IN	15		15						
2	01	25	2018	RN	2	13:10	IN	IN	52			22	30				
1	02	13	2018	RN	1	16:05	IN	IN	68			68					
2	02	14	2018	RN	1	11:25	IN	IN	43		43						
4	02	14	2018	RG	1	14:15	IN	IN	32	32							
3	02	26	2018	RG	1	15:25	IN	IN	27	27							
1	02	27	2018	RN	1	10:40	OUT	IN	101		101						
1	02	27	2018	K.	1	12:05	IN	IN	73		73						
2	02	27	2018	RN	1	13:30	IN	IN	126			126					
2	02	27	2018	RN	1	13:30	IN	IN	116				116				

Cumulative data for all species detected during winter and summer vantage points (**Table 7.28**) over the 12-month study shows that raven (41.1%), golden plover (15.7%), red grouse (11.2%), kestrel (10.2%) and cormorant (5.1%) were the most frequently detected species. Raven was the only species recorded throughout every month of the study (**Table 7.28**). Remaining species were all recorded less than 5%.

Common sandpiper, snipe and sparrowhawk were only observed during the breeding season. Wigeon, whooper swan and curlew were only observed during wintering months (**Table 7.28**) despite the latter breeding to north of the Site but were recorded during other surveys (**Section 7.3.4.2**). Other species were seen inside and/or outside the 500 m turbine buffers within both breeding and wintering seasons.

Table 7.28 – Cumulative breeding and wintering vantage point aggregated species sightings records within the Survey Area and 500 m buffer by month

Species	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	TOTAL	% of detections
CA					1	5	2	1		1			10	5.1
CU											1		1	0.5

CS			1	2									3	1.5
EA	1										2		3	1.5
GP	7	6		1				2	7	3	3	2	31	15.7
H.			2								1		3	1.5
K.	3		1	6	4	2	2				1	1	20	10.2
MA		1	1										2	1.0
PE				1									1	0.5
RG	2	6	1		1	1	2			5	2	2	22	11.2
RN	7	7	8	3	4	6	3	12	11	9	6	5	81	41.1
SH	1				1								2	1.0
SN	1	1	3	1	1	1							8	4.1
T.			2	1	1					1			5	2.5
WE					1						1		2	1.0
WN										1			1	0.5
WS									1	1			2	1.0
Total	22	21	19	15	14	15	9	15	19	21	17	10	197	

7.3.4 Migration Vantage Point Surveys

There were 36 hours observation completed at each vantage point in the spring (SMVP) between January 2018 and April 2018 and in the autumn (AMVP) between September 2017 and November 2017 (**Tables 7.29 & 7.30**) with a total of 72 hours completed during migration seasons. Survey times ranged from 06.35hrs to 21.15hrs (**Table 7.29**) and covered a wide range of weather conditions (**Table 7.31**).

Table 7.29 – Migration season vantage point survey effort

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
AMVP	MIG	DR	9	19	2017	07:15	10:15	03:00
AMVP	MIG	CS	9	19	2017	17:50	20:50	03:00
AMVP	MIG	CS	9	26	2017	16:45	19:45	03:00
AMVP	MIG	CS	9	28	2017	16:55	19:55	03:00
AMVP	MIG	DR	10	5	2017	10:10	13:10	03:00
AMVP	MIG	CS	10	11	2017	16:50	19:50	03:00
AMVP	MIG	DR	10	12	2017	06:35	09:35	03:00
AMVP	MIG	CS	10	24	2017	16:15	19:15	03:00
AMVP	MIG	DR	11	8	2017	06:55	09:55	03:00
AMVP	MIG	CS	11	15	2017	14:30	17:30	03:00
AMVP	MIG	CS	11	22	2017	14:20	17:20	03:00
AMVP	MIG	CS	11	27	2017	14:25	17:25	03:00
SMVP	MIG	CS	1	23	2018	15:00	18:00	03:00
SMVP	MIG	CS	1	31	2018	15:20	18:20	03:00
SMVP	MIG	DR	2	11	2018	06:50	09:50	03:00
SMVP	MIG	DR	2	21	2018	08:55	11:55	03:00

SMVP	MIG	CS	2	26	2018	16:10	19:10	03:00
SMVP	MIG	DR	2	28	2018	09:05	12:05	03:00
SMVP	MIG	DR	3	7	2018	08:30	11:30	03:00
SMVP	MIG	DR	3	21	2018	12:35	15:35	03:00
SMVP	MIG	CS	3	26	2018	18:00	21:00	03:00
SMVP	MIG	CS	3	30	2018	18:10	21:10	03:00
SMVP	MIG	CS	4	5	2018	18:15	21:15	03:00
SMVP	MIG	CS	4	12	2018	10:15	13:15	03:00

Table 7.30 – Migration vantage point survey effort by month

VP No.	Jan	Feb	Mar	Apr		Sep	Oct	Nov	TOTAL
Spring Migration	6	12	12	6					36
Autumn Migration	-	-	-	-		12	12	12	36
TOTAL	6	12	12	6		12	12	12	72

Table 7.31 – Migration vantage point weather conditions

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
AMIG	9	19	10	10	10	10	400	300	300	300	SE2	SE2	SE2	S2	ILR	CHM	CHM	CHM	1.5	0.5	0.5	0.5
AMIG	9	19	10	10	10	10	580	570	590	600	S3	S3	S3	S3	NIL	NIL	NIL	NIL	5	5	5	5
AMIG	9	26	9	9	10	10	450	600	650	650	SE4	SE4	SE4	SE4	NIL	NIL	NIL	NIL	5	5	5	5
AMIG	9	28	10	10	10	10	500	550	600	600	S3	S3	S3	S3	CLR	NIL	IHR	IHR	5	5	5	5
AMIG	10	5	6	10	8	6	800	600	800	800	NW4	NW4	NW4	NW4	NIL	ILR	NIL	ILR	5	5	5	5
AMIG	10	11	8	7	6	3	600	600	650	700	NW4	NW5	NW5	NW4	ILR	ILR	ILR	NIL	5	5	5	5
AMIG	10	12	10	10	10	9	600	600	400	600	SW4	SW4	SW4	SW4	NIL	NIL	IHM	NIL	0.5	5	1.5	5
AMIG	10	24	10	10	10	10	600	600	550	550	SW4	SW3	SW3	SW3	NIL	CLR	CHR	CLR	5	5	5	5
AMIG	11	8	5	7	10	10	1000	800	800	800	SW4	SW4	SW4	SW4	NIL	NIL	NIL	NIL	1.5	5	5	5
AMIG	11	15	10	10	10	10	700	550	350	300	S4	SW4	SW4	SW4	NIL	NIL	ILR	NIL	5	5	5	0.5
AMIG	11	27	10	10	10	10	600	500	500	500	N1	N1	N1	N1	NIL	ILR	NIL	NIL	5	5	5	5
AMIG	11	27	10	10	10	10	600	600	600	600	NW4	NW5	NW6	NW6	IHR	IHR	IHR	IHR	5	5	5	5
SMIG	1	23	10	8	7	7	300	500	550	550	SW5	SW4	SW3	SW4	ILR	NIL	NIL	NIL	0.5	5	5	5
SMIG	1	31	9	10	10	10	600	600	600	600	W4	NW5	NW5	NW5	NIL	ILH	ILH	ILH	5	5	5	0.5
SMIG	2	11	10	10	10	10	350	350	350	350	S4	S5	S4	S4	CLM	CLM	NIL	CLR	1	1.5	1.5	1.5
SMIG	2	21	2	3	2	2	1000	1000	1000	800	SE2	SE2	SE2	SE2	NIL	NIL	NIL	NIL	5	5	5	5
SMIG	2	26	9	9	8	9	700	700	800	800	SE4	E4	E4	SE4	NIL	NIL	NIL	NIL	5	5	5	5
SMIG	2	28	3	8	6	8	1000	600	800	600	E3	E4	E4	E3	NIL	ILS	NIL	ILS	5	3	5	3
SMIG	3	7	10	10	10	10	400	350	400	350	SW2	SW2	SW3	SW2	CLM	CLM	ILM	CHM	1.5	1.5	0.5	1.5
SMIG	3	21	10	10	10	10	800	600	600	600	SW4	SW4	SW4	SW4	NIL	NIL	NIL	NIL	5	5	5	5

SMIG	3	26	10	10	10	10	700	500	400	400	S4	S5	S5	S5	CLR	CLR	CLR	CLR	5	5	2	0.5
SMIG	3	30	9	10	10	10	600	600	600	600	NE3	NE3	NE3	NE3	NIL	NIL	NIL	ILR	5	5	5	0.5
SMIG	4	5	10	10	10	10	800	800	800	800	SE3	SE4	SE4	SE4	NIL	ILR	NIL	NIL	5	5	5	0.5
SMIG	4	12	10	10	10	10	340	340	340	340	SE3	SE3	SE3	SE3	NIL	NIL	NIL	NIL	1.5	1.5	1.5	1

There were seven target species (**Table 7.1**) recorded inside the Survey Area and 500 m turbine buffers; cormorant, heron, buzzard; hen harrier; kestrel; red grouse, raven and snipe (**Tables 7.32 & 7.33**).

Raven (33.3%), red grouse (25%) and cormorant (16.7%) were the most frequently recorded species during the migration vantage point observations. Hen harrier were recorded once during spring migration and raven were the most frequently recorded species with a marginally greater level of activity in the spring period (**Table 7.34**) than during the autumn (**Table 7.34**).

Table 7.32 – Migration vantage point sightings records recorded within the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments
AMIG	9	19	2017	2	SN	1	07:20	1	
AMIG	9	19	2017	2	CA	1	18:10	1	
AMIG	9	19	2017	2	RG	1	19:10	1	Female flew between turbines
AMIG	9	19	2017	2	RG	2	20:25	1	
AMIG	9	19	2017	2	RG	1	20:35	1	
AMIG	9	26	2017	2	K.	1	16:50	1	
AMIG	9	28	2017	2	RN	2	17:50	1	
AMIG	10	5	2017	2	CA	1	10:15	1	
AMIG	10	5	2017	2	CA	1	10:45	1	Lifted from lough
AMIG	10	5	2017	2	K.	1	12:10	1	
AMIG	10	5	2017	2	RG	1	19:30	1	Calling
AMIG	10	12	2017	2	H.	1	07:30	1	Over lough
AMIG	10	12	2017	2	H.	1	07:35	1	Over lough
AMIG	10	12	2017	2	RN	2	08:10	1	
AMIG	10	12	2017	2	RN	1	08:40	1	
AMIG	11	15	2017	2	CA	1	15:00	1	Loafing on lough
AMIG	11	27	2017	2	RG	1	16:20	1	Calling
SMIG	2	26	2018	2	RG	1	18:35	1	Calling
SMIG	2	28	2018	1	HH	1	09:20	1	Male
SMIG	2	28	2018	2	RN	1	10:55	1	
SMIG	3	21	2018	2	RN	1	13:30	1	
SMIG	3	21	2018	2	RN	2	13:55	1	

SMIG	3	26	2018	2	RN	2	18:30	1	
SMIG	3	30	2018	2	RN	2	18:35	1	

Table 7.33 – Migration vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers.

Species	Number of detections	%	Number of five minute intervals	%
CA	4	16.7	4	16.7
H.	2	8.3	2	8.3
HH	1	4.2	1	4.2
K.	2	8.3	2	8.3
RG	6	25.0	6	25.0
RN	8	33.3	8	33.3
SN	1	4.2	1	4.2
Total	24		24	

Table 7.34 – Migration vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers by month

Species	Sep	Oct	Nov		Jan	Feb	Mar	Apr	TOTAL
CA	1	2	1						4
H.		2							2
HH						1			1
K.	1	1							2
RG	3	1	1			1			6
RN	1	2				1	4		8
SN	1								1
Total	7	8	2			3	4		24

One target 1 species flight (hen harrier) (**Table 7.1**) was recorded (**Tables 7.33 & 7.34**) and had flying height(s) recorded (**Table 7.35**) and were mapped (**Figure 7.19**).

Other species were recorded during wintering vantage point surveys (**Table 7.27a & 7.27b**) and migration corridors (beyond 2 km) were observed through the Barnesmore Gap (whooper swan / greylag goose) with some whooper swans also utilising / roosting at loughs within the Operational Barnesmore Windfarm during migration season.

Table 7.35 – Breeding vantage point flying height and duration of Target 1 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time detected	Duration (secs)	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m	Notes
SMIG	2	28	2018	HH	1	09:18:00	48	33	15							Male foraging

7.3.4.1 Breeding Priority Species Surveys

There were 185 hours and five minutes spent searching adjacent habitats for priority species (**Table 7.1; Table 7.36**) with efforts concentrated on golden eagle, hen harrier, merlin, red grouse, gulls and waders during the breeding season. Survey times ranged between 03.30hrs to 23.55hrs and covered a wide range of weather conditions (**Table 7.36**).

Table 7.36 Details of breeding priority species searches (PSS), including survey effort, weather

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	2km	22	3	2017	16:15	19:15	03:00	6	800	NE	4	NIL	5
PSS	2km	23	3	2017	07:00	13:50	06:50	10	1000	NE	4	NIL	5
PSS	5km	23	3	2017	07:00	09:00	02:00	10	1000	NE	4	NIL	5
PSS	500m	29	3	2017	11:20	11:25	00:05	10	500	S	3	NIL	5
PSS	5km	29	3	2017	08:50	10:20	01:30	10	450	S	2	ILR	5
PSS	500m / 800 m	29	3	2017	14:40	16:10	01:30	10	650	S	3	NIL	5
PSS	500m / 2km / 5km / 10km	29	3	2017	08:50	10:30	01:40	10	450	S	2	ILR	5
PSS	500m / 2km	29	3	2017	10:30	11:30	01:00	10	450	S	2	ILR	5
PSS	500m / 2km / 5km	29	3	2017	13:45	20:15	06:30	10	1400	SE	2	NIL	5
PSS	5km	30	3	2017	13:30	14:05	00:35	10	600	S	2	NIL	5
PSS	500m / 800 m / 2km / 5km	30	3	2017	08:05	13:25	05:20	5	750	SE	3	NIL	5
PSS	5km / 10km	2	4	2017	09:00	17:30	08:30	8	1200	NW	2	ILR	3
PSS	5km / 10km	6	4	2017	12:15	14:00	01:45	6	600	W	3	NIL	5
PSS	5km / 10km	6	4	2017	12:35	14:05	01:30	10	500	W	3	NIL	5
PSS	10km	6	4	2017	09:25	12:30	03:05	6	1400	W	3	NIL	5
PSS	5km	6	4	2017	12:50	15:45	02:55	8	1400	SW	1	NIL	5
PSS	5km / 10km	13	4	2017	12:20	16:20	04:00	10	600	W	4	ILR	5
PSS	5km	13	4	2017	12:30	16:30	04:00	10	600	W	4	ILR	5
PSS	10km	13	4	2017	09:40	12:30	02:50	10	1600	W	1	NIL	5
PSS	10km	13	4	2017	13:45	16:30	02:45	10	1600	W	2	NIL	5
PSS	5km	16	4	2017	10:05	17:15	07:10	8	1600	SW	1	NIL	5
RGS/SNS	500m	20	4	2017	14:45	17:45	03:00	8	1500	SW	2	NIL	5
RGS/SNS	500m	20	4	2017	19:00	23:00	04:00	10	600	W	2	NIL	5
RGS/SNS	500m	20	4	2017	19:00	23:10	04:10	10	600	W	2	NIL	5
RGS/SNS	500m	20	4	2017	22:00	23:30	01:30	10	600	W	2	NIL	5
RGS/SNS	500m / 800m / 2km	21	4	2017	03:30	05:45	02:15	10	500	W	3	ILR	4
PSS	5km	5	5	2017	09:45	12:45	03:00	2	700	NE	3	NIL	5
RGS/SNS	500m	6	5	2017	22:05	23:55	01:50	2	3000	NE	3	NIL	5

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	5km / 10km	6	5	2017	10:15	18:20	08:05	7	1600	SE	1	NIL	5
RGS/SNS	500m / 5km / 10km	19	5	2017	20:30	23:50	03:20	9	600	SW	3	NIL	3
RGS/SNS	500m	22	5	2017	20:45	23:45	03:00	9	500	SW	3	NIL	5
PSS	5km / 10km	25	5	2017	15:00	18:00	03:00	10	500	SE	4	NIL	5
PSS	5km / 10km	30	5	2017	17:30	21:50	04:20	7	750	NE	1	NIL	5
PSS	2km / 5km	7	6	2017	08:20	11:20	03:00	4	600	S	1	NIL	5
PSS	5km	7	6	2017	08:25	11:25	03:00	5	800	NW	3	NIL	5
PSS	5km / 10km	7	6	2017	15:10	18:05	02:55	5	700	NW	2	NIL	5
PSS	5km / 10km	7	6	2017	15:30	19:00	03:30	6	800	NW	1	NIL	5
PSS	10km	16	6	2017	09:45	12:45	03:00	10	400	S	2	NIL	5
PSS	5km	24	6	2017	09:45	20:05	10:20	9	700	W	2	NIL	5
PSS	5km / 10km	9	7	2017	13:45	17:00	03:15	10	600	SW	2	ILM-NIL	2
PSS	10km	22	7	2017	15:15	18:30	03:15	10	700	NE	1	NIL	5
PSS	5km / 10km	22	7	2017	13:05	19:35	06:30	10	700	NE	2	NIL	5
PSS	10km	25	7	2017	16:00	18:00	02:00	2	800	E	1	NIL	5
PSS	10km	26	7	2017	13:00	16:00	03:00	7	700	W	3	ILR	5
PSS	500m / 2km / 5km	27	7	2017	09:00	12:00	03:00	10	600	SW	5	NIL	5
PSS	>10km	27	7	2017	08:40	10:20	01:40	8	1000	NW	1	NIL	5
PSS	>10km	27	7	2017	11:35	16:00	04:25	7	1000	NW	1	NIL	5
PSS	2km / 5km	28	7	2017	16:20	19:20	03:00	10	700	SW	4	ILR	5
PSS	500m / 800 m / 2km	31	7	2017	08:05	10:50	02:45	10	550	SW	3	CLR	5
PSS	5km	31	7	2017	09:20	11:25	02:05	7	1200	S	1	NIL	5
PSS	2km / 5km	31	7	2017	12:10	14:25	02:15	8	1400	SW	1	NIL	5
PSS	2km	9	8	2017	07:00	08:00	01:00	8	600	NE	3	NIL	5
PSS	5km	18	8	2017	15:45	19:55	04:10	8	700	SW	2	NIL	5
RGS	500m	18	8	2017	09:00	12:00	03:00	9-7	600	SW	3	NIL	5
RGS	500m	31	8	2017	10:55	14:55	04:00	5	1000	SW	2	NIL	5

There were 22 target species recorded; namely buzzard, curlew, cormorant, common sandpiper, golden eagle, golden plover, heron, hen harrier, herring gull, kestrel, lesser black-backed gull, mallard, merlin, peregrine, raven, red grouse, red-

throated diver, ring ouzel, snipe, sparrowhawk, teal and white-tailed eagle (**Table 7.37**). In addition, vantage point effort was 180 hours during the breeding season and breeding bird surveys comprised 96 hours.

The sightings from all surveys were aggregated with priority species search effort to identify territory locations of target species (**Table 7.1**) and in particular to identify curlew, red grouse, snipe and raptor territories within the Survey Areas (**Figure 7.20**) and published avoidance distances (Ruddock & Whitfield, 2007[21]; Pearce-Higgins et al., 2009) (**Figures 7.21 & 7.22**).

7.3.4.1.1 Raptor surveys

One raptor territory, kestrel, was recorded within the 500 m Surveys Area and both the 500 m turbine buffers of the existing and proposed turbines (**Figures 7.20 – 7.26**). Within the wider 2 km Survey Area (**Figures 7.20 – 7.24**) there were, hen harrier (n = 1; failed), merlin (n = 1; 1 fledged young), peregrine (n = 1; 1 successful), sparrowhawk were recorded in the 2 km Survey Area. Within the 5 km Survey Area an additional hen harrier territory was recorded (3 young fledged) and buzzard (4 pairs), sparrowhawk (3 pairs), kestrel (3 pairs).

Within 10 km a pair of golden eagles was recorded to fledge one young chick and additional merlin (n = 3), hen harrier (n = 2 failed nests and a third site only recording a displaying male in the early season), and peregrine (n = 2) (**Figures 7.20 – 7.24**) and a smaller number of other species including buzzard, raven, kestrel, sparrowhawk. One of the birds was readily identifiable by wing tags (Blue White) and several movement including over the Operational Barnesmore Windfarm identified the same bird. Two additional peregrine and two additional hen harrier territories were recorded within 15 km along with two additional buzzard pairs.

A sub-adult white-tailed eagle was recorded in a number of locations from a range of surveys between 500 m and 10 km Survey Areas and was repeatedly identifiable as a non-breeding Irish fledged juvenile. The bird was recorded near the Site, in the wider hinterland and at Lough Mourne and Lough Eske. This eagle was observed apparently fishing around Lough Slug adjacent to the site.

7.3.4.1.2 Red grouse surveys

Whilst some grouse were recorded within the wider 10 km and 15 km Survey Area; these were systematically surveyed within the Survey Area and 500 m Survey Area although some parts of the Survey Area does not contain suitable habitat for this species in particular the semi-improved pasture along the access tracks or coniferous woodland areas in the north and east respectively of the Site. Within the Survey Area and 500 m Survey Area there were up to 30 red grouse territories recorded in 2017. There were 23 of these within the 500 m buffer of the existing turbines and 24 within the 500 m buffer of the proposed turbines (**Figure 7.22**).

7.3.4.1.3 Wader surveys

There were no curlew within the Survey Area and 500 m buffer during 2017, although historically these are known to occur in the wider area (**Technical Appendix 7.2**). A curlew territory was recorded within the 800 Survey Area, and just under 1 km (990 m) from both operational and proposed turbines. Adults were recorded alarm calling at hooded crows in May at this locality, but there was no evidence of any fledged young and this pair appear to have failed. Additional curlew were recorded within 10 km Survey Area to the east.

Golden plover were recorded to have fledged at least two chicks to the north of the Site within the 800 m Survey Area. The family party were recorded in June feeding at the lough edge at the north part of the Site. Additional breeding golden plover were recorded to the south within 10 km and also to the north-west (although a larger flock seen in April / May) and may still have been on passage. A number of flocks were seen in spring around the Site which later departed.

There were extensive snipe records from the range of surveys conducted and snipe territory mapping revealed that there were 29 territories within the Survey Area and 500 m Survey Area, of which 19 were within the 500 m existing turbine and 23 within the 500 m proposed turbine buffer (**Figures 7.20 – 7.24**). There was one territory which was within 500 m of the proposed Site Access Track. The 400 m buffer of snipe territory locations (see Pearce-Higgins et al., 2009) (**Figure 7.22**) shows that all of the 25 existing turbines are within 400 m of the snipe territories, whilst only 12 of the 13 proposed turbines

[21] Ruddock, M. & Whitfield, D.P. (2007). A review of disturbance distances in selected bird species. Report from Natural Research (Projects) Ltd. to Scottish Natural Heritage. Natural Research, Banchory, UK.

are within the 400 m buffer of the snipe territories i.e. one of the turbines is more than 400 m away from any snipe (**Figure 7.22**).

Several pairs of common sandpiper were recorded within the Operational Barnesmore Windfarm breeding along edges of lakes and in close proximity to existing turbines. Other common sandpipers were recorded at Lough Mourne (>5 km), Lough Eske (>5 km), Dunragh (>5 km) and Lough Eske (>5 km) (**Figures 7.20 – 7.24**).

7.3.4.1.4 Other species surveys

A pair of ring ouzel was recorded to the north of the Site just beyond the 500 m turbine buffers. These birds were recorded mobbing hooded crows, singing although no young were ever observed. Red-throated diver and great northern diver were recorded in the 10 km Survey Area to the south within 10 km and a breeding site was suspected for the former although not confirmed there but birds were seen foraging and in flight at a number of locations all of which are plotted and both herring gull and lesser black-backed gull were recorded within 10 km Survey Area to the south east at Lough Derg and the latter also recorded at Lough Eske (**Figures 7.20 – 7.24**).

Herons, cormorants and range of other waterbirds including mallard, little grebe and teal were recorded at some of the lakes and were recorded both foraging and within suitable breeding habitat (**Table 7.38**). Within 500 m Survey Area ravens (n = 3) were recorded whilst additional pairs of ravens were also recorded beyond 2 km from the Survey Area (**Figures 7.20 – 7.24**).

Table 7.37 Details of breeding priority species searches (PSS), including survey dates and species detected

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	2km	22	3	2017	H., RG, RN, T., K.	H. and T. recorded over lakes adjacent to track, RN over Clogher Hill with active site, into small section of crag. K. hunting to north over trees
PSS	2km	23	3	2017	PE, RN, K.	PE seen perched up and circling; RN active site along slopes of Gap. K. hunting and soaring along ridge
PSS	5km	23	3	2017	HH, BZ, ML	Male HH to north of Site, seen flying and undulating. BZ pair soaring and displaying over forest. ML along road and into trees
PSS	500m	29	3	2017	WE, CA	Additional sighting en-route to VP
PSS	5km	29	3	2017	PE, RN	PE seen flying and perched. RN family party along ridge line
PSS	500m / 800 m	29	3	2017	MA, RN	MA flew onto lough, RN pair flying to pylons, same pair flew back in same direction
PSS	500m / 2km / 5km / 10km	29	3	2017	GP, K., RN	GP(13) flying low over Lough Hill, K. male hunting over moor, GP(2) flying over Croaghonagh, RN(2) flew from forest NW.
PSS	500m / 2km	29	3	2017	EA, K.	EA circling and gliding over ridge, seen from track, flew NW over valley. K. soaring, hovering and stooped for prey
PSS	500m / 2km / 5km	29	3	2017	RG, MA, HH	15:59 - RG flew, 16:03 - MA (2) pair flew onto lough, 17:30 - RG feathers, 17:36 - common frog in heather. HH pair seen separately but within 1 km of each other

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	5km	30	3	2017	EA, PE	Additional sighting during VP. EA circling to west, mobbed by PE. Joined by 2nd EA, then dispersed.
PSS	500m / 800 m / 2km / 5km	30	3	2017	RG, GP, RZ, EA, SN, CU	Fox scat, frog spawn, RG droppings, GP in heather / moorland to north, RZ in river gully. EA (2) flying south-east, SN chipping south of road. CU heard calling
PSS	5km / 10km	2	4	2017	K., BZ, HH	10:03 K. Adult male kestrel hunting over open grassland on edge of forest and flew off in south-east direction. Adult male BZ hunting, flew off in west direction. HH male undulating
PSS	5km / 10km	6	4	2017	EA, BZ	EA seen hunting and BZ soaring and then perched and dropped to ground after rat, then back towards clump of trees
PSS	5km / 10km	6	4	2017	K., HH	K. hunting and flew towards small quarry then across main road. HH male brief sighting over trees
PSS	10km	6	4	2017	SH, BZ	SH adult female flying low and BZ pair on site where previous HH occurred
PSS	5km	6	4	2017	BZ, SH, ML	Adult male BZ observed circling, SH towards road carrying food, ML heard calling
PSS	5km / 10km	13	4	2017	EA, PE, RN	EA pellet and kill found on rocky outcrop, PE seen in flight heading north. RN mobbed PE
PSS	5km	13	4	2017	BZ, MA, K.	BZ pair soaring and displaying, MA pair on L. Fad, K. pair seen at west side hunting along ridge of Gap
PSS	10km	13	4	2017	BZ, HH, CU	Adult male BZ circling over forest. HH adult female over re-stock, perched and flew off low into restock. CU seen at side of road near historical breeding site along NI border
PSS	10km	13	4	2017	HH, BZ	HH pair present and on site along valley and BZ near previous HH site north of L. Derg
PSS	5km	16	4	2017	HH	HH male near suitable habitat and female perched up nearby. Some chittering at HC. At separate site adult male hen Harrier flying over potential nest site with prey
RGS/SNS	500m	20	4	2017	SN, RG	Various locations recorded for SN, RG calling and adjacent to tracks
RGS/SNS	500m	20	4	2017	RG, SN	Various locations chipping and drumming recorded included immediately adjacent to turbines

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
RGS/SNS	500m	20	4	2017	SN, RG, PE, CS	RG calling, PE prey strike, second prey strike, RG pair flushed, no alarm, SN alarming/flew, RG and CS calling from Meenbrock Lough
RGS/SNS	500m	20	4	2017	RG, SN	Both species heard calling including close to track edges and adjacent to / behind control room
RGS/SNS	500m / 800m / 2km	21	4	2017	NIL	No waders heard or seen
PSS	5km	5	5	2017	HH, PE	Adult male HH hunting and flew from forest nest site. PE pair seen perched on crag and ML heard calling apparently at RN from forest edge
RGS/SNS	500m	6	5	2017	SN, MA, T.	22:08 SN chipping. 22:17 SN displaying. 22:19 SN displaying, chipping. 22:21 SN chipping. 22:29 SN chipping. 22:41 SN chipping. 22:41 MA 2. 22:45 T. 2 in flight calling
PSS	5km / 10km	6	5	2017	SH, HH, RD, LB, HG, GP, BZ, K, ND	Adult male SH observed flying into mature Sitka spruce. BZ site at corner of road. HH seen further north than before and have moved. RD seen foraging and single GP heard calling from ground. LB (6) and HG (5) seen over small islands. BZ active nest site to south of Dunragh with pair defending site against HC. K pairs active to north and west of L. Derg. ND calling /wailing on Derg
RGS/SNS	500m / 5km / 10km	19	5	2017	PE, K., RG, SN, CS	PE seen at active ledge and K. also seen. RG @ 21:33, 22:14, 22:28, 22:31, SN @ 21:47, 22:31, 22:33, CS @ 22:34, 22:36.
RGS/SNS	500m	22	5	2017	RG, SN, CS	RG @ 21:11, SN @ 21:54,22:17, 22:31, 22:40, CS 5 sightings
PSS	5km / 10km	25	5	2017	PE	PE adult pair perched up separately, with evidence of splash on rocks and two probable recent kills
PSS	5km / 10km	30	5	2017	SN, EA, PE	17:51 - SN chipping and drumming, 19:24 - EA seen flying in area for 25 minutes, mobbed by merlin then landed on small cliff, not seen again, 19:37 - second EA seen in distance. PE observed at separate sites
PSS	2km / 5km	7	6	2017	RN, K.	RN flying, RN flying NW, K. hunting over forest
PSS	5km	7	6	2017	MA, K., BZ, SH, HH	08:30 - MA(2) flying over RG, 09:03 - K. male hunting, 09:35 - SH mobbing BZ over forest, 10:12 - HH male flying <10m over moor and in with food to nest site in restock

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	5km / 10km	7	6	2017	PE, K., LB, HG	Single adult PE seen perched up no sign of second adult; some kills observed another adult seen separately at second area in flight and hunting, stooped at ground possible snipe or grouse. Kestrel site remains active along border at River Finn. Gulls recorded at Lough Derg
PSS	5km / 10km	7	6	2017	EA, ML, LB, BZ	Active EA site with one chick, merlin seen flying up gully, active K. and PE seen. LB pair seen at Eske with BZ pairs active at north and east side of Eske and additional territory recorded several km west side of Eske
PSS	10km	16	6	2017	SN, PE, EA, K. RN	SN chipping and drumming. PE pair active, K. nest active, RN calling
PSS	5km	24	6	2017	HH, PE, ML, K., RN, RD	HH pair failed at previously active site, other site not readily visible but male seen heading up gully. Single adult PE that flew north. Used PE nest observed and flying young observed. RN family party of 6 birds. Active K. site. ML adult pair seen along forest edge. RD seen loafing and swimming on water at west
PSS	5km / 10km	9	7	2017	LB, HG, CA, K., BZ	LB and two juveniles seen on water, HG 4 bird (two on water). Several CA fishing on L. Derg. K. with young chasing adult to north of lough and BZ pair to north of lough also with flying young
PSS	10km	22	7	2017	ML, RN	ML recently fledged chick observed flying and freshly harvested woodland / track, no nest located, but aggravated bird and in / out of trees indicative of recently fledged. RN family party roosting along forest edge
PSS	5km / 10km	22	7	2017	HH, EA, PE, RD, LB, HG, SH,	HH fledged chicks observed and both adults delivering prey, nearby site remains active in forest ride. Third site failed along river valley. Single adult PE observed near crag and later separate PE seen in flight towards HH sites. LB and HG seen on L. Derg and one RD seen in brief flight at Dunragh. SH active nest site along NI border active and young heard calling also BZ juveniles heard calling north of SH
PSS	10km	25	7	2017	K., EA, PE, BZ	12:45 - K. pair flying & calling with young, 12:55 - pair hunting in same area. EA 1 young seen with adult pair in attendance including blue white

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
						tagged bird. PE flew over from east, 2 BZ sites north and east of Lough Eske both with flying juveniles
PSS	10km	26	7	2017	SN, RN, EA	13:25 - SN chipping, 14:40 - RN(3) flying and calling, 15:15 - EA circling
PSS	500m / 2km / 5km	27	7	2017	EA, K., RN	09:31 - Mature adult EA hunting, mobbed by female K. from nest site, 10:24 - same EA seen hunting, 10:52 - same EA mobbed by RN
PSS	>10km	27	7	2017	HH, CU, SH, BZ	HH adult pair observed feeding 2 chicks. CU recorded calling in area where recorded previously, chicks likely but not seen. SH site active adjacent to road with calling juveniles heard. BZ (4) 2 adults and 2 juveniles recorded flying over forest
PSS	>10km	27	7	2017	BZ, PE, ML, SH, HH	BZ pair with two chicks, PE seen in flight over afforested crag, SH with 3 young calling, ML and HH seen with fledged young. Additional HH site failed with no evidence of juveniles
PSS	2km / 5km	28	7	2017	BZ, K.	18:10 - BZ circling then flew to perch in forest, 18:25 - K. male hunting flying
PSS	500m / 800 m / 2km	31	7	2017	SN, K. RG	K. with fledged young from nearby site, SN chipping briefly and RG flew towards Site from three separate locations
PSS	5km	31	7	2017	BZ, CS, MA	No sightings at HH site, BZ pair circling with 1+ juvenile from below HH site. CS and MA seen at Lough Mourne
PSS	2km / 5km	31	7	2017	K., BZ	No sightings at HH site. K. pair adjacent to main road hunting frequently but no signs of juveniles from earlier activity. BZ pair and juveniles soaring over forest along border.
PSS	2km	9	8	2017	SH, K.	Additional sightings from track at site entrance both with juveniles from closest sites
PSS	5km	18	8	2017	HH, SH, BZ	Fledged chicks observed along forest ride lifting over and around tops of trees. Juvenile SH heard calling from trees and BZ adult and 2 juveniles soaring to north along border
RGS	500m	18	8	2017	RG, SN, RN	RG and SN across the site also RN recorded in flight
RGS	500m	31	8	2017	RG, SN, RN, K.	RG and SN at various localities along with raven along ridge and K. juvenile hunting to east west side

7.3.4.2 Wintering Priority Species Surveys

During the winter of 2017 to 2018 (September 2017 to February 2018) there were 127 hours and 45 minutes spent searching adjacent habitats (**Figures 7.1 – 7.3**) for priority species (**Table 7.1; Table 7.38**) with efforts concentrated on hen harrier wintering sites and whooper swan during the wintering season. Survey times ranged between 05.45hrs to 20.45hrs and covered a wide range of weather conditions (**Table 7.38**).

Table 7.38 Details of wintering priority species searches (PSS), including survey effort, weather

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	10km / >10km	5	9	2017	13:50	18:05	04:15	10	600	W	3	NIL	3
RGS	500m / 2km	19	9	2017	10:25	14:15	03:50	10	600	SE	3	NIL	5
PSS	500m / 2km	20	9	2017	15:00	19:00	04:00	10	500	N	2	ILR	5
PSS / WBS	500m / 2km / 5km / 10km	27	9	2017	16:15	20:45	04:30	10	350	SE	4	CHR	3
PSS / WBS	500m / 2km / 5km / 10km	28	9	2017	10:30	13:30	03:00	9	500	SE	2	NIL	5
PSS / WBS	5km / 10km	5	10	2017	05:45	09:45	04:00	7	800	NW	4	NIL	5
PSS / WBS	500m / 2km / 5km / 10km	19	10	2017	13:35	19:30	05:55	10	400	SE	3	CLR	5
PSS	500m / 2km	24	10	2017	11:15	14:15	03:00	10	500	SW	4	NIL	5
PSS / WBS	2km / 5km / 10km	27	10	2017	10:50	16:50	06:00	10	600	SE	1	NIL	5
PSS / WBS	500m / 2km / 5km / 10km	31	10	2017	07:05	15:20	08:15	10	600	SE	2	NIL	5
PSS / WBS / WRS	5km / 10km	10	11	2017	14:45	17:45	03:00	10	600	W	3	ILR	5
PSS / WBS / WRS	500m / 2km / 5km / 10km	15	11	2017	06:20	10:40	04:20	10	300	S	2	ILM	5
PSS / WBS / WRS	2km / 5km / 10km	17	11	2017	13:05	17:30	04:25	10	500	SW	3	ILR	5
PSS / WBS / WRS	2km / 5km / 10km	28	11	2017	06:35	09:05	02:30	6	600	N	3	NIL	5

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS / WBS / WRS	2km / 5km / 10km	28	11	2017	15:15	17:25	02:10	10	600	N	2	NIL-ILM	2
PSS / WBS / WRS	2km / 5km / 10km	30	11	2017	07:10	09:00	01:50	6	500	N	2	NIL	5
PSS / WBS / WRS	2km / 5km	5	12	2017	14:30	16:35	02:05	10	400	SW	4	NIL	5
PSS / WBS / WRS	5km / 10km	27	12	2017	11:20	17:20	06:00	10	600	NW	2	NIL	5
WRS	5km / 10km	27	12	2017	07:45	09:50	02:05	10	600	NW	2	NIL	5
WRS	5km / 10km	27	12	2017	15:10	17:10	02:00	9	500	NW	2	NIL	5
WRS	500m / 2km	28	12	2017	16:15	17:20	01:05	7	600	N	2	NIL	5
WRS	500m / 2km	28	12	2017	16:15	17:20	01:05	8	500	N	2	NIL	5
PSS	10km / 20km	6	1	2018	07:55	12:55	05:00	2	800	NE	3	NIL	5
WBS / WRS	2km / 5km / 10km	11	1	2018	07:05	10:15	03:10	8	600	SE	1	CHM	1
PSS / WBS	2km / 5km / 10km	11	1	2018	13:25	15:25	02:00	8	600	SE	1	ILM	5
PSS / WBS / WRS	5km / 10km / 20km	12	1	2018	15:10	17:35	02:25	8	600	SE	1	NIL	5
PSS / WBS / WRS	2km / 5km / 10km	18	1	2018	07:30	11:40	04:10	8	600	W	3	NIL	5
PSS / WBS / WRS	2km / 5km / 10km	25	1	2018	14:20	18:00	03:40	10	600	W	2	ILR	3
PSS	2km	31	1	2018	09:50	11:55	02:05	10	600	W	3	CLR	5
PSS	10km / >10km	6	2	2018	06:45	13:15	06:30	3	500	NW	4	NIL	5
PSS	5km / 10km / 20km	10	2	2018	07:05	14:35	07:30	8	800	SW	2	NIL	5
PSS / WBS	2km / 5km / 10km / 20km	13	2	2018	13:15	14:15	01:00	6	800	W	3	NIL	5
PSS	2km	21	2	2018	12:05	15:00	02:55	2	1000	SE	1	NIL	5

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS / WBS	500m / 2km / 5km / 10km	27	2	2018	15:30	17:00	01:30	9	800	N	4	NIL	5
PSS / WRS	2km / 5km	28	2	2018	12:35	19:05	06:30	9	800	N	3	N	5

There were 35 target species recorded; namely buzzard, cormorant, Canada goose, common gull, coot, curlew, golden eagle, greater black-backed gull, goosander, greylag goose, goldeneye, golden plover, heron, herring gull, hen harrier, kestrel, lesser black-backed gull, mallard, moorhen, mute swan, northern diver, red grouse, raven, sparrowhawk, snipe, sanderling, teal, tufted duck, white-tailed eagle, white-fronted goose, wigeon, whooper swan and hybrid / feral goose (**Table 7.39**). In addition, wintering vantage point effort was 180 hours during the wintering season and wintering bird surveys comprised 46 hours and 45 minutes.

The sightings from all surveys were aggregated with priority species search effort to identify key wintering locations of target species (**Table 7.1**) and in particular to identify hen harrier and whooper swan locations within the Survey Areas (**Figures 7.25 – 7.26**) and published avoidance distances (e.g. Ruddock & Whitfield, 2007[22]; Pearce-Higgins et al., 2009) (**Figures 7.25 – 7.26**).

Wintering priority species were recorded widely within 2 km (including raptors, gulls, waders, swans whilst other species such as snipe and red grouse were more habitat specific). Gulls were typically associated with the extant water-bodies but also some agricultural habitats. Snipe and grouse were encountered across the Site and 500 m Survey Area although in apparently lower density than during the breeding season. Some species were recorded very distant > 15 km e.g. sanderling, curlew, light-bellied Brent geese etc at Donegal Bay area. Northern diver were recorded on a single visit to Lough Eske.

Ravens were recorded roosting at the forest to the south-east with a maximum roost count of 13 birds and also to the north (at separate site) within 2 km, 5 km and within Barnesmore Gap and also around Lough Eske. These birds were occasionally observed feeding on carrion in the Site and frequently recorded during vantage point surveys over winter and migration season.

There were wintering, roosting and foraging whooper swans recorded within the 500 m Survey Area within lakes contained on the Site and over-wintering swans (and also mute swans) were recorded at a variety of other locations within the 2 km, 10 km and >10 km Survey Areas. The whooper swans utilising the site at Lough Golagh and Lough Naleaghany comprised of small family parties including both adults and juveniles and corresponds to the sightings from vantage point surveys. There are therefore several wintering swan roost sites within the area (**Figures 7.25 – 7.26**) including a range of additional ones identified historically (Robinson et al., 2004; **Figure 7.5**) and some roosting / foraging / commuting routes were identified including the small family party recorded on Site, which was likely to have been foraging with the Castlederg flock (to the east) and connectivity between Cullionboy Lough and Lough Golagh / Lough Naleaghany birds on the Site was also observed and verified further by vantage point surveys. A whooper swan migration corridor appears to occur along the length of the Barnesmore Gap.

A range of goose species including Canada goose, greylag goose, Greenland white-fronted goose and hybrid / feral goose were recorded roosting and/or foraging and/or on passage at a number of locations in the wider hinterland areas recorded within 2 km or 5 km during winter of 2017 and 2018. Greenland white-fronted goose were recorded closest at Lough Mourne, Lough Derg, Lough Nillan, Pettigoe (Dunragh) and at Lough Eske all more than 5 (8) km away from the Site (**Table 7.39**). There are therefore several wintering goose roost and transit sites within the area (**Figures 7.25 – 7.26**) and some roosting / foraging / commuting routes were identified although these were located away from the Operational Barnesmore Windfarm. Pettigoe white-fronted geese were observed flying south at dawn and therefore away from the Operational Barnesmore windfarm and may also interchange at Lough Derg for roosting. Other detections e.g. at Lough Mourne appear to have been

[22] Ruddock, M. & Whitfield, D.P. (2007). A review of disturbance distances in selected bird species. Report from Natural Research (Projects) Ltd. to Scottish Natural Heritage. Natural Research, Banchory, UK.

birds during migration and whilst some movements may occur over / around the Site but none were observed during wintering or migration vantage point surveys and most migration movements were recorded along the Barnesmore Gap.

Hen harrier winter roost areas were identified within 10 km and >10 km and none were recorded within 2 km or 5 km (**Figures 7.25 – 7.26**). Most roost detections were of a single bird and the maximum roost count was two birds (female and one male) and appear to be used regularly over the winter survey period at a discrete number of different locations. Several other suitable areas of roosting habitat occurred within 2 km and within 5 km but no hen harriers were observed there.

Table 7.39 Details of wintering priority species searches (PSS), including survey dates and species detected.

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	10km / >10km	5	9	2017	HH, RN, BZ	Female HH seen foraging and group of 11 RN flying to north, BZ along river Finn
RGS	500m / 2km	19	9	2017	RG, SN	SN flew, RG flew west in wider landownership area
PSS	500m / 2km	20	9	2017	RN, K.	RN group perched up on northern side of Gap and others flew north along roadside up on to cliff. K male perched along cliff face
PSS / WBS	500m / 2km / 5km / 10km	27	9	2017	H., MS, MA, WS, ZL	18:00 - H. seen at Lough Beagh, 19:18 - MS(5), MA(23) and WS(3) on Taisk Lough also ZL seen there
PSS / WBS	500m / 2km / 5km / 10km	28	9	2017	HH, MS, EA, K.	10:47 - HH female lifted from ground (roost) mobbed by HC(2), 10:52 - MS on lough, 12:36 - MS(5) all juvenile on Lough Taisk, 13:11 - EA(2) soaring, 1 bird wing-tagged and sat-tagged, 13:23 - K. flew over road near
PSS / WBS	5km / 10km	5	10	2017	WS, MS, SH, CG	07:04 - WS(6) landed on lough, 08:12 - WS(2) landed on lough, 09:25 - MS(2) landed on water, SH through woodland and separately across road into ash woodland. CG loafing on water
PSS / WBS	500m / 2km / 5km / 10km	19	10	2017	GP, WG, HH, EA	GP flew south, WG (9), flew east and lost to view, HH adult male (very white) seen foraging from roadside, BZ male soaring at 60-90 m agl. Possible EA seen along ridge but very brief sighting and lost to view after 7-8 seconds
PSS	500m / 2km	24	10	2017	RN, GP	GP(5) flying low over Cross Hill, north of wind farm, RN(2) and single RN flying over same area
PSS / WBS	2km / 5km / 10km	27	10	2017	H., MS, T., MA, RN, GP, WG, WS, HH	Lough Derg - H. western edge, H. eastern edge, MS(2) loafing SW corner, T.(2) S shore, MA(3), Barnesmore Gap - RN(1) & H.(1), Croaghmeen - RN(3) flying NW towards windfarm, RN(1) over Barrack Hill, GP(13) flying from Lough Mourne. WG (3) seen loafing alongside 4 WS that arrived from south-east, single male HH flying at <10m
PSS / WBS	500m / 2km / 5km / 10km	31	10	2017	BZ, RN, H., MA, SH,	Lough Eske - RN 3 flying north of Eske, H. on western shore, MS(2) loafing,

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
					MS, WS, EA, MH	MA(4) loafing, RN(3) flying north of Lough Eske, SH male flying across road, RN(3) flying towards windfarm over, RN flying over forest, BZ hunting over forest and moor. WS (3) on Cullionboy and H. perched on edge, EA soaring along ridge
PSS / WBS / WRS	5km / 10km	10	11	2017	K., RN, T., WS, HH, BZ	K. hunting, RN flying over forest, T.(11) on lough. 5 WS (2A; 3J), HH male into roost, H. along edge of water and BZ perched on conifer plantation
PSS / WBS / WRS	500m / 2km / 5km / 10km	15	11	2017	WG, GP, WS, H., LB, MA, T. TU, ZL, H.	Flock of WG (15) lifted and flew south from Pettigoe, GP (38) circling and WS (3) on west side of Derg and also LB (2), MA (2), T. (3), TU (7) and ZL recorded again at Taisk
PSS / WBS / WRS	2km / 5km / 10km	17	11	2017	RN, SH, MS, GD, CA, MA, WS, K., HH	RN in flight, SH hunting, then MS(2) flying from L. Eske, GD(3) along shore of Lough Eske, CA(4) on shore of L. Eske, MS(3) 2 adult +1 juvenile corner of L. Eske. MA(5) flying along road, SH hunting along lough shore, RN(2) flying over, K. hunting over forest and moor, H. on Lough Mourne, WS(3) flying over Barrack Hill. HH male and female into roost site
PSS / WBS / WRS	2km / 5km / 10km	28	11	2017	RN, H., MS, MA, RD	RN(2) flying N of L. Eske, Lough Eske - H. on northern shore, MS(2) on water, MA(5) at southern end, H. flying parallel with main road, RD (single) on water and diving and then RN(3). No EA seen
PSS / WBS / WRS	2km / 5km / 10km	28	11	2017	WG, GP, BZ	WG (8) seen in flight towards dusk. Roost location not seen lost to view. GP (19) circling over hilltop and second flock (41) went south
PSS / WBS / WRS	2km / 5km / 10km	30	11	2017	H., SH, GN, TU, MS, CA, RN, MH	Lough Eske - H.,GN(4), TU, SH. MS(2), CA(3), RN south of L. Eske, MA & MH on lough @, RN(2) flying
PSS / WBS / WRS	2km / 5km	5	12	2017	BZ, SH, GP, RN	Two flocks of GP (31 / 67) circling and flew west. BZ perched in trees, and second bird soaring. SH along tracks and into woodland. RN (7) to north
PSS / WBS / WRS	5km / 10km	27	12	2017	SH, MS, MA, CA, RN, LB, WS, H., T., GP, HH	Lough Derg - WS (4), LB (3), H.(1), Lough Eske - SH, MS(2) MA(7), CA(5), MS(2) flying north towards Donegal town, RN(3) south of L. Eske. T. 3 at lough Mourne. RN flying NE. WG / GJ (15) too dark and distant to confirm into lough, GP heard calling from two locations; HH sub-adult male seen towards dusk heading east

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
WRS	5km / 10km	27	12	2017	HH	HH female exited apparent roost site @ 08:12
WRS	5km / 10km	27	12	2017	HH, WS	Male HH foraging and appeared to head into roost in area of rush / heath along water course. WS (3) overhead and descended
WRS	500m / 2km	28	12	2017	HH, RN	HH male and female circling over potential roost site 15 minutes before dark, lost to view in mist heading to ground
WRS	500m / 2km	28	12	2017	HH	HH male seen heading in direction of roost site but lost to view
PSS	10km / 20km	6	1	2018	BZ, MS, GB, CM, MA, HG, RN, MH	BZ flying east, MS (2) flying along road. MA 7, H. 1, SS 17, CM 3 separate flocks (8 + 3 + 6), GB 1, HG 2, RN in flight (2 + 2)
WBS / WRS	2km / 5km / 10km	11	1	2018	RN, WN, H., BZ	H. perched at Lough Carn, WN(6) on Lough Mourne, BZ flying north, RN roosting to east side of lough in 4-5 locations
PSS / WBS	2km / 5km / 10km	11	1	2018	CG, RN, MH, MS, MA, CO, SH, CA	CG (4) flying south along the Gap, MH on Lough Atheye, MS, CO, MA on western side of L. Eske, CA & MA loafing, SH female hunting west of L. Eske
PSS / WBS / WRS	5km / 10km / 20km	12	1	2018	WS, RN, BZ	WS (5+8) feeding in fields, separately then WS (2). RN 4. WS (3) went west towards Barnesmore, BZ circling
PSS / WBS / WRS	2km / 5km / 10km	18	1	2018	RN, MS, CA, MA, EA, GP, K.	CA, MS and MA on L. Eske, RN flying along the Gap, MA on L. Mourne, MA (5) flying NE of L. Mourne, RN (2) flying NE towards wind farm. EA soaring (juvenile) to north with two separate flocks of GP. K. along ridge
PSS / WBS / WRS	2km / 5km / 10km	25	1	2018	RN, MH, H., MA, CA, T., GP	T.(2) on western shore L. Eske, CA(4), MA(7) and MA(5 + 7) at southern end of L. Eske, RN flying SE of lough, RN flying through the Gap, H. and MH on small lough. H. and RN 5 at Lough Mourne. Flock of GP circling hilltop for c 25 minutes
PSS	2km	31	1	2018	RN, SH, H., WS	RN (2) flying together and RN (5) to north. H. in flight and SH hunting, RN along edge of Site scavenging. WS (3) on Cullionboy
PSS	10km / >10km	6	2	2018	WS, H, T., CU, MA, MS, MH, BZ, TU, CG, HG, SS, CU,	L. Derg WS (7+13). H. on L. Derg. T. 5 on lake. CU flew over. MA on lake. MA, MH, WS, MS, TU on lake. BZ (1+1) and CG flying nearby. HG, SS, CU, LB, flying nearby. WS on lake. WS (17), GN (3), TU(2), MH, CA(2) on L.Eske. RN to

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
					LB, GN,CA, RN,SH, H., EA	north of Eske. RN flying through gap. T. (6) on L. Mourne. SH, RN flying. H. on ground by lake. EA juvenile flying over hill
PSS	5km / 10km / 20km	10	2	2018	MS, MA, CA, RN, HH, BZ, GN, ND	MS(2), MA(2), CA, MA(4), ND loafing on L. Eske, HH female flying over Barrack Hill, RN(27,4,2,2) flying over Garranbane Hill, RN flying through the Gap, MA(3) on L. Sallagh, BZ and LB(3) flying over Killeter Forest. RN 3 flying. GN 3 on lake, RN 2 flying. BZ 2 perched. WS 3 (2 adults and 1 juvenile) on ground. SH north of Lough Eske
PSS / WBS	2km / 5km / 10km / 20km	13	2	2018	WS, SH, MH, MA, MS, RN, GB, SS, PB, CM	Donegal Bay / Murvagh - GB, SS, PB (11), CM (3+5), WS(22), 2ND (off-shore), Durnesh - WS(1), SH female hunting, MH, L. Eske - MA(4), MS(2), RN. RN flying outside Donegal town. MA 2 on lake
PSS	2km	21	2	2018	RG, SN, RN	RG / SN in wider area to west of Site (x 3), RN (2 + 2 + 3) on ground and apparently scavenging
PSS / WBS	500m / 2km / 5km / 10km	27	2	2018	RN, WE, MA	RN (3) flying over Killeter Forest, RN (2) flying over. No swans seen. WE flying over gap lost sight of then regained sight. MA on lake
PSS / WRS	2km / 5km	28	2	2018	WS, BZ, HH	WS (4) overhead, BZ over forest circling, HH male into roost at 17:12, lost to view.

7.3.5 Field Surveys 2018 – 2019

7.3.5.1 Breeding Bird Surveys

Breeding season transect surveys were carried out between during April 2018 and August 2018 (**Table 7.40**). There were 96 hours and 55 minutes undertaken in transect surveys covering both the Survey Area and 500 m Survey Area for all species and priority species (curlew) within the 800 m buffer (see also Section 3.6.1). All parts of the Survey Area were accessible (**Figure 7.7**) for walkover surveys although one part of the Site Boundary was revised but there were not considered to be any constraints to species detection (see also **Chapter 7**). Survey times ranged from 06.05 hrs to 21.55 hrs (**Table 7.40**) and covered a wide range of weather conditions (**Table 7.40**).

Table 7.40 Summary of survey effort and weather during breeding bird surveys

Month	Day	Year	Obs	Start	End	Dur	Cloud Cover	Cloud Height (m)	Wind - Dir & Speed	Precip	Vis (km)
3	7	2018	CS	06:45	11:45	05:00	10	450	SW4	ILM	2
3	21	2018	AM	07:20	12:20	05:00	10	500	SW4-3	NIL	5
3	21	2018	CS	07:20	12:20	05:00	10	500	SW4-3	NIL	5
3	30	2018	CS	10:30	13:40	03:10	10	700	NE3	NIL	5
3	30	2018	CS	16:10	18:00	01:50	10	700	NE3	NIL	5
4	12	2018	CS	06:05	10:05	04:00	10	320-500	SE3	NIL	5
4	19	2018	CS	10:30	15:30	05:00	9-8	600	SW3	ILR-NIL	5

Month	Day	Year	Obs	Start	End	Dur	Cloud Cover	Cloud Height (m)	Wind - Dir & Speed	Precip	Vis (km)
4	27	2018	CS	11:10	15:45	04:35	8	700-800	N1-2	NIL	5
4	27	2018	MR	11:05	16:30	05:25	5-8	800-1000	NW2	ILR-NIL	5
5	23	2018	CS	09:10	16:10	07:00	2-4	800	E2	NIL	5
5	24	2018	CS	07:45	13:45	06:00	4-5	800	SE2	NIL	5
5	25	2018	CS	08:10	12:15	04:05	8-10	550-600	NE4-3	NIL	5
6	19	2018	CS	08:20	15:20	07:00	10	700	SW2	ILR-NIL	5
6	20	2018	CS	08:15	12:05	03:50	6-4	700-800	NW3	NIL	5
6	28	2018	CS	08:55	15:55	07:00	0-1	NIL-1200	NE1	NIL	5
7	17	2018	CS	08:50	13:50	05:00	8	600	SW3-2	NIL	5
7	17	2018	DR	13:30	15:10	01:40	8	600-700	SW3-2	NIL	5
7	17	2018	MR	10:05	14:50	04:45	8	600-700	SW3-2	NIL	5
7	23	2018	CS	18:55	21:55	03:00	10	600	W2	NIL	5
7	24	2018	CS	10:10	15:50	05:40	9-10	700	SW3	NIL	5
7	25	2018	CS	10:00	12:55	02:55	8	700-800	SW3	NIL	5

There were 26 species recorded (**Table 7.41**) within the Survey Area and 500 m Survey Area (**Figure 7.1**) of which only three were red-listed species in Ireland (Colhoun & Cummins, 2013; meadow pipit, ring ouzel and red grouse) and five UK red-listed species (Eaton et al., 2014; cuckoo; mistle thrush; merlin; ring ouzel and skylark).

There were fewer species (n = 16) recorded within the existing 500 m turbine buffer (**Table 7.42**) including three red-listed species (Colhoun & Cummins, 2013; meadow pipit, ring ouzel and red grouse) and two UK red-listed species (Eaton et al., 2014; ring ouzel and skylark). There were 21 species recorded within the proposed 500 m turbine buffer (**Table 7.43**) including three red-listed species (Colhoun & Cummins, 2013; meadow pipit; ring ouzel and red grouse) and two UK red-listed species (Eaton et al., 2014; ring ouzel and skylark).

Behavioural analysis for all the species within the Survey Area and 500 m Survey Area indicates that there were 43 extant species recorded and/or exhibiting breeding behaviours. There were 10) confirmed breeding species and another six probable and seven possible breeding species respectively (**Table 7.41**; **Figures 7.27; 7.28 & 7.29**). There were fewer confirmed breeding species in the existing (n = 8) and proposed (n = 8) 500 m turbine buffers; and an additional two and five respectively probable and four and six possible breeding species respectively.

Meadow pipits and skylarks were widespread across parts of the Survey Area and 500 m Survey Area although the latter were more restricted in their range and appeared clustered in specific habitat areas (**Figure 7.31**) and the habitat associations of these species were evident from the distribution with a scarcity in areas of improved pasture and / or afforested habitats and wider presence on the semi-improved / semi-natural habitats (**Figure 7.31**). Areas of extant turf-extraction were particularly devoid of these two species.

Analyses of breeding bird transect surveys for waders indicates that there was evidence of up to 14 snipe territories within the Survey Area and 500 m Survey Area of which 10 were located within the 500 m existing and 11 within the 500 m proposed turbine buffers. Additional territories were detected during other surveys (Sections 7.3.6.1) where cumulative analyses are undertaken.

There were no curlew territories inside the Survey Area and 500 m Survey Area and no territories were recorded within the 800 m Survey Area, either, during 2018 although curlew were recorded in the wider 2 km Survey Area at approximately 1 km. Curlew were more than 1 km from any existing or proposed turbines but wider cumulative curlew (and other priority species) analyses are undertaken later (**Section 7.3.5.6**). Golden plover were recorded probably breeding in 2018. Both these two waders were in similar localities to their respective 2017 territories.

There were 15 red grouse territories recorded during breeding bird surveys within the Survey Area and 500 m Survey Area but further priority species surveys were undertaken to identify the full distribution and abundance of these species in the Survey Areas (see **Section 7.3.5.6**). There were 12 territory detected during walkover surveys within 500 m of existing turbines and 11 within 500 m of the proposed turbines.

Walkover data identified two raptor species; kestrel and merlin, but the latter was not recorded breeding. One pair of kestrels was recorded within the 500 m Survey Area but this was beyond the existing and proposed 500 m turbine buffers and wider cumulative raptor analyses are undertaken later (**Section 7.3.5.6**).

Table 7.41 – Summary of numbers of territories of each species detected during breeding bird surveys inside the Survey Area and 500 m buffer including conservation status

Species	Confirmed	Probable	Possible	Non-breeding	TOTAL	BOCCI3	BOCC4
B.		3			3	GREEN	GREEN
BT			6		6	GREEN	GREEN
CH		31	2		33	GREEN	GREEN
CK			2		2	GREEN	RED
CS			4		4	AMBER	AMBER
CT		9			9	GREEN	GREEN
H.				5	5	GREEN	GREEN
HC	6	1			7	GREEN	GREEN
HM	1				1	AMBER	AMBER
J.			1		1	GREEN	GREEN
K.	1				1	AMBER	AMBER
M.		1			1	AMBER	RED
MA	1		1		2	GREEN	AMBER
ML				1	1	AMBER	RED
MP	51	73	432		556	RED	AMBER
R.		7			7	AMBER	GREEN
RG	3	2	10		15	RED	AMBER
RN	1			1	2	GREEN	GREEN
RZ		1			1	RED	RED
S.	2	22	2		26	AMBER	RED
SC		2	4		6	AMBER	GREEN
SK			6		6	GREEN	GREEN
SN	5	1	8		14	AMBER	AMBER
W.	1				1	AMBER	GREEN
WR			1		1	GREEN	GREEN
WW			1		1	GREEN	AMBER
Grand Total	72	153	480	7	712		

Table 7.42 – Summary of numbers of territories of each species detected during breeding bird surveys inside the existing 500 m turbine area including conservation status.

Species	Confirmed	Probable	Possible	Non-breeding	Total	BOCCI3	BOCC4
CS			4		4	AMBER	AMBER
H.				3	3	GREEN	GREEN
HC	1				1	GREEN	GREEN
HM	1				1	AMBER	AMBER
MA	1				1	GREEN	AMBER
MP	27	53	259		339	RED	AMBER
R.		1			1	AMBER	GREEN
RG	3	2	7		12	RED	AMBER
RN				1	1	GREEN	GREEN
RZ		1			1	RED	RED
S.	1	19	1		21	AMBER	RED
SC			2		2	AMBER	GREEN
SN	3	1	6		10	AMBER	AMBER
W.	1				1	AMBER	GREEN
WR			1		1	GREEN	GREEN
WW			1		1	GREEN	AMBER
Total	38	77	281	4	400		

Table 7.43 – Summary of numbers of territories of each species detected during breeding bird surveys inside the proposed 500 m turbine area including conservation status

Species	Confirmed	Probable	Possible	Non-breeding	Total	BOCCI3	BOCC4
B.		1			1	GREEN	GREEN
BT			1		1	GREEN	GREEN
CH		4			4	GREEN	GREEN
CS			4		4	AMBER	AMBER
CT		2			2	GREEN	GREEN
H.				5	5	GREEN	GREEN
HC	2				2	GREEN	GREEN
HM	1				1	AMBER	AMBER
J.			1		1	GREEN	GREEN
MA	1		1		2	GREEN	AMBER
MP	33	56	282		371	RED	AMBER
R.		2			2	AMBER	GREEN
RG	3	2	6		11	RED	AMBER
RN				1	1	GREEN	GREEN
RZ		1			1	RED	RED
S.	1	21	1		23	AMBER	RED
SC			2		2	AMBER	GREEN
SN	3	1	7		11	AMBER	AMBER

Species	Confirmed	Probable	Possible	Non-breeding	Total	BOCCI3	BOCC4
W.	1				1	AMBER	GREEN
WR			1		1	GREEN	GREEN
WW			1		1	GREEN	AMBER
Total	45	90	307	6	448		

7.3.5.1.1 Comparison of breeding bird surveys between 2017 and 2018

There was some evidence of change in all breeding season detections between survey years 2017 to 2018 (**Table 7.44**) although broadly a similar suite and abundance of species were recorded between years. Some species increased marginally between years whilst others declined. Meadow pipit were the most dominant species between years although these numbers have changed by circa -34% between survey years whilst skylark declined by -79% between survey years.

Table 7.44 – Summary of numbers of territories of each species detected during breeding bird surveys inside the Survey Area and 500 m Survey Area including conservation status showing change between surveys 2014 - 2018

Species	2017	2018	Change 2017 - 2018	BOCCI3	BOCC4
B.	0	3	3	GREEN	GREEN
BT	10	6	-4	GREEN	GREEN
CA	6		-6	AMBER	GREEN
CH	42	33	-9	GREEN	GREEN
CK	1	2	1	GREEN	RED
CS	3	4	1	AMBER	AMBER
CT	1	9	8	GREEN	GREEN
GC	1	0	-1	AMBER	GREEN
GL	1	0	-1	RED	RED
GP	4	0	-4	RED	GREEN
GR	1	0	-1	AMBER	GREEN
H.	1	5	4	GREEN	GREEN
HC	5	7	2	GREEN	GREEN
HM		1	1	AMBER	AMBER
J.		1	1	GREEN	GREEN
K.	7	1	-6	AMBER	AMBER
LI	1		-1	AMBER	RED
M.	1	1	0	AMBER	RED
MA	2	2	0	GREEN	AMBER
MG	2		-2	GREEN	GREEN
ML		1	1	AMBER	RED
MP	844	556	-288	RED	AMBER
R.	16	7	-9	AMBER	GREEN
RG	25	15	-10	RED	AMBER
RN	13	2	-11	GREEN	GREEN
RZ	1	1	0	RED	RED

Species	2017	2018	Change 2017 - 2018	BOCCI3	BOCC4
S.	129	26	-103	AMBER	RED
SC	8	6	-2	AMBER	GREEN
SH	1		-1	AMBER	GREEN
SL	2		-2	AMBER	GREEN
SK		6	6	GREEN	GREEN
SN	13	14	1	AMBER	AMBER
ST	8		-8	GREEN	RED
T.	2		-2	AMBER	AMBER
W.	7	1	-6	AMBER	GREEN
WP	2		-2	GREEN	GREEN
WR	17	1	-16	GREEN	GREEN
WW	6	1	-5	GREEN	AMBER
Total	1183	712	-471	-	-

7.3.5.2 Wintering Bird Surveys

Wintering season transect surveys were carried out between September 2018 and February 2019 inclusive (**Table 7.45**). There were 46 hours and 50 minutes completed in wintering walkover surveys. Survey times ranged from 06.35 hrs to 20.30 hrs (**Table 7.45**) and covered a wide range of weather conditions (**Table 7.45**).

Table 7.45 Summary of survey effort and weather during wintering bird surveys

Month	Day	Year	Obs	Start	End	Dur	Cloud Cover	Cloud Height (m)	Wind - Dir & Speed	Precip	Vis (km)
9	12	2018	CS	07:50	09:10	01:20	7	800	NW2-3	NIL	5
9	15	2018	MR	06:35	14:05	07:30	8	500	W3	ILR-NIL	5
10	23	2018	CS	13:10	16:10	03:00	10	350-400	W5-4	NIL	0.5-1
10	24	2018	CS	10:30	14:00	03:30	10	500	W4	NIL	5
10	30	2018	CS	11:10	13:10	02:00	10	800	S3-2	NIL	5
11	21	2018	CS	10:10	13:10	03:00	10-8	450-500	E3	ILR-NIL	5
11	28	2018	CS	11:15	14:05	02:50	10	350-400	S5-SW5	ILR-NIL	
12	6	2018	CS	11:10	13:10	02:00	10	380-400	W4	NIL	5
12	20	2018	CS	09:55	14:00	04:05	10	450	SW4	IHR-NIL	5
1	23	2019	DR	12:50	15:50	03:00	10	350-400	W2-1	NIL	5
1	24	2019	SON	14:00	16:20	02:20	10	200	SW2	CLR	0.5
1	25	2019	SON	13:50	15:20	01:30	10	200	W3	CLR	0.5
1	29	2019	CS	08:30	11:30	03:00	10	700	NW2-3	ILS-NIL	5
2	20	2019	SON	09:50	12:15	02:25	10	350-450	S4	CHR-IHR	0.5-3
2	20	2019	JB	10:30	13:00	02:30	10	350-450	S4	IHR	2
2	26	2019	MR	17:40	20:30	02:50	4-6	700-800	E1-2	NIL	2-4

There were 142 observation of 227 individuals from 22 species recorded (**Tables 7.46; Figure 7.32**) within the Survey Area and 500 m Survey Area (**Figure 7.1**) of which three were red-listed species in Ireland (golden plover, meadow pipit and red grouse; Colhoun & Cummins, 2013) and three UK red-listed species (fieldfare, mistle thrush and song thrush; Eaton et al., 2014).

There were fewer species (72 observations of 144 individuals from 13 species) recorded within the 500 m existing turbine buffer (**Tables 7.47**) including three red-listed species in Ireland (golden plover, meadow pipit and red grouse; Colhoun & Cummins, 2013) and no UK red-listed species (Eaton et al., 2014).

Whilst within the proposed turbine 500 m buffer there were 87 detections of 168 individuals from 13 species (**Table 7.48**) including three red-listed species in Ireland (golden plover, meadow pipit and red grouse; Colhoun & Cummins, 2013) and no UK red-listed species (Eaton et al., 2014).

Table 7.46 Summary of numbers of each species detected during wintering bird surveys inside the Survey Area and 500 m Survey Area including conservation status

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
B.	2	2	GREEN	GREEN
BT	3	3	GREEN	GREEN
CH	7	7	GREEN	GREEN
FF	1	1	GREEN	RED
GP	8	80	RED	GREEN
H.	1	1	GREEN	GREEN
HC	10	15	GREEN	GREEN
JD	1	1	GREEN	GREEN
K.	1	1	AMBER	AMBER
M.	1	1	AMBER	RED
MA	2	3	GREEN	AMBER
MP	59	60	RED	AMBER
R.	2	2	AMBER	GREEN
RB	1	1	GREEN	AMBER
RG	17	18	RED	AMBER
RN	9	10	GREEN	GREEN
SB	1	1	GREEN	AMBER
SC	2	3	AMBER	GREEN
SN	8	8	AMBER	AMBER
ST	1	1	GREEN	RED
WR	4	4	GREEN	GREEN
WS	1	4	AMBER	AMBER
Total	142	227		

Table 7.47– Summary of numbers of each species detected during wintering bird surveys inside the existing 500 m turbine area including conservation status

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
CH	1	1	GREEN	GREEN
GP	5	73	RED	GREEN
H.	1	1	GREEN	GREEN
HC	3	5	GREEN	GREEN
MA	2	3	GREEN	AMBER
MP	30	30	RED	AMBER
RB	1	1	GREEN	AMBER
RG	15	16	RED	AMBER
RN	7	7	GREEN	GREEN
SB	1	1	GREEN	AMBER
SC	1	1	AMBER	GREEN
SN	4	4	AMBER	AMBER
WR	1	1	GREEN	GREEN
Total	72	144		

Table 7.48 – Summary of numbers of each species detected during wintering bird surveys inside the proposed 500 m turbine area including conservation status

Species	No. of detections	No. of individuals	BOCCI3	BOCC4
BT	1	1	GREEN	GREEN
CH	3	3	GREEN	GREEN
GP	5	77	RED	GREEN
H.	1	1	GREEN	GREEN
HC	6	9	GREEN	GREEN
MA	2	3	GREEN	AMBER
MP	36	37	RED	AMBER
RB	1	1	GREEN	AMBER
RG	14	15	RED	AMBER
RN	7	7	GREEN	GREEN
SN	7	7	AMBER	AMBER
WR	3	3	GREEN	GREEN
WS	1	4	AMBER	AMBER
Total	87	168		

7.3.5.3 Breeding Vantage Point Surveys

There were 36 hours observation completed at each of the five vantage points between March 2018 and August 2018 (**Tables 7.49 & 7.50**). Cumulative observation time from all vantage points over the Survey Area was 180 hours during the study period (**Table 7.50**). Survey times ranged from 06.40 hrs to 23.00 hrs (**Table 7.49**) and covered a wide range of weather conditions (**Table 7.51**).

Table 7.49 – Breeding vantage point survey effort

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
BVP	3	CS	3	7	2018	11:45	14:45	03:00
BVP	4	DR	3	7	2018	11:45	14:45	03:00
BVP	1	DR	3	15	2018	06:40	09:40	03:00
BVP	5	DR	3	15	2018	13:25	16:25	03:00
BVP	2	CS	3	21	2018	12:35	15:35	03:00
BVP	2	DR	3	21	2018	09:20	12:20	03:00
BVP	4	CS	3	26	2018	14:50	17:50	03:00
BVP	5	DR	3	28	2018	10:25	13:25	03:00
BVP	1	CS	3	29	2018	15:25	18:25	03:00
BVP	3	CS	3	29	2018	12:10	15:10	03:00
BVP	4	CS	4	6	2018	18:15	21:15	03:00
BVP	2	CS	4	6	2018	15:00	18:00	03:00
BVP	1	CS	4	6	2018	11:50	14:50	03:00
BVP	3	CS	4	19	2018	17:20	20:20	03:00
BVP	5	DR	4	25	2018	07:40	10:40	03:00
BVP	1	DR	4	25	2018	10:55	13:55	03:00
BVP	4	MR	4	26	2018	15:25	18:25	03:00
BVP	2	MR	4	26	2018	18:40	21:40	03:00
BVP	3	CS	4	27	2018	18:15	21:15	03:00
BVP	5	MR	4	27	2018	16:40	19:40	03:00
BVP	5	CS	5	9	2018	08:25	11:25	03:00
BVP	3	CS	5	11	2018	12:50	15:50	03:00
BVP	4	CS	5	11	2018	09:35	12:35	03:00
BVP	2	CS	5	11	2018	18:30	21:30	03:00
BVP	1	CS	5	22	2018	18:50	21:50	03:00
BVP	4	CS	5	23	2018	16:15	19:15	03:00
BVP	3	CS	5	25	2018	19:40	22:40	03:00
BVP	1	CS	5	28	2018	13:40	16:40	03:00
BVP	2	CS	5	28	2018	16:50	19:50	03:00
BVP	5	CS	5	28	2018	10:25	13:25	03:00
BVP	3	CS	6	7	2018	11:10	14:10	03:00
BVP	4	CS	6	7	2018	14:20	17:20	03:00
BVP	1	CS	6	13	2018	15:45	18:45	03:00
BVP	2	CS	6	13	2018	19:00	22:00	03:00
BVP	5	DR	6	15	2018	07:55	10:55	03:00
BVP	5	CS	6	18	2018	19:00	22:00	03:00
BVP	4	CS	6	19	2018	15:25	18:25	03:00

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
BVP	1	CS	6	19	2018	18:35	21:35	03:00
BVP	3	CS	6	20	2018	12:05	15:05	03:00
BVP	2	CS	6	28	2018	15:55	18:55	03:00
BVP	3	CS	7	3	2018	16:30	19:30	03:00
BVP	4	CS	7	3	2018	19:35	22:35	03:00
BVP	5	CS	7	4	2018	09:20	12:20	03:00
BVP	1	CS	7	4	2018	12:30	15:30	03:00
BVP	2	CS	7	11	2018	20:00	23:00	03:00
BVP	1	CS	7	18	2018	18:45	21:45	03:00
BVP	5	CS	7	23	2018	15:45	18:45	03:00
BVP	2	CS	7	25	2018	13:00	16:00	03:00
BVP	4	CS	7	30	2018	15:25	18:25	03:00
BVP	3	CS	7	30	2018	18:40	21:40	03:00
BVP	5	CS	8	2	2018	17:55	20:55	03:00
BVP	3	CS	8	8	2018	17:10	20:10	03:00
BVP	2	CS	8	9	2018	08:45	11:45	03:00
BVP	5	DR	8	12	2018	07:40	10:40	03:00
BVP	4	CS	8	14	2018	12:50	15:50	03:00
BVP	1	CS	8	14	2018	16:00	19:00	03:00
BVP	1	CS	8	22	2018	12:25	15:25	03:00
BVP	3	CS	8	24	2018	14:30	17:30	03:00
BVP	2	MR	8	31	2018	14:40	17:40	03:00
BVP	4	MR	8	31	2018	11:30	14:30	03:00

Table 7.50 – Breeding vantage point survey effort by month

VP No.	Mar	Apr	May	Jun	Jul	Aug	TOTAL
1	6	6	6	6	6	6	36
2	6	6	6	6	6	6	36
3	6	6	6	6	6	6	36
4	6	6	6	6	6	6	36
5	6	6	6	6	6	6	36
TOTAL	30	30	30	30	30	30	180

Table 7.51 – Breeding vantage point weather conditions

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
3	3	7	10	10	10	10	350	450	350	400	S3	S3	SE3	SE3	CLR	ILR	ILR	ILR	0.5	1.5	0.5	1.5
4	3	7	10	10	10	10	400	400	450	450	SW3	SW3	SW4	SW3	IHM	ILM	IHS	NIL	1	1.5	1.5	2

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
1	3	15	10	10	10	10	350	300	400	450	SE3	SE4	SE3	SE3	IHM	CHM	IHM	IHM	1.5	3	3	5
5	3	15	5	3	6	7	600	800	800	800	SE3	SE3	SE2	SE2	NIL	NIL	NIL	NIL	2.5	2.5	2.5	2.5
2	3	21	10	10	10	10	600	600	600	600	SW4	SW4	SW4	SW4	NIL	ILR	ILR	NIL	5	5	5	5
2	3	21	10	10	10	10	450	500	500	500	SW4	SW4	SW4	SW4	NIL	NIL	NIL	NIL	5	5	5	5
4	3	26	10	10	10	10	700	700	700	700	S3	S3	S3	S3	NIL	NIL	NIL	CLR	5	5	5	5
5	3	28	7	9	10	10	800	500	500	500	SW2	SW2	SW2	SW2	NIL	IHR	NIL	CLR	2.5	2.5	2.5	2.5
1	3	29	10	10	10	10	650	600	600	550	SE3	SE2	SE2	SE2	ILR	ILR	IHR	ILR	5	5	5	5
3	3	29	10	10	9	10	600	650	650	650	SE3	SE3	SE3	SE3	NIL	NIL	NIL	ILR	5	5	5	5
4	4	6	10	10	10	10	600	700	700	600	S4	S5	S5	S5	ILR	ILR	ILR	NIL	5	5	5	5
2	4	6	10	10	10	10	400	500	600	600	SE4	S3	S3	S3	IHR	ILR	IHR	IHR	5	5	5	5
1	4	6	10	10	10	10	400	400	400	400	SE4	SE4	SE4	SE4	CHR	CHR	IHR	IHR	3	5	5	5
3	4	19	4	4	3	2	800	800	900	900	W3	W3	W3	W3	NIL	NIL	NIL	NIL	5	5	5	5
5	4	25	10	10	8	6	800	800	800	800	SW2	SW2	SW2	SW3	NIL	ILR	ILR	NIL	2.5	2.5	2.5	2.5
1	4	25	8	8	6	8	800	800	600	600	SW3	SW3	SW4	SW3	NIL	ILR	NIL	NIL	5	5	5	5
4	4	26	5	5	5	4	1000	1000	1000	1000	SW2	W3	W3	W3	ILR	NIL	NIL	NIL	5	5	5	5
2	4	26	4	4	4	4	1000	1000	1000	1000	SW2	SW2	SW2	SW2	NIL	NIL	NIL	NIL	5	5	5	5
3	4	27	6	5	3	2	700	700	700	700	N2	N2	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
5	4	27	7	6	4	3	1000	1000	1000	1000	NW1	NW1	NW1	NW1	NIL	NIL	NIL	NIL	5	5	5	5
5	5	9	10	10	10	10	600	600	600	600	SW2	SW2	SW2	SW2	NIL	ILR	ILR	NIL	5	5	5	5
3	5	11	10	10	10	10	500	600	600	600	SW4	SW4	S4	S4	CHR	CHR	ILR	ILR	3	3	3	3
4	5	11	10	10	10	10	500	550	550	500	S4	S4	S4	SW4	CHR	CHR	CHR	CHR	3	3	3	3
2	5	11	8	7	6	6	650	750	750	750	SW3	SW3	SW3	SW3	ILR	NIL	NIL	NIL	5	5	5	5
1	5	22	7	8	9	9	700	700	650	600	SE1	SE1	SE1	SE1	NIL	NIL	NIL	NIL	5	5	5	5
4	5	23	2	2	2	1	900	900	900	900	E2	E2	E2	E2	NIL	NIL	NIL	NIL	5	5	5	5
3	5	25	1	1	1	1	800	800	800	800	N3	N4	N4	N4	NIL	NIL	NIL	NIL	5	5	5	5
1	5	28	10	10	10	10	800	800	800	800	SE1	SW1	SW1	SW1	NIL	NIL	NIL	NIL	5	5	5	5
2	5	28	10	9	8	10	800	800	800	800	W1	W1	SE1	SE1	NIL	NIL	NIL	NIL	5	5	5	5
5	5	28	6	6	8	10	800	800	800	800	SE1	SE1	E1	E1	NIL	NIL	NIL	NIL	5	5	5	5
3	6	7	8	9	10	10	700	700	800	900	NE1	NE1	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
4	6	7	10	9	6	7	900	800	700	700	N3	N3	NE3	NE3	NIL	ILR	NIL	NIL	5	5	5	5
1	6	13	10	10	10	10	500	500	500	500	S3	S3	SW3	SW3	ILR	CHR	CHR	CHR	5	5	5	5
2	6	13	10	10	10	10	500	450	450	450	SW4	SW5	SW5	SW5	CHR	CHR	IHR	IHR	3	2	3	3
5	6	15	10	10	10	10	500	500	500	500	SW3	SW3	SW3	SW3	CHR	CHR	CLR	CHR	1	1.5	2	1
5	6	18	6	8	8	9	600	700	600	600	W2	W2	W2	W2	NIL	NIL	ILR	NIL	5	5	5	5
4	6	19	10	10	10	10	450	450	400	400	SE3	SE3	SE2	SE2	CLR	CLR	CLR	CHR	2	2	2	2

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
1	6	19	10	10	10	10	400	380	360	380	SE2	SW2	SW2	SW2	CLR	CLR	CLR	CLR	1.5	2	1	2
3	6	20	9	10	10	10	700	700	700	700	NW3	NW3	NW3	NW3	NIL	NIL	NIL	NIL	5	5	5	5
2	6	28	1	1	0	0	900	900	0	0	NE3	NE3	NE3	NE3	NIL	NIL	NIL	NIL	5	5	5	5
3	7	3	1	1	1	1	800	800	800	800	SE2	SE2	SE2	SE2	NIL	NIL	NIL	NIL	5	5	5	5
4	7	3	1	1	1	1	800	800	800	800	SE2	SE2	SE2	SE2	NIL	NIL	NIL	NIL	5	5	5	5
5	7	4	1	1	1	1	1000	1000	1000	1000	S1	S1	S1	SW1	NIL	NIL	NIL	NIL	5	5	5	5
1	7	4	1	1	1	1	1000	1000	1000	1000	SW2	SW2	SW2	SW2	NIL	NIL	NIL	NIL	5	5	5	5
2	7	11	7	7	9	9	700	700	700	700	N3	N3	N3	N3	NIL	NIL	ILR	NIL	5	5	5	5
1	7	18	6	5	4	5	700	700	700	700	N2	N1	N1	N1	NIL	NIL	NIL	NIL	5	5	5	5
5	7	23	9	9	9	9	500	500	500	500	N3	N3	N3	N3	NIL	NIL	NIL	NIL	5	5	5	5
2	7	25	8	7	6	7	700	700	700	700	SW4	SW3	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
4	7	30	10	9	8	9	600	600	600	600	SW2	SW2	SW2	SW2	CHR	IHR	IHR	IHR	1	5	5	5
3	7	30	9	10	9	8	600	600	600	600	SW2	SW3	SW3	SW2	IHR	IHR	IHR	IHR	5	5	5	5
5	8	2	10	10	10	10	400	500	600	650	SW1	SW1	SW1	SW1	ILR	ILR	NIL	NIL	5	5	5	5
3	8	8	7	7	6	6	550	650	700	700	W4	W4	W4	W4	NIL	NIL	NIL	NIL	5	5	5	5
2	8	9	7	8	8	9	600	650	650	650	SW4	SW4	SW4	SW4	NIL	NIL	NIL	NIL	5	5	5	5
5	8	12	10	10	9	8	350	350	500	600	W1	W1	W1	W1	ILM	ILM	NIL	NIL	2	2	2	2
4	8	14	10	10	10	10	340	340	330	320	SW3	SW3	SW3	SW3	CLR	CLR	CLR	CLR	0.5	0.5	0.5	0.5
1	8	14	10	10	10	10	300	300	300	310	SW3	SW3	SW3	SW3	CLR	CLR	CLR	CLR	1	1	1	1
1	8	22	9	9	9	10	700	700	700	700	NW3	NW3	NW3	NW2	NIL	ILR	ILR	NIL	5	5	5	5
3	8	24	8	9	9	9	700	700	750	750	NW4	NW4	NW5	NW5	IHR	IHR	IHR	IHR	5	5	5	5
2	8	31	9	9	10	10	1100	1100	1000	1000	SE3	SE3	SE3	E3	NIL	NIL	ILR	ILR	5	5	5	2
4	8	31	8	8	7	7	900	1000	1200	1000	SE4	SE5	SE4	SE3	NIL	NIL	NIL	NIL	5	5	5	5

There were nine target species (**Table 7.52**) recorded inside the Survey Area and 500 m turbine buffers; buzzard, cormorant, common sandpiper, heron, kestrel, mallard, red grouse, raven and snipe (**Tables 7.52 & 7.53; Figures 7.33 - 7.36**). The occurrence rate of the detected species was less than 5% of total observation time for six species, and greater than 5% for three species (**Table 7.53**) kestrel, red grouse, raven and snipe.

Most frequently recorded were raven and snipe accounting for 63% of the observation duration. There were no Target 1 species detected during the breeding season and secondary species were additionally mapped to show areas of activity (**Figures 7.14; 7.15 & 7.16,** see also Section 3.3.4) and varied seasonally (**Table 7.54**).

Beyond the 500 m turbines buffers for either Operational Barnesmore turbines and/or proposed Barnesmore turbines there were additional flights recorded (also included on **Figures 7.33 - 7.36**) including buzzard (1); cormorant (1), kestrel (7); peregrine (1); raven (16); sparrowhawk (3), teal (1) and white-tailed eagle (1).

Table 7.52 – Breeding vantage point sightings records recorded within the 500 m turbine buffers.

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
2	3	21	2018	2	MA	2	13:40	1	Pair	IN	IN
2	3	21	2018	2	RN	1	10:45	1		IN	IN
4	3	26	2018	2	RG	1	16:50	1	Short flight calling	IN	IN
2	4	6	2018	2	RN	1	15:40	1		IN	IN
1	4	6	2018	2	RN	2	13:10	1	Flying together, landed on the ground	OUT	IN
1	4	25	2018	2	CA	1	11:25	1	Lifted from lough	IN	OUT
1	4	25	2018	2	RN	1	12:20	1		OUT	IN
1	4	25	2018	2	RN	1	12:20	1		OUT	IN
4	4	26	2018	2	RN	1	16:50	1		IN	IN
4	4	26	2018	2	SN	1	17:35	1	Chipping	IN	IN
2	4	26	2018	2	MA	1	18:50	1	Landed on water	IN	IN
2	4	26	2018	2	RG	2	19:20	1	Pair flying and calling	IN	IN
2	4	26	2018	2	SN	1	19:40	1	Chipping	IN	IN
2	4	26	2018	2	SN	1	20:20	1	Chipping	IN	IN
2	4	26	2018	2	RG	1	20:20	1	Calling	IN	IN
3	4	27	2018	2	SN	1	18:20	1	Flushed	IN	IN
3	4	27	2018	2	SN	1	18:20	1	Flushed	IN	IN
3	4	27	2018	2	RN	1	19:10	1	Flying and calling	IN	IN
5	4	27	2018	2	K.	1	17:40	1	Male hunting, prey strike, perched on rock to eat, looked like lizard prey	IN	OUT
5	4	27	2018	2	RN	1	18:05	1	In front of VP	IN	IN
5	4	27	2018	2	K.	1	18:55	1	Male hunting	IN	IN
5	4	27	2018	2	RN	1	19:15	1		IN	OUT
3	5	11	2018	2	RN	1	14:40	1	Flying and calling	IN	IN
2	5	11	2018	2	SN	1	20:40	1	Chipping	IN	IN
2	5	28	2018	2	RN	1	16:55	1		IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments	Existing (500 m)	Proposed (500 m)
3	6	7	2018	2	SN	1	12:25	1	Chipping	IN	IN
3	6	7	2018	2	K.	1	13:55	1	Male hunting	IN	IN
4	6	7	2018	2	RN	1	14:30	1	Mobbed by BZ	IN	IN
4	6	7	2018	2	BZ	1	14:30	1	Mobbing RN and being mobbed by HC(2)	IN	OUT
4	6	7	2018	2	BZ	1	14:40	1	Mobbing HC	IN	IN
1	6	13	2018	2	SN	1	16:25	1	Chipping	OUT	IN
2	6	13	2018	2	SN	1	19:05	1	Flushed	IN	IN
3	6	20	2018	2	SN	1	13:00	1	Chipping	IN	IN
3	6	20	2018	2	RN	1	13:25	1	Flying	IN	IN
2	6	28	2018	2	CS	2	16:00	1	Two birds calling from different lakes	IN	IN
2	6	28	2018	2	CS	2	16:00	1	Two birds calling from different lakes	IN	IN
4	7	3	2018	2	SN	1	20:15	1	Chipping	IN	IN
4	7	3	2018	2	SN	1	20:30	1	Chipping	IN	IN
4	7	3	2018	2	SN	1	21:05	1	Chipping	IN	IN
4	7	3	2018	2	RN	1	21:15	1	Flying	IN	OUT
1	7	4	2018	2	RN	1	12:40	1	Flying low	IN	IN
1	7	4	2018	2	K.	1	12:45	1	Male direct flight	IN	IN
3	7	30	2018	2	H.	1	19:15	1	Flying over lough	IN	IN
3	8	8	2018	2	K.	1	17:15	1	Hunting	IN	IN
3	8	8	2018	2	K.	1	18:40	1	Hunting	OUT	IN
1	8	14	2018	2	RN	1	16:55	1	Perched on fence then flew over hill out of sight	OUT	IN
2	8	31	2018	2	RG	2	16:05	1		IN	IN
4	8	31	2018	2	RN	1	14:20	1		IN	IN

Table 7.53 – Breeding vantage point aggregated species sightings records within the 500 m turbine buffers.

Species	Number of detections	%	Number of five minute intervals	%
BZ	2	4.2	2	4.2
CA	1	2.1	1	2.1
CS	2	4.2	2	4.2
H.	1	2.1	1	2.1
K.	6	12.5	6	12.5
MA	2	4.2	2	4.2
RG	4	8.3	4	8.3
RN	17	35.4	17	35.4
SN	13	27.1	13	27.1
Total	48		48	

No target 1 species (**Table 7.1**) were recorded within either of the 500 m turbine buffers (**Tables 7.52 & 7.53**) but some were recorded beyond these buffers white-tailed eagle (1; >180 m a.g.l) and peregrine (n = 2; 20-50 m a.g.l) and were mapped (**Figures 7.36**). Neither of the recorded flights were at risk of collision for these two species since they were outside the potential collision risk area for both Operational and proposed turbines.

Peregrine were observed after the end of the breeding season (in late summer) and linked to nesting territory nearby whilst the white-tailed eagle was a reintroduced sub-adult bird which was not breeding in the area. Neither of the recorded flights were at risk of collision for these two species since they were outside the potential collision risk area.

There were seven additional golden eagle flights recorded beyond the 500 m turbine areas and three peregrine flights also recorded beyond the 500 m turbine areas (**Figure 7.36**).

A range of secondary species flights were also documented (**Table 7.52 & 7.53**; excluding raven **Table 7.55**) and mapped (**Figure 7.33 – 7.35**).

Table 7.54 – Breeding vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers by month

Species	Mar	Apr	May	Jun	Jul	Aug	TOTAL
BZ				2			2
CA		1					1
CS				2			2
H.					1		1
K.		2		1	1	2	6
MA	1	1					2
RG	1	2				1	4
RN	1	8	2	2	2	2	17
SN		5	1	4	3		13
Total	3	19	3	11	7	5	48

Table 7.55 – Breeding vantage point flying height and duration of Target 2 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
2	3	21	2018	MA	2	13:40	57	IN	IN	57							
4	3	26	2018	RG	1	16:50	16	IN	IN	16							
1	4	25	2018	CA	1	11:25	39	IN	OUT	39							
4	4	26	2018	SN	1	17:35	16	IN	IN	16							
2	4	26	2018	MA	1	18:50	12	IN	IN	12							
2	4	26	2018	RG	2	19:20	7	IN	IN	7							
2	4	26	2018	SN	1	19:40	3	IN	IN	3							
2	4	26	2018	SN	1	20:20	6	IN	IN	6							
2	4	26	2018	RG	1	20:20	17	IN	IN	17							
3	4	27	2018	SN	1	18:20	3	IN	IN	3							
3	4	27	2018	SN	1	18:20	4	IN	IN	4							
5	4	27	2018	K.	1	17:40	71	IN	OUT	71							
5	4	27	2018	K.	1	18:55	283	IN	IN		130	130	23				
2	5	11	2018	SN	1	20:40	2	IN	IN	2							
3	6	7	2018	SN	1	12:25	2	IN	IN	2							
3	6	7	2018	K.	1	13:55	44	IN	IN		44						
4	6	7	2018	BZ	1	14:30	67	IN	OUT			40	27				
4	6	7	2018	BZ	1	14:40	9	IN	IN				9				
1	6	13	2018	SN	1	16:25	2	OUT	IN	2							
2	6	13	2018	SN	1	19:05	9	IN	IN	9							
3	6	20	2018	SN	1	13:00	3	IN	IN	3							
2	6	28	2018	CS	2	16:00	8	IN	IN	8							
2	6	28	2018	CS	2	16:00	11	IN	IN	11							
4	7	3	2018	SN	1	20:15	4	IN	IN	4							
4	7	3	2018	SN	1	20:30	2	IN	IN	2							
4	7	3	2018	SN	1	21:05	3	IN	IN	3							
1	7	4	2018	K.	1	12:45	74	IN	IN		34	40					
3	7	30	2018	H.	1	19:15	57	IN	IN	47	10						
3	8	8	2018	K.	1	17:15	54	IN	IN		54						
3	8	8	2018	K.	1	18:40	37	OUT	IN		37						
2	8	31	2018	RG	2	16:05	28	IN	IN	28							

7.3.5.4 Wintering Vantage Point Surveys

There were 39 hours observation completed at each of the five vantage points between September 2018 and March 2019 (**Tables 7.56 & 7.57**). Cumulative observation time from all vantage points over the Survey Area was 195 hours during the study period (**Table 7.57**). Survey times ranged from 06.25 hrs to 20.05 hrs (**Table 7.56**) and covered a wide range of weather conditions (**Table 7.58).**

Table 7.56– Wintering vantage point survey effort.

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
WVP	1	CS	9	11	2018	14:50	17:50	03:00
WVP	5	CS	9	12	2018	09:20	12:20	03:00
WVP	4	CS	9	13	2018	07:25	10:25	03:00
WVP	3	DR	9	21	2018	08:55	11:55	03:00
WVP	2	DR	9	21	2018	12:10	15:10	03:00
WVP	5	DR	9	22	2018	07:35	10:35	03:00
WVP	3	CS	9	27	2018	15:55	18:55	03:00
WVP	1	CS	9	28	2018	11:25	14:25	03:00
WVP	2	CS	9	28	2018	14:35	17:35	03:00
WVP	4	CS	9	29	2018	09:20	12:20	03:00
WVP	1	DR	10	6	2018	11:30	14:30	03:00
WVP	3	CS	10	9	2018	13:05	16:05	03:00
WVP	4	CS	10	15	2018	13:15	16:15	03:00
WVP	5	CS	10	16	2018	11:40	14:40	03:00
WVP	2	CS	10	16	2018	14:55	17:55	03:00
WVP	4	CS	10	22	2018	13:10	16:10	03:00
WVP	2	CS	10	23	2018	16:20	19:20	03:00
WVP	3	CS	10	24	2018	14:10	17:10	03:00
WVP	1	DR	10	30	2018	08:40	11:40	03:00
WVP	5	DR	10	30	2018	11:55	14:55	03:00
WVP	5	CS	11	6	2018	07:00	10:00	03:00
WVP	2	CS	11	7	2018	07:55	10:55	03:00
WVP	3	CS	11	14	2018	14:40	17:40	03:00
WVP	4	CS	11	20	2018	07:20	10:20	03:00
WVP	1	CS	11	20	2018	10:30	13:30	03:00
WVP	2	CS	11	21	2018	07:05	10:05	03:00
WVP	3	CS	11	22	2018	07:10	10:10	03:00
WVP	1	CS	11	28	2018	08:00	11:00	03:00
WVP	4	CS	11	28	2018	14:10	17:10	03:00
WVP	5	CS	11	29	2018	07:10	10:10	03:00
WVP	1	CS	12	5	2018	07:30	10:30	03:00
WVP	3	CS	12	6	2018	08:05	11:05	03:00
WVP	5	DR	12	6	2018	14:10	17:10	03:00
WVP	2	DR	12	12	2018	09:05	12:05	03:00
WVP	4	DR	12	12	2018	12:15	15:15	03:00
WVP	1	DR	12	18	2018	08:30	11:30	03:00
WVP	5	DR	12	18	2018	12:05	15:05	03:00

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
WVP	3	CS	12	20	2018	14:00	17:00	03:00
WVP	4	MR	12	31	2018	14:40	17:40	03:00
WVP	2	MR	12	31	2018	11:30	14:30	03:00
WVP	3	CS	1	4	2019	08:50	11:50	03:00
WVP	1	DR	1	10	2019	08:05	11:05	03:00
WVP	5	DR	1	10	2019	11:35	14:35	03:00
WVP	4	DR	1	16	2019	08:25	11:25	03:00
WVP	2	DR	1	16	2019	11:35	14:35	03:00
WVP	5	SON	1	22	2019	11:10	14:10	03:00
WVP	3	DR	1	23	2019	09:50	12:50	03:00
WVP	1	DR	1	27	2019	10:55	13:55	03:00
WVP	2	CS	1	29	2019	11:35	14:35	03:00
WVP	4	CS	1	30	2019	10:40	13:40	03:00
WVP	3	CS	2	6	2019	12:10	15:10	03:00
WVP	1	CS	2	6	2019	09:00	12:00	03:00
WVP	5	CS	2	7	2019	07:10	10:10	03:00
WVP	2	CS	2	14	2019	10:30	13:30	03:00
WVP	4	SON	2	18	2019	10:40	13:40	03:00
WVP	3	SON	2	20	2019	13:00	16:00	03:00
WVP	5	SON	2	21	2019	08:30	11:30	03:00
WVP	1	JB	2	21	2019	08:50	11:50	03:00
WVP	2	MR	2	27	2019	06:25	09:25	03:00
WVP	4	CS	2	27	2019	16:05	19:05	03:00
WVP	5	DR	3	10	2019	15:45	18:45	03:00
WVP	1	DR	3	15	2019	11:20	14:20	03:00
WVP	4	DR	3	26	2019	07:20	10:20	03:00
WVP	2	DR	3	26	2019	10:30	13:30	03:00
WVP	3	CS	3	28	2019	17:05	20:05	03:00

Table 7.57– Wintering vantage point survey effort by month

VP No.	Sep	Oct	Nov	Dec	Jan	Feb	Mar	TOTAL
1	6	6	6	6	6	6	3	39
2	6	6	6	6	6	6	3	39
3	6	6	6	6	6	6	3	39
4	6	6	6	6	6	6	3	39
5	6	6	6	6	6	6	3	39
TOTAL	30	30	30	30	30	30	15	195

Table 7.58 – Wintering vantage point weather conditions

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
1	9	11	10	10	10	10	600	600	700	700	W5	W5	W5	W5	IHR	IHR	IHR	IHR	5	5	5	5
5	9	12	7	6	8	8	800	800	800	800	NW2	NW2	NW2	NW2	NIL	NIL	ILR	ILR	5	5	5	5
4	9	13	10	10	10	10	370	370	380	370	W3	W3	W3	W3	NIL	IHR	IHR	ILR	2	2	2	2
3	9	21	10	9	10	9	600	400	500	500	NW4	W4	W5	W5	IHR	ILR	ILR	NIL	3	5	5	5
2	9	21	9	10	6	8	600	500	600	500	W4	W4	NW4	W4	NIL	IHR	NIL	ILR	5	3	5	3
5	9	22	10	10	10	9	800	800	800	800	SW2	SW1	SW1	SW1	NIL	NIL	NIL	NIL	2.5	2.5	2.5	2.5
3	9	27	9	8	8	7	700	700	700	700	N4	N 4	N4	N3	NIL	NIL	NIL	NIL	5	5	5	5
1	9	28	10	10	10	10	800	800	800	800	NW1	NW1	NW1	NW1	NIL	NIL	NIL	NIL	5	5	5	5
2	9	28	10	10	10	10	800	800	800	800	NW2	NW2	NW3	NW3	NIL	NIL	NIL	NIL	5	5	5	5
4	9	29	10	10	9	9	900	900	900	900	W5	W6	W6	W5	NIL	NIL	NIL	NIL	5	5	5	5
1	10	6	4	7	6	8	800	600	600	600	NW2	NW3	NW3	NW3	NIL	NIL	ILR	NIL	5	5	5	5
3	10	9	10	10	10	10	380	400	380	500	SW6	SW6	S7	SW6	CLR	ILR	ILR	ILR	2	3	2	5
4	10	15	3	3	2	2	900	900	900	900	S3	S2	S2	S2	NIL	NIL	NIL	NIL	5	5	5	5
5	10	16	9	9	7	5	600	700	700	700	SW3	SW2	SW2	SW2	NIL	NIL	NIL	NIL	5	5	5	5
2	10	16	5	7	8	9	750	700	700	700	SW4	SW4	SW4	SW4	NIL	NIL	NIL	NIL	5	5	5	5
4	10	22	9	10	9	8	700	700	700	800	W4	W5	W5	W5	NIL	NIL	NIL	NIL	5	5	5	5
2	10	23	10	10	10	10	340	340	340	340	W5	W5	W4	W4	NIL	ILR	ILR	ILR	0.5	0.5	0.5	0.5
3	10	24	10	10	10	10	500	500	500	500	W4	W4	W4	W3	NIL	ILR	ILR	ILR	5	5	5	5
1	10	30	6	8	8	10	1000	800	800	800	E3	E3	SE3	SE3	NIL	NIL	NIL	NIL	5	5	5	5
5	10	30	10	10	10	10	800	800	800	800	SE2	SE2	SE2	SE2	NIL	ILR	ILR	NIL	3	3	3	3
5	11	6	8	9	9	10	600	500	600	600	S2	S2	S2	S2	NIL	NIL	ILR	ILR	5	5	5	5
2	11	7	10	10	10	10	500	500	550	400	NW2	NW2	NW2	W2	CLR	CLR	CLR	CLR	5	5	5	5
3	11	14	10	10	10	10	700	700	700	700	S7	S7	S7	S6	NIL	ILR	ILR	ILR	5	5	5	0.5
4	11	20	4	6	9	4	700	700	700	700	E4	E4	E4	E4	NIL	NIL	NIL	NIL	0.5	5	5	5
1	11	20	4	5	7	6	700	700	700	700	E4	E4	E3	E3	NIL	NIL	NIL	NIL	5	5	5	5
2	11	21	10	10	10	10	360	360	400	450	E3	E3	E3	E3	CLR	CLR	ILR	NIL	0.5	0.5	5	5
3	11	22	10	10	10	10	350	350	380	380	E3	E3	E3	SE3	CLR	ILR	NIL	NIL	0.5	0.5	2	2
1	11	28	10	10	10	10	370	370	360	370	S5	S5	S5	S5	CLR	CLR	CLR	ILR	5	5	5	5
4	11	28	10	10	10	10	400	400	350	400	SW6	SW6	W7	W7	CLR	ILR	IHR	IHR	3	3	0.5	0.5
5	11	29	10	10	10	9	500	500	500	500	SW2	SW2	SW2	SW2	NIL	NIL	ILR	ILR	0.5	5	5	5
1	12	5	10	10	10	10	400	350	330	330	S3	S3	S3	S3	CLR	CLR	CLR	ILR	0.5	2	2	2
3	12	6	10	10	10	10	350	350	350	350	SW4	SW4	SW4	SW4	CLR	ILR	NIL	NIL	0.5	0.5	0.5	0.5
5	12	6	8	8	6	6	500	500	600	600	SW2	SW2	SW3	SW3	NIL	ILR	NIL	NIL	2	2	2	2
2	12	12	10	9	8	10	350	400	500	450	S2	SE2	SE2	SSE2	CLM	ILM	NIL	ILM	1	1.5	5	1
4	12	12	10	10	10	9	400	450	450	400	SE3	SE3	SE4	SE4	NIL	NIL	NIL	NIL	5	5	5	5
1	12	18	10	9	10	10	600	600	400	500	S3	S3	SW3	SW3	ILR	NIL	IHR	NIL	5	5	5	5

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
5	12	18	8	6	6	6	500	600	600	600	SW3	S2	S2	S2	NIL	NIL	ILR	NIL	5	5	5	5
3	12	20	10	10	10	10	450	380	330	230	SW5	SW5	SW5	SW5	ILR	IHR	ILR	ILR	5	2	0.5	0.5
4	12	31	10	10	10	10	900	900	800	900	SW4	SW5	SW4	SW4	NIL	NIL	NIL	NIL	5	5	5	5
2	12	31	10	9	10	10	800	800	800	800	S4	S4	S4	S4	NIL	NIL	NIL	NIL	2	2	2	2
3	1	4	10	10	10	10	900	900	900	900	SW3	SW3	S3	S3	NIL	NIL	NIL	NIL	5	5	5	5
1	1	10	10	10	10	10	800	800	800	800	NW1	NW2	NW2	NW1	NIL	NIL	NIL	NIL	1.5	5	5	5
5	1	10	10	10	10	10	800	800	800	800	NW1	NW1	NW1	NW1	NIL	NIL	NIL	NIL	5	5	5	5
4	1	16	6	8	6	10	500	400	500	400	SW3	SW3	SW3	SW3	NIL	NIL	ILR	CHS	5	5	5	1
2	1	16	10	10	9	7	350	400	400	500	SW3	SW3	SW3	W3	CHM	IHM	CLR	NIL	0.5	1	1.5	5
5	1	22	5	8	8	6	300	200	250	300	NW2	NW2	NW2	NW2	IHR	IHR	IHR	NIL	4	4	4	4
3	1	23	10	10	10	10	400	350	300	400	W2	W2	W2	W2	NIL	CHM	CHS	ILM	5	1	1	5
1	1	27	10	8	9	8	700	700	700	700	NW3	NW3	NW3	NW3	HIS	HIS	ILS	ILS	2	5	5	5
2	1	29	8	8	7	9	350	400	400	430	NW2	NW2	NW3	NW3	NIL	NIL	ILS	NIL	5	5	5	5
4	1	30	9	10	9	9	700	700	700	800	SW4	SW3	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
3	2	6	10	10	9	9	500	600	700	700	SW3	SW3	SW3	SW3	CLR	ILR	ILR	NIL	5	5	5	5
1	2	6	9	7	4	6	550	600	700	700	NW1	NW1	NW1	NW1	ILR	ILR	ILR	NIL	0.5	5	5	5
5	2	7	10	10	9	7	700	750	800	800	S4	S4	S3	S3	NIL	NIL	NIL	NIL	5	5	5	5
2	2	14	10	10	10	10	400	375	375	375	SW5	SW5	SW5	SW5	IHR	IHR	IHR	IHR	5	3	3	3
4	2	18	10	10	10	10	700	600	500	600	S4	S4	S4	S4	NIL	NIL	IHR	IHR	5	5	5	4
3	2	20	10	10	8	6	600	600	600	600	S2	S2	S2	S2	NIL	NIL	NIL	NIL	5	5	5	5
5	2	21	4	4	5	7	1000	1000	1000	1000	SE1	SE2	SE2	SE2	NIL	NIL	NIL	NIL	5	5	5	5
1	2	21	9	9	7	7	600	600	600	600	SW2	SW2	SW2	SW2	NIL	NIL	NIL	NIL	4	4	4	4
2	2	27	3	2	2	2	2000	2000	2000	2000	SE1	SE1	SE1	SE1	NIL	NIL	NIL	NIL	2	2	2	2
4	2	27	9	8	10	10	350	500	500	500	W3	W2	W2	W3	NIL	ILR	NIL	NIL	2.5	2.5	2.5	2.5
5	3	10	7	10	6	6	600	500	600	600	W4	W3	W3	W3	ILR	NIL	ILR	NIL	5	5	5	5
1	3	15	9	9	10	9	500	500	450	450	SW3	SW3	SW4	SW4	NIL	NIL	NIL	NIL	5	5	5	5
4	3	26	9	9	10	10	500	500	450	450	SW4	SW4	SW4	SW4	NIL	NIL	ILR	ILR	5	5	5	5
2	3	26	9	9	8	6	600	600	600	600	W3	W3	W2	W2	NIL	NIL	NIL	NIL	5	5	5	5
3	3	28	10	10	10	10	600	600	600	600	SW3	SW3	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5

There were 12 target species (**Table 7.59 & 7.60**) recorded inside the Survey Area and 500 m turbine buffers during the wintering period; buzzard, cormorant, common sandpiper, golden eagle, golden plover, heron, kestrel, mallard, red grouse, raven, snipe and whooper swan.

The occurrence rate of the detected species ranged from 0.9% - 35% with four species which were recorded more than 5% of total observation time namely cormorant (11.1%), golden plover (16.7%), red grouse (19.4%) and raven (35.2%) (**Tables 7.59 & 7.60**). There was some variation in detection rates across the wintering period (**Table 7.61**) and most frequently recorded were raven, golden plover and snipe accounting for 71% of the observation duration.

Beyond the 500 m turbines buffers for either Operational Barnesmore turbines and/or proposed Barnesmore turbines there were additional flights recorded (also included on **Figures 7.33 - 7.35 & 7.37**) which varied seasonally including curlew (1); golden plover (1), heron (1), hen harrier (1), kestrel (2); peregrine (3); raven (11); sparrowhawk (4) and whooper swan (1).

Table 7.59 – Wintering vantage point sightings records recorded within the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
1	09	11	2018	2	K.	1	16:05	1	Hunting, prey strike	IN	IN
1	09	11	2018	2	K.	2	16:30	1	K.(2) chasing, more playful than aggressive	IN	IN
5	09	12	2018	2	BZ	1	10:35	2	Circling then flew towards Site	IN	IN
3	09	21	2018	2	CA	1	09:20	1	Then perched on rock	IN	IN
2	09	21	2018	2	CA	1	12:15	1	Then perched on rock	IN	IN
2	09	21	2018	2	RN	2	15:05	1		IN	IN
3	09	27	2018	2	CA	3	16:00	1	On lough	IN	IN
3	09	27	2018	2	CA	1	18:10	1	Lifted from lough, flew west	IN	IN
3	09	27	2018	2	CA	1	18:15	1	Lifted from lough, flew west	IN	IN
1	09	28	2018	2	RN	1	11:55	1	Flying, calling	IN	IN
1	09	28	2018	2	RN	4	12:35	1	Flying, calling	OUT	IN
1	09	28	2018	2	RN	1	12:50	1	Flying	IN	IN
1	10	06	2018	2	CA	1	11:35	1		OUT	IN
1	10	06	2018	2	RN	1	11:50	1		IN	IN
1	10	06	2018	2	RN	1	12:00	1	Landed on electric pole	IN	IN
1	10	06	2018	2	RN	1	12:20	1		IN	IN
1	10	06	2018	2	K.	1	12:50	1		OUT	IN
4	10	15	2018	2	BZ	1	13:20	1		OUT	IN
4	10	15	2018	2	SN	1	16:15	1	Flushed	IN	IN
4	10	22	2018	2	RN	1	13:30	1	Flying, tumbling	IN	IN
1	10	30	2018	2	RN	1	08:40	1		IN	IN
1	10	30	2018	2	RN	1	08:40	1		OUT	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
1	10	30	2018	1	WS	4	09:05	1	Two adults, one sub-adult and two juveniles feeding on lough at start of vp (and seen during prior survey) then flew	OUT	IN
2	11	07	2018	1	GP	5	10:05	1	Flew around lough then landed again	IN	IN
3	11	14	2018	2	RG	1	14:40	1	Female	IN	IN
4	11	20	2018	2	SN	1	10:25	1	Flushed	IN	IN
4	11	20	2018	2	SN	1	10:25	1	Flushed	IN	IN
4	11	20	2018	2	CS	1	10:25	1	Flushed	IN	IN
2	11	21	2018	1	GP	19	09:45	1	Flying together around lough	IN	IN
2	11	21	2018	1	GP	18	10:00	1	Flying together around lough	IN	IN
1	12	05	2018	2	RN	1	08:40	1		IN	IN
3	12	06	2018	2	SN	1	08:20	1		IN	IN
2	12	12	2018	2	CA	1	09:40	1	On lough	IN	IN
2	12	12	2018	2	RN	1	10:00	1		IN	IN
2	12	12	2018	2	RG	3	10:10	1		IN	IN
2	12	12	2018	1	GP	19	10:20	1	Undulating flights in and out of mist	IN	IN
2	12	12	2018	1	GP	39	11:30	2	Undulating flights in and out of mist	IN	IN
4	12	12	2018	2	RN	1	14:50	1		IN	IN
4	12	12	2018	2	H.	1	15:00	1		IN	IN
1	12	18	2018	2	RN	2	09:15	1		IN	IN
1	12	18	2018	2	RN	1	09:25	1		IN	IN
1	12	18	2018	2	RN	2	09:55	1		IN	IN
1	12	18	2018	2	RN	1	10:00	1		IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
1	12	18	2018	2	RN	2	10:45	1		IN	IN
3	12	20	2018	1	GP	37	14:10	1		IN	IN
4	12	31	2018	2	RG	1	14:45	1		IN	IN
4	12	31	2018	1	GP	3	17:00	1		IN	IN
4	12	31	2018	2	RG	1	17:00	1		IN	IN
2	12	31	2018	1	GP	3	13:55	1		IN	IN
3	01	04	2019	2	RN	1	10:45	1		IN	IN
3	01	04	2019	2	RN	1	10:50	1		IN	IN
3	01	04	2019	2	RN	1	11:50	1		IN	IN
1	01	10	2019	2	RN	2	08:30	1		IN	IN
1	01	10	2019	2	RN	1	09:15	1		IN	IN
1	01	10	2019	2	CA	1	09:30	1		IN	IN
1	01	10	2019	2	RN	1	10:05	1		OUT	IN
1	01	10	2019	2	RN	1	11:00	1		IN	IN
5	01	10	2019	2	RN	1	12:00	1		IN	IN
4	01	16	2019	2	RN	3	08:35	1		IN	IN
4	01	16	2019	2	CA	1	10:45	1		IN	IN
4	01	16	2019	2	RG	1	11:25	1	Heard calling	IN	IN
2	01	16	2019	2	RG	1	12:10	1	Heard calling	IN	IN
3	01	23	2019	1	GP	39	10:10	3	Undulating flights	IN	IN
3	01	23	2019	1	GP	23	12:00	1	Undulating flights	IN	IN
1	01	27	2019	2	RN	2	11:30	1		IN	IN
1	01	27	2019	2	MA	3	12:55	1	On lough	OUT	IN
3	02	06	2019	2	RN	1	12:30	1		IN	IN
1	02	06	2019	2	RN	1	10:45	1		IN	IN
1	02	06	2019	2	RN	1	10:45	1		IN	IN
2	02	14	2019	2	RN	2	11:00	1	Flying separately then circling together for a long time	IN	IN
2	02	14	2019	2	RN	5	11:15	1		IN	OUT
2	02	14	2019	2	RG	2	11:25	1		IN	IN
2	02	14	2019	1	GP	7	12:00	1		IN	IN
3	02	20	2019	1	EA	1	14:30	1	Juvenile soaring >400m agl	IN	IN
3	02	20	2019	1	EA	1	15:15	1	Adult >400 agl same direction as	IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
									juvenile earlier		
1	02	21	2019	1	GP	50	11:20	1	Flying more than 500 m agl	IN	IN
1	02	21	2019	2	RN	1	11:30	1		IN	IN
4	02	27	2019	2	RG	1	16:40	1	Heard	IN	IN
4	02	27	2019	2	RG	1	18:30	1	Heard	IN	IN
4	02	27	2019	2	RG	1	18:35	1	Heard	IN	IN
4	02	27	2019	2	RG	1	18:35	1	Heard	IN	IN
4	02	27	2019	2	RG	1	18:50	1	Heard	IN	IN
2	02	27	2019	2	RG	1	06:45	1	Calling	IN	IN
2	02	27	2019	2	RG	1	06:45	1	Calling	IN	IN
2	02	27	2019	2	RG	1	06:50	1	Calling	IN	IN
2	02	27	2019	2	RG	1	06:50	1	Calling	IN	IN
2	02	27	2019	1	GP	11	07:05	1		IN	IN
2	02	27	2019	1	GP	6	07:05	1		IN	IN
2	02	27	2019	2	RN	2	07:45	1		IN	IN
2	02	27	2019	2	RN	1	08:15	1	Perched in trees	IN	OUT
2	02	27	2019	1	GP	14	08:25	1	Flew back to ground	IN	IN
2	02	27	2019	2	RG	2	08:25	1	Flying and first called from ground at 06:29	IN	IN
2	02	27	2019	2	RG	1	08:25	1	Flying and first called from ground at 06:35	IN	IN
2	02	27	2019	2	RG	1	08:35	1	Flying and first called from ground at 06:36	IN	IN
2	02	27	2019	1	GP	14	08:35	1	Back to ground	IN	IN
2	02	27	2019	2	RG	1	08:35	1	Flew in front of VP	IN	IN
2	02	27	2019	2	RG	1	08:35	1		IN	IN
2	02	27	2019	1	GP	6	08:50	1		IN	IN
1	03	15	2019	2	CA	1	12:15	1	On lough	IN	IN
4	03	26	2019	2	RN	1	08:25	1		IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
2	03	26	2019	2	MA	1	10:35	1	Male on lough	IN	IN
2	03	26	2019	2	CA	1	12:10	1		IN	IN
2	03	26	2019	2	RN	2	12:35	1		IN	IN
3	03	28	2019	2	CA	1	17:15	1	Then perched on rock	IN	IN
3	03	28	2019	1	GP	1	18:15	1		IN	IN
3	03	28	2019	2	SN	1	19:45	1	Heard calling	IN	IN
3	03	28	2019	2	SN	1	19:55	1	Heard calling	IN	IN
3	03	28	2019	2	SN	1	20:00	1	Heard calling	IN	IN

Table 7.60– Wintering vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers.

Species	Number of detections	%	Number of five minute intervals	%
BZ	2	1.9	3	2.8
CA	12	11.1	12	11.1
CS	1	0.9	1	0.9
EA	2	1.9	2	1.9
GP	18	16.7	21	19.4
H.	1	0.9	1	0.9
K.	3	2.8	3	2.8
MA	2	1.9	2	1.9
RG	21	19.4	21	19.4
RN	38	35.2	39	36.1
SN	7	6.5	7	6.5
WS	1	0.9	1	0.9
Total	108		113	

Table 7.61– Wintering vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffer by month.

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	TOTAL
BZ	1	1						2
CA	5	1		1	2		3	12
CS			1					1
EA						2		2

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	TOTAL
GP			3	5	2	7	1	18
H.				1				1
K.	2	1						3
MA					1		1	2
RG			1	3	2	15		21
RN	4	6		8	10	8	2	38
SN		1	2	1			3	7
WS		1						1
Total	12	11	7	19	17	32	10	108

Three target 1 species flights (**Table 7.1**) were recorded (**Table 7.61**); golden plover (n = 18), golden eagle (n = 2), and whooper swan (n =1) and had flying height(s) recorded (**Table 7.62**) and were mapped (**Figures 7.37**).

Golden plover were again recorded wintering on the Site and present for the majority of the wintering / migration season and spent large amounts of time roosting and perched on existing tracks and turbine bases (M. Ruddock, personal observation) and also observed to undertake specific avoidance actions when flying through the windfarm and operational turbines (**Figures 7.37**). The majority of golden plover activity (1,492 second) was within rotor swept areas (20 m – 180 m) whilst remainder (1,361 seconds) was above and/or below rotor swept heights (**Table 7.62**).

Golden eagle were recorded in February with a single juvenile and single adult both recorded separately on the same day although both were recorded >400 m a.g.l and therefore above existing and/or proposed rotor heights and outside collision risk window.

Whooper swans were recorded on a single occasion and were recorded flying at low elevation (<10 m) and below rotor height exiting one of the loughs on Site following apparent overnight roosting and foraging on the same lough. This lough has been recorded previously utilised by whooper swans and appears to be used by small family groups during passage and/or occasional overnight roosting. Other whooper swan flights beyond the turbine buffers were recorded along the Barnesmore Gap which appears to be a regular migration / commuting corridor during wintering season but is considerably beyond the turbine buffers (**Figures 7.18; 7.37**).

A single hen harrier was recorded beyond the 500 m turbine buffers and this species was recorded during the winter including roosting in the wider area beyond 2 km (see Section 7.3.5.6) during the winter period. All hen harrier flights detected were recorded below rotor swept area (<10 m).

Table 7.62a – Wintering vantage point flying height and duration of Target 1 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	10	30	2018	WS	4	09:02	47	OUT	IN	47							
2	11	07	2018	GP	5	10:03	12	IN	IN	12							
2	11	21	2018	GP	19	09:43	19	IN	IN	19							
2	11	21	2018	GP	18	09:57	14	IN	IN	14							
2	12	12	2018	GP	19	10:16	110	IN	IN				60	30			20
2	12	12	2018	GP	39	11:29	325	IN	IN	25			120	160			20
3	12	20	2018	GP	37	14:08	153	IN	IN				93	60			
4	12	31	2018	GP	3	16:57	9	IN	IN		9						

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
2	12	31	2018	GP	3	13:51	7	IN	IN		7						
3	01	23	2019	GP	39	10:07	1680	IN	IN	840			840				
3	01	23	2019	GP	23	11:56	96	IN	IN	51		45					
2	02	14	2019	GP	7	11:56	7	IN	IN	7							
3	02	20	2019	EA	1	14:25	150	IN	IN								150
3	02	20	2019	EA	1	15:10	68	IN	IN								68
1	02	21	2019	GP	50	11:20	184	IN	IN								184
2	02	27	2019	GP	11	07:01	11	IN	IN			11					
2	02	27	2019	GP	6	07:01	32	IN	IN			32					
2	02	27	2019	GP	14	08:22	86	IN	IN	86							
2	02	27	2019	GP	14	08:31	32	IN	IN		18	14					
2	02	27	2019	GP	6	08:47	49	IN	IN		49						
3	03	28	2019	GP	1	18:13	27	IN	IN			27					

Table 7.62b – Wintering vantage point flying height and duration of Target 2 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
1	09	11	2018	K.	1	16:05	132	IN	IN	70	62						
1	09	11	2018	K.	2	16:30	5	IN	IN			5					
5	09	12	2018	BZ	1	10:35	507	IN	IN		150	100	100	100	57		
3	09	21	2018	CA	1	09:20	14	IN	IN	14							
2	09	21	2018	CA	1	12:15	8	IN	IN	8							
3	09	27	2018	CA	3	16:00	5	IN	IN	5							
3	09	27	2018	CA	1	18:10	82	IN	IN	82							
3	09	27	2018	CA	1	18:15	89	IN	IN	89							
1	10	06	2018	CA	1	11:35	23	OUT	IN		23						
1	10	06	2018	K.	1	12:50	141	OUT	IN	40	40	40	21				
4	10	15	2018	BZ	1	13:20	63	OUT	IN			3	20	20	20		
4	10	15	2018	SN	1	16:15	8	IN	IN	8							
3	11	14	2018	RG	1	14:40	11	IN	IN	11							
4	11	20	2018	SN	1	10:25	3	IN	IN	3							
4	11	20	2018	SN	1	10:25	3	IN	IN	3							
4	11	20	2018	CS	1	10:25	3	IN	IN	3							
3	12	06	2018	SN	1	08:20	3	IN	IN	3							
2	12	12	2018	CA	1	09:40	97	IN	IN	97							
2	12	12	2018	RG	3	10:10	11	IN	IN	11							
4	12	12	2018	H.	1	15:00	112	IN	IN				112				

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
4	12	31	2018	RG	1	14:45	15	IN	IN	15							
4	12	31	2018	RG	1	17:00	16	IN	IN	16							
1	01	10	2019	CA	1	09:30	32	IN	IN			32					
4	01	16	2019	CA	1	10:45	68	IN	IN		34	34					
4	01	16	2019	RG	1	11:25	16	IN	IN	16							
2	01	16	2019	RG	1	12:10	5	IN	IN	5							
1	01	27	2019	MA	3	12:55	28	OUT	IN	14	14						
2	02	14	2019	RG	2	11:25	31	IN	IN	31							
4	02	27	2019	RG	1	16:40	5	IN	IN	5							
4	02	27	2019	RG	1	18:30	7	IN	IN	7							
4	02	27	2019	RG	1	18:35	7	IN	IN	7							
4	02	27	2019	RG	1	18:35	4	IN	IN	4							
4	02	27	2019	RG	1	18:50	5	IN	IN	5							
2	02	27	2019	RG	1	06:45	4	IN	IN	4							
2	02	27	2019	RG	1	06:45	5	IN	IN	5							
2	02	27	2019	RG	1	06:50	5	IN	IN	5							
2	02	27	2019	RG	1	06:50	4	IN	IN	4							
2	02	27	2019	RG	2	08:25	13	IN	IN	13							
2	02	27	2019	RG	1	08:25	10	IN	IN	10							
2	02	27	2019	RG	1	08:35	9	IN	IN	9							
2	02	27	2019	RG	1	08:35	18	IN	IN	18							
2	02	27	2019	RG	1	08:35	19	IN	IN	19							
1	03	15	2019	CA	1	12:15	106	IN	IN	30	30	30	16				
2	03	26	2019	MA	1	10:35	3	IN	IN	3							
2	03	26	2019	CA	1	12:10	45	IN	IN		45						
3	03	28	2019	CA	1	17:15	14	IN	IN	14							
3	03	28	2019	SN	1	19:45	2	IN	IN	2							
3	03	28	2019	SN	1	19:55	3	IN	IN	3							
3	03	28	2019	SN	1	20:00	2	IN	IN	2							

Cumulative data for all species detected during winter and summer vantage points (**Table 7.63**) over the 13-month study shows that raven (35.3%), red grouse (16%), snipe (12.8%), golden plover (11.5%), cormorant (8.3%) and kestrel (5.8%) were the most frequently detected species throughout the 2018 – 2019 surveys.

Raven were recorded most frequently during (almost) every month of the study (**Table 7.63**), although were recorded most frequently in late winter and early spring and were also known to both nest and winter roost nearby. Red grouse were recorded more frequently in the late winter early spring. Cormorant were recorded utilising loughs for fishing and more frequently during the wintering season whilst kestrels were more frequently recorded late summer and early autumn. Snipe were more frequently recorded during the breeding season.

All of the species recorded within the 500 m turbine buffers were recorded in each season (but some locations were beyond the 500 m turbine areas (**Figure 7.33 - 7.37**).There were three species recorded in the winter which were not recorded during the breeding season, namely golden plover, golden eagle and whooper swan. None of the species seen during the breeding season were exclusively seen in that season within the Survey Area and 500 m turbine buffers. Although curlew were observed (**Figure 7.37**) they were beyond the Survey Area and 500 m turbine buffers towards the known breeding site.

Table 7.63– Cumulative breeding and wintering vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers by month

Species	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	TOTAL	% of detections
BZ				2			1	1						4	2.6
CA		1					5	1		1	2		3	13	8.3
CS				2					1					3	1.9
EA												2		2	1.3
GP									3	5	2	7	1	18	11.5
H.					1					1				2	1.3
K.		2		1	1	2	2	1						9	5.8
MA	1	1									1		1	4	2.6
RG	1	2				1			1	3	2	15		25	16.0
RN	1	8	2	2	2	2	4	6		8	10	8	2	55	35.3
SN		5	1	4	3			1	2	1			3	20	12.8
WS								1						1	0.6
Total	3	19	3	11	7	5	12	11	7	19	17	32	10	156	

7.3.5.4.1 Comparison of breeding and wintering vantage point surveys between 2017-2018 and 2018-2019

Between the two years of survey (2017 – 2018 and 2018 – 2019) there were some minor changes noted in species detection rates (**Table 7.64**). There was a difference in kestrel activity between years perhaps due to the presence of nesting pair in closer proximity to the turbine buffers in 2017.

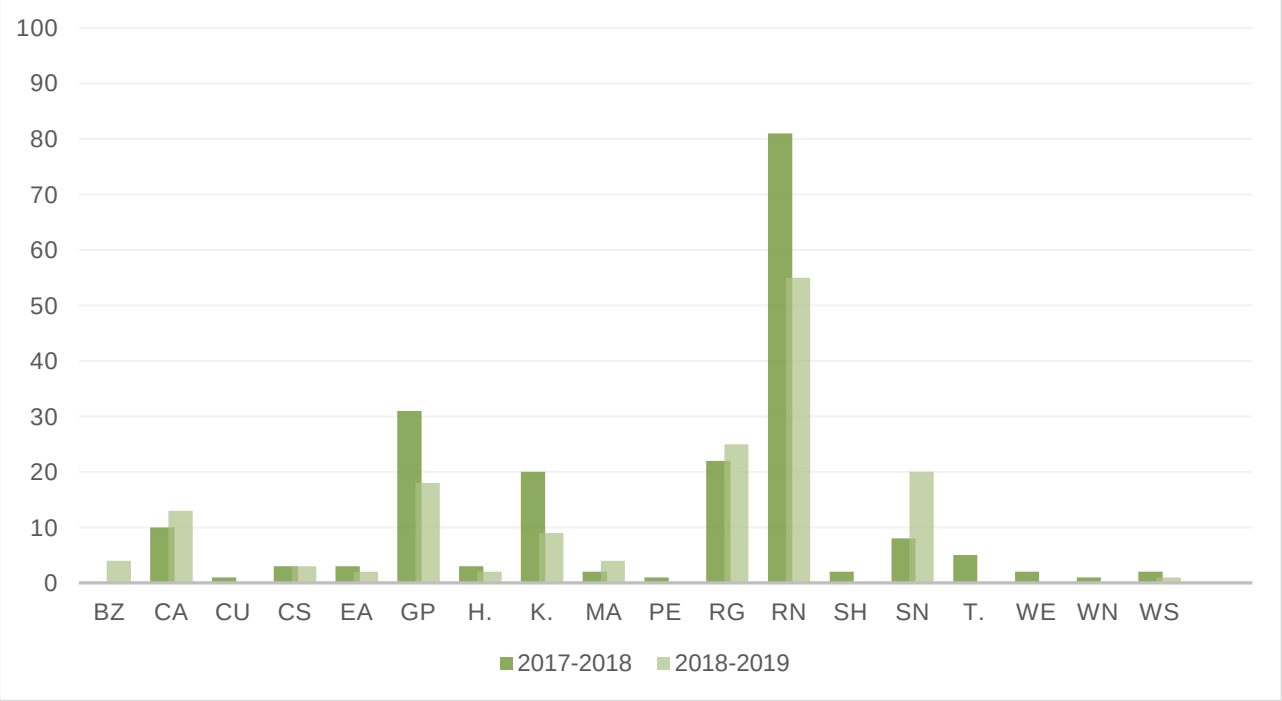
Golden plover detections on vantage points were also lower in 2018 – 2019 than in 2017 – 2018 and may be indicative of the absence of the breeding birds in 2018 – 2019 compared to 2017. Whilst slightly reduced between years, the relative activity of cormorant, red grouse and golden eagle were generally similar between the survey years.

Raven were the principal species recorded in both years and seasons of survey and all vantage point observations series including during breeding, wintering or migration periods. However raven declined slightly in recent years (**Table 7.64**). Raven, golden plover, kestrel, heron, cormorant and whooper swan were observed exhibiting avoidance / habituation responses to operational turbines (as mapped) and also recorded flying under and around turbines readily (M. Ruddock, personal observation; **Figures 7.14 – 7.18 & 7.33 – 7.37**).

No gull species (including herring gull or lesser black-backed gull) were recorded in flight throughout the vantage point surveys. Nor were white-fronted goose recorded during vantage point surveys. All these species were recorded during wider hinterland surveys though.

Table 7.64– Cumulative breeding and wintering vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers between 2017 / 2018 and 2018 / 2019. Showing species detections and proportions and direction of change between surveys in 2017-2018 and 2018-2019 (tabulated and graphed).

Species	TOTAL 2017 - 2018	% of detections	TOTAL 2018 - 2019	% of detections	Direction of change (%)
BZ	0	0	4	2.6	↑
CA	10	5.1	13	8.3	↑
CU	1	0.5	0	0	↓
CS	3	1.5	3	1.9	↑
EA	3	1.5	2	1.3	↓
GP	31	15.7	18	11.5	↓
H.	3	1.5	2	1.3	↓
K.	20	10.2	9	5.8	↓
MA	2	1	4	2.6	↑
PE	1	0.5	0	0	↓
RG	22	11.2	25	16	↑
RN	81	41.1	55	35.3	↓
SH	2	1	0	0	↓
SN	8	4.1	20	12.8	↑
T.	5	2.5	0	0	↓
WE	2	1	0	0	↓
WN	1	0.5	0	0	↓
WS	2	1	1	0.6	↓



7.3.5.5 Migration Vantage Point Surveys

There were 36 - 39 hours observation completed at each vantage point in the autumn (AMVP) between September 2018 and November 2018 and in the spring (SMVP) between January 2019 and April 2019 (**Tables 7.65 & 7.66**) with a total of 75 hours completed during migration seasons. Survey times ranged from 06.45hrs to 21.50hrs (**Table 7.65**) and covered a wide range of weather conditions (**Table 7.67**).

Table 7.65– Migration season vantage point survey effort

Type	VP No	Observer	Month	Day	Year	Start	End	Duration
AMVP	MIG	CS	9	11	2018	18:05	21:05	03:00
AMVP	MIG	CS	9	19	2018	17:45	20:45	03:00
AMVP	MIG	CS	9	27	2018	18:50	21:50	03:00
AMVP	MIG	CS	9	28	2018	17:50	20:50	03:00
AMVP	MIG	CS	10	9	2018	09:50	12:50	03:00
AMVP	MIG	CS	10	15	2018	16:35	19:35	03:00
AMVP	MIG	CS	10	22	2018	16:20	19:20	03:00
AMVP	MIG	CS	10	24	2018	07:00	10:00	03:00
AMVP	MIG	CS	11	5	2018	14:50	17:50	03:00
AMVP	MIG	CS	11	13	2018	14:40	17:40	03:00
AMVP	MIG	CS	11	15	2018	06:45	09:45	03:00
AMVP	MIG	CS	11	29	2018	10:25	13:25	03:00
SMVP	MIG	CS	1	28	2019	15:00	18:00	03:00
SMVP	MIG	CS	1	30	2019	07:30	10:30	03:00
SMVP	MIG	CS	2	6	2019	15:20	18:20	03:00
SMVP	MIG	CS	2	14	2019	07:05	10:05	03:00
SMVP	MIG	JB	2	20	2019	16:00	19:00	03:00
SMVP	MIG	JB	2	26	2019	16:20	19:20	03:00
SMVP	MIG	DR	3	11	2019	09:10	12:10	03:00
SMVP	MIG	DR	3	15	2019	08:05	11:05	03:00
SMVP	MIG	DR	3	21	2019	07:30	10:30	03:00
SMVP	MIG	JB	3	27	2019	13:00	16:00	03:00
SMVP	MIG	SON	3	29	2019	09:45	12:45	03:00
SMVP	MIG	CS	4	2	2019	13:25	16:25	03:00
SMVP	MIG	CS	4	19	2019	18:45	21:45	03:00

Table 7.66 – Migration vantage point survey effort by month

VP No.	Sep	Oct	Nov		Jan	Feb	Mar	Apr	TOTAL
Autumn Migration	12	12	12						36
Spring Migration	-	-	-		6	12	15	6	39
TOTAL	12	12	12		6	12	15	6	75

Table 7.67 – Migration vantage point weather conditions

VP & DATE			Cloud Cover				Cloud Height (m)				Wind - Direction & Speed				Precipitation				Visibility (km)			
VP No.	M	D	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3	0	+1	+2	+3
AMVP	9	11	10	10	10	10	700	700	700	700	W5	W5	W5	W5	NIL	IHR	IHR	NIL	5	5	5	0.5
AMVP	9	19	8	9	10	10	650	650	700	700	W6	SW6	SW7	SW6	NIL	NIL	IHR	ILR	5	5	5	0.5
AMVP	9	27	7	7	6	8	700	700	700	700	N4	N4	N4	N4	NIL	NIL	NIL	NIL	5	5	5	0.5
AMVP	9	28	10	10	10	10	800	800	800	800	W4	W4	W4	W4	NIL	NIL	NIL	NIL	5	5	5	0.5
AMVP	10	9	10	10	10	10	450	390	380	380	SW5	SW6	SW6	SW6	CLR	CLR	CLR	CLR	5	2	2	2
AMVP	10	15	2	2	4	8	900	900	900	900	S3	S4	S4	S4	NIL	NIL	NIL	NIL	5	5	5	5
AMVP	10	22	8	9	8	8	800	800	800	800	W5	W5	W5	W5	NIL	NIL	NIL	NIL	5	5	5	5
AMVP	10	24	10	10	10	10	500	500	500	500	W3	W3	W3	W3	NIL	NIL	NIL	NIL	0.5	5	5	5
AMVP	11	5	10	10	10	10	300	300	300	300	SE3	SE3	S3	S3	CLR	CLR	ILR	ILR	0.5	0.5	0.5	0.5
AMVP	11	13	10	10	10	10	700	700	700	700	S4	S4	S4	S4	NIL	NIL	ILR	CLR	5	5	5	5
AMVP	11	15	10	10	10	10	300	350	400	450	S6	S6	S6	S6	NIL	NIL	NIL	ILR	0.5	1	5	5
AMVP	11	29	9	9	9	9	500	500	600	600	SW4	SW4	SW4	SW4	NIL	NIL	ILR	NIL	5	5	5	5
SMVP	1	28	4	6	3	8	800	800	800	800	NW3	NW3	NW4	NW3	NIL	ILH	NIL	NIL	5	5	5	5
SMVP	1	30	8	7	6	8	350	350	350	350	NW2	NW2	NIL	NW1	NIL	NIL	NIL	NIL	0.5	5	5	5
SMVP	2	6	9	8	8	8	800	800	800	800	SW3	SW3	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
SMVP	2	14	10	10	10	10	700	700	700	700	S3	S3	S4	SE4	NIL	NIL	NIL	NIL	0.5	5	5	5
SMVP	2	20	7	6	5	5	700	700	700	700	S2	S2	S2	S2	NIL	NIL	NIL	NIL	5	5	5	5
SMVP	2	26	2	4	4	4	700	700	700	700	SE1	E1	E1	E1	NIL	NIL	NIL	ILM	5	4	4	1
SMVP	3	11	8	6	9	10	600	600	600	600	SW3	SW4	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
SMVP	3	15	9	8	9	8	600	600	600	600	W4	W3	W4	W4	IHR	NIL	ILR	NIL	5	5	5	5
SMVP	3	21	10	10	10	10	300	300	400	300	SW3	SW3	SW3	SW3	CHM	CHM	CLM	CHM	0.5	0.5	1	0.5
SMVP	3	27	4	4	3	2	900	900	900	900	SW3	SW3	SW3	SW3	NIL	NIL	NIL	NIL	5	5	5	5
SMVP	3	29	10	10	10	10	900	900	900	900	W3	W3	W3	W3	NIL	NIL	NIL	NIL	5	5	5	5
SMVP	4	2	10	10	10	10	650	600	600	600	NW4	NW4	NW4	NW4	ILS	ILS	ILH	ILS	5	5	5	5
SMVP	4	19	9	8	8	8	1000	1000	1000	1000	SW3	SW3	SW2	SW2	NIL	NIL	NIL	NIL	5	5	5	5

There were eight target species (**Table 7.1**) recorded inside the Survey Area and 500 m turbine buffers; cormorant, common sandpiper, golden plover, heron, mallard, red grouse, raven and snipe (**Tables 7.68 & 7.69**).

Red grouse (27%), raven (21%), snipe (18%) and cormorant (15%) were the most frequently detected species during the migration surveys with similar detection frequencies for common sandpiper (6.1%) and golden plover (6.1%) with remaining two species <3% (heron and mallard). There was a higher level of activity of species in the spring period (**Table 7.70**) than the autumn period (**Table 7.70**).

There were no flocks' whooper swans or other geese recorded during migration surveys within the Survey Area and 500 m turbine buffers (**Figure 7.38**) although whooper swans were recorded in other surveys (**Figures 7.14 – 7.18; 7.33 – 7.37**). Beyond the 500 m turbines buffers for either Operational Barnesmore turbines and/or proposed Barnesmore turbines there were additional golden eagle flights recorded (also included on **Figures 7.38**) of a wing-tagged and satellite tagged bird.

Table 7.68– Migration vantage point sightings records recorded within the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
AMIG	09	27	2018	2	CA	1	19:10	1	Lifted from lough and flew west	IN	IN
AMIG	09	28	2018	2	RN	2	18:25	1	Flying together	IN	IN
AMIG	10	22	2018	2	CA	1	16:55	1	Flying low over lough	IN	IN
AMIG	10	24	2018	2	SN	1	07:05	1	Flew from beside road	IN	IN
AMIG	10	24	2018	2	CA	1	08:05	1	Flew in to land on lough	IN	IN
AMIG	10	09	2018	2	RN	1	09:55	1		IN	IN
AMIG	10	09	2018	2	RG	1	09:55	1	Flew near vp	IN	IN
AMIG	11	15	2018	2	RN	2	09:00	1	Flying together	IN	IN
AMIG	11	29	2018	2	RG	1	10:25	1	Flushed	IN	IN
SMIG	01	28	2019	2	H.	1	15:05	1	Flying low over lough heading east	IN	IN
SMIG	01	30	2019	2	CS	1	09:40	1	Flew low over lough then landed	IN	IN
SMIG	01	30	2019	2	CS	1	09:40	1	Separate bird	IN	IN
SMIG	02	14	2019	2	RN	1	08:55	1	Flying south	IN	IN
SMIG	02	26	2019	2	MA	4	16:40	1	2 males & 2 females	IN	IN
SMIG	02	26	2019	2	RN	11	17:35	1		IN	IN
SMIG	02	26	2019	2	RG	1	18:35	1		IN	IN
SMIG	02	26	2019	2	RG	1	18:35	1		IN	IN
SMIG	02	26	2019	2	RG	1	18:40	1		IN	IN
SMIG	02	26	2019	2	RG	1	18:45	1		IN	IN
SMIG	02	26	2019	2	SN	1	19:00	1		IN	IN
SMIG	03	11	2019	1	GP	13	09:55	1	Undulating flight	IN	IN
SMIG	03	11	2019	2	CA	1	10:30	1		IN	IN
SMIG	03	11	2019	1	GP	15	11:55	1		IN	IN
SMIG	03	15	2019	2	SN	1	08:05	1	Flushed	IN	IN
SMIG	03	21	2019	2	RG	2	07:30	1	Flew from track	IN	IN
SMIG	03	21	2019	2	RG	1	07:35	1	Flushed	IN	IN
SMIG	03	21	2019	2	SN	1	09:30	1	Flushed	IN	IN

VP No	Month	Day	Year	Target	Species	Number	Time Detected	Number of 5 min intervals	Comments		
SMIG	03	21	2019	2	RG	1	10:05	1	Heard calling	IN	IN
SMIG	04	02	2019	2	CA	1	13:55	1	Lifted from lough, circled, landed again	IN	IN
SMIG	04	02	2019	2	RN	1	15:50	1	Flew over lough	IN	IN
SMIG	04	19	2019	2	RN	1	20:35	1	Heard calling	IN	IN
SMIG	04	19	2019	2	SN	1	21:20	1	Heard calling	IN	IN
SMIG	04	19	2019	2	SN	1	21:25	1	Heard calling	IN	IN

Table 7.69– Migration vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers.

Species	Number of detections	%	Number of five minute intervals	%
CA	5	15.2	5	15.2
CS	2	6.1	2	6.1
GP	2	6.1	2	6.1
H.	1	3.0	1	3.0
MA	1	3.0	1	3.0
RG	9	27.3	9	27.3
RN	7	21.2	7	21.2
SN	6	18.2	6	18.2
Total	33		33	

Table 7.70– Migration vantage point aggregated species sightings records within the Survey Area and 500 m turbine buffers by month.

Species	Sep	Oct	Nov	Jan	Feb	Mar	Apr	TOTAL
CA	1	2				1	1	5
CS				2				2
GP						2		2
H.				1				1
MA					1			1
RG		1	1		4	3		9
RN	1	1	1		2		2	7
SN		1			1	2	2	6
Total	2	5	2	3	8	8	5	33

One target 1 species flights (**Table 7.1**) were recorded (**Tables 7.68, 7.69 & 7.70**) within the 500 m turbine buffers; golden plover (n = 2) and had flying height(s) recorded (**Table 7.71**) and were mapped (**Figures 7.38**) along with the golden eagle flights which were recorded beyond the 500 m turbine buffers. Golden plover flights were recorded in the spring and this species is also known to over-winter on the Site.

Table 7.71a – Migration vantage point flying height and duration of Target 1 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
SMIG	03	11	2019	GP	13	09:52	48	IN	IN		18		30				
SMIG	03	11	2019	GP	15	11:51	98	IN	IN	38	15	15	15	15			

Table 7.71b – Migration vantage point flying height and duration of Target 2 species records inside the Survey Area and 500 m turbine buffers.

VP No	Month	Day	Year	Species	No	Time 1st detected	Duration (secs)	E	P	<10m	10-20m	20-40m	40-60m	60-100m	100-120m	120-180m	>180m
AMIG	09	27	2018	CA	1	19:10	42	IN	IN	20	22						
AMIG	10	22	2018	CA	1	16:55	32	IN	IN	32							
AMIG	10	24	2018	SN	1	07:05	10	IN	IN	10							
AMIG	10	24	2018	CA	1	08:05	28	IN	IN	10	18						
AMIG	10	09	2018	RG	1	09:55	22	IN	IN	22							
AMIG	11	29	2018	RG	1	10:25	30	IN	IN	30							
SMIG	01	28	2019	H.	1	15:05	113	IN	IN	54	59						
SMIG	01	30	2019	CS	1	09:40	34	IN	IN	34							
SMIG	01	30	2019	CS	1	09:40	25	IN	IN	25							
SMIG	02	26	2019	MA	4	16:40	2	IN	IN	2							
SMIG	02	26	2019	RG	1	18:35	5	IN	IN	5							
SMIG	02	26	2019	RG	1	18:35	6	IN	IN	6							
SMIG	02	26	2019	RG	1	18:40	5	IN	IN	5							
SMIG	02	26	2019	RG	1	18:45	4	IN	IN	4							
SMIG	02	26	2019	SN	1	19:00	3	IN	IN	3							
SMIG	03	11	2019	CA	1	10:30	56	IN	IN	5	15	36					
SMIG	03	15	2019	SN	1	08:05	16	IN	IN	16							
SMIG	03	21	2019	RG	2	07:30	13	IN	IN	13							
SMIG	03	21	2019	RG	1	07:35	10	IN	IN	10							
SMIG	03	21	2019	SN	1	09:30	5	IN	IN	5							
SMIG	03	21	2019	RG	1	10:05	17	IN	IN	17							
SMIG	04	02	2019	CA	1	13:55	110	IN	IN	85	25						
SMIG	04	19	2019	SN	1	21:20	3	IN	IN	3							
SMIG	04	19	2019	SN	1	21:25	3	IN	IN	3							

7.3.5.6 Breeding Priority Species Surveys 2018

There were 165 hours and 45 minutes spent searching adjacent habitats for priority species between March 2018 and August 2018 (**Table 7.1; Table 7.72**) with efforts concentrated on golden eagle, hen harrier, merlin, red grouse, gulls and waders during the breeding season. Survey times ranged between 05.10hrs to 23.55hrs and covered a wide range of weather conditions (**Table 7.72**).

Table 7.72 Details of breeding priority species searches (PSS), including survey effort, weather

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	2km / 5km	7	3	2018	15:20	17:40	02:20	10	500	SW	3	NIL	5
PSS	5km / 10km / 20km	15	3	2018	09:50	13:10	03:20	9	500	SW	2	NIL	5
PSS	2km / 5km / 10km	21	3	2018	12:35	18:05	05:30	10	500	SW	3	NIL	5
PSS	5km	21	3	2018	16:00	18:00	02:00	10	500	SW	3	NIL	5
PSS	10km	21	3	2018	16:00	18:00	02:00	10	500	SW	3	NIL	5
PSS	2km / 5km / 10km	28	3	2018	05:20	10:20	05:00	10	600	SW	2	NIL	5
PSS	5km / 10km	29	3	2018	18:30	19:50	01:20	10	550	SE	2	NIL	5
PSS	2km	29	3	2018	10:30	12:00	01:30	10	500	SE	3	NIL	5
PSS	500m / 2km	30	3	2018	13:40	16:10	02:30	10	700	NE	2	NIL	5
PSS	2km / 5km	1	4	2018	10:05	17:15	07:10	10	500	SW	2	NIL	5
RGS / SNS	500m	6	4	2018	21:15	23:45	02:30	10	600	S	5	NIL	5
PSS	5km	12	4	2018	13:45	18:45	05:00	10	340	SE	2	NIL	5
RGS / SNS	500m / 2km	18	4	2018	21:00	23:50	02:50	9	650	S	4	NIL	5
PSS	2km / 5km	21	4	2018	10:05	18:05	08:00	9	600	SW	2	NIL	5
PSS	500m / 2km / 5km / 10km	25	4	2018	05:10	07:10	02:00	10	800	SW	2	NIL	5
PSS	500m / 2km / 5km / 10km	25	4	2018	13:55	17:55	04:00	10	800	SW	2	NIL	5
RGS / SNS	500m	26	4	2018	21:40	00:35	02:55	4	1000	NIL	NIL	NIL	5
RGS / SNS	500m	27	4	2018	21:20	23:20	02:00	2	700	N	3	NIL	0.5
PSS	2km	27	4	2018	16:00	18:00	02:00	8	650	NW	2	ILR	5
PSS	2 km / 5 km	27	4	2018	11:05	18:00	06:55	6	600	NW	2	NIL - ILR	5

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	500m / 2km	11	5	2018	16:05	18:05	02:00	9	600	S	4	ILR	5
PSS		11	5	2018	21:30	22:30	01:00	8	700	S	4	ILR	5
PSS	5km	22	5	2018	17:45	19:30	01:45	5	800	SE	1	NIL	5
RGS / SNS	500m	22	5	2018	21:50	23:45	01:55	9	600	SE	1	NIL	5
PSS	5km	23	5	2018	19:40	21:40	02:00	1	900	E	2	NIL	5
RGS / SNS	500m	23	5	2018	22:00	23:55	01:55	1	1000	E	2	NIL	5
RGS / SNS	500m	25	5	2018	22:40	23:50	01:10	1	800	N	4	NIL	5
RGS / SNS	500m	28	5	2018	20:00	23:25	03:25	10	800	SE	1	NIL	5
PSS	5km / 10km	29	5	2018	07:50	17:35	09:45	9	700	SE	2	NIL	5
PSS	2 km / 5 km	1	6	2018	10:35	18:35	08:00	8	600	S	3	NIL	5
PSS	2 km / 5 km	1	6	2018	09:55	19:35	09:40	8	600	S	2	NIL	5
RGS / SNS	500m	12	6	2018	22:00	23:20	01:20	10	500	SW	4	IHR	2
PSS	5km / 10km	16	6	2018	12:30	14:30	02:00	8	500	SW	3	IHR	3
PSS	5km / 10km	15	6	2018	12:30	17:00	04:30	9	500	SW	3	IHR	4
RGS / SNS	500m / 2km	18	6	2018	22:15	23:35	01:20	9	600	W	2	NIL	5
PSS	500m / 2km	11	7	2018	16:55	19:55	03:00	10	650	N	3	NIL	5
PSS	2km / 5km	17	7	2018	08:50	13:20	04:30	6	700	SW	5	NIL	5
PSS	2km / 5km	17	7	2018	07:00	09:55	02:55	6	700	SW	3	NIL	5
PSS	500m / 2km	23	7	2018	22:00	23:10	01:10	10	600	W	1	NIL	5
PSS	500m / 2km / 5km	24	7	2018	11:05	17:10	06:05	8	600	SW	2	NIL	5
PSS	500m / 2km / 5km	25	7	2018	14:00	18:00	04:00	8	700	SW	3	NIL	5
PSS	500m / 2km / 5km	25	7	2018	14:00	18:00	04:00	8	700	SW	3	NIL	5
PSS	500m / 2km / 5km	26	7	2018	13:00	18:00	05:00	8	600	SW	3	NIL	5

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	500m / 2km / 5km	12	8	2018	10:40	13:40	03:00	8	800	W	1	NIL	5
RGS	500m	14	8	2018	09:15	12:45	03:30	10	340-450	SW	3	CLR-ILR	5
RGS	500m	22	8	2018	09:25	12:25	03:00	10	700	NW	3	NIL	5
RGS	500m	24	8	2018	11:25	14:25	03:00	10-8	800	W	4	IHR-ILR	5

There were 26 target species were recorded; namely buzzard, common sandpiper, cormorant, curlew, greater black-backed gull, goldeneye, golden eagle, golden plover, herring gull, heron, hen harrier, kestrel, lapwing, lesser black-backed gull, light-bellied brent goose, mallard, merlin, mute swan, peregrine, red grouse, raven, sanderling, sparrowhawk, snipe, tufted duck and whooper swan (**Table 7.73**). The sightings from all surveys were aggregated to identify territory locations of target species (**Table 7.1**) and in particular to identify curlew, red grouse, snipe and raptor territories within the Survey Area and 500 m buffer (**Figure 7.39 – 7.43**) and to review published avoidance distances (Ruddock & Whitfield, 2007; Pearce-Higgins et al., 2009) (**Figure 7.39 – 7.43**).

7.3.5.6.1 Raptor surveys

There were no raptor species recorded breeding within either the 500 m existing or proposed turbine buffers. One species, kestrel, was recorded breeding in the wider 500 m Survey Area on a small natural crag. Within the 2 km Survey Area there were three species recorded breeding buzzard, hen harrier, peregrine and sparrowhawk. These species were all recorded within conifer forest plantation.

There was one pair of hen harrier breeding within the 2 km Survey Area and were therefore beyond 500 m from either existing or proposed turbines (**Figure 7.39 – 7.43**). This pair were present in the early season (March and April) and subsequently were not recorded after late April. Shooting was heard in late April, from circa 3 km away, in the same vicinity and buzzards were also recorded nesting nearby the previously identified site and were observed chasing the male hen harrier and this pair may have been disturbed and/or displaced. Two pairs of buzzards and an additional three pairs of sparrowhawk were breeding within the Survey Area and 2 km Survey Area (**Figure 7.39 – 7.43**).

In the wider 5 km Survey Area buzzard (n = 6) and sparrowhawk (n = 3) along with one merlin territory and an additional kestrel territory (**Figure 7.39 – 7.43**) were recorded. Two peregrine sites were recorded to be occupied within 5 km – 10 but neither of these were followed for the remainder of the season to establish breeding outcome once occupancy was established (**Figure 7.39 – 7.43**).

Between 5 km and 10 km, a pair of golden eagles was again present with one chick fledged and were seen widely within an extended territorial range and the nest was located further west than in 2017 and less activity was recorded during vantage point surveys. Six additional buzzard territories were identified along with one kestrel territory and three harrier territory all of which were recorded to fail (**Figure 7.39 – 7.43**).

Two of the hen harrier territories recorded in 2017 within 10 km Survey Area were not apparently occupied in 2018 although one territory may have shifted further south perhaps due to high levels of forestry activity in the spring time in the area of the 2017 site. One additional hen harrier territory was identified beyond the 10 km Survey Area during 2018 although some spatial dynamics are likely in this species in this region based on suitability of the age structure and availability of replanted (second rotation) forest stands and therefore year-to-year variation is likely. One territory for each of merlin, peregrine and buzzard were recorded in the >10 km Survey Area.

7.3.5.6.2 Red grouse surveys

Red grouse surveys within the Survey Area and 500 m Survey Area identified 27 red grouse territories (25 in 2017). There were 20 and 19 of these respectively which were within the 500 m buffers of both the existing turbines and the proposed turbines (**Figure 7.41**) and none of the existing and proposed turbines were completely outside the 500 m buffer of red grouse territories (**Figure 7.41**).

7.3.5.6.3 Wader surveys

There was one curlew pair within the 800 m Survey Area. All curlew territories recorded were greater than 1km beyond both existing and proposed turbines (see Pearce-Higgins et al., 2009; **Figure 7.39 – 7.43**). This curlew territory was recorded in the same areas as 2017 to the north and was present from February through until late April when no further observations were recorded and perhaps shooting disturbance may also have affected this species (**Table 7.79; Figure 7.39 – 7.43**). Some cut firebreaks and land management is evident on the bog adjacent to the forest in this area and wider land management may be occurring in this area which may influence curlew (and other species) breeding but no further details on land management are known.

Two golden plover were recorded in the 2 km Survey Area in late spring and in breeding plumage, but no further observations of this species were obtained. These birds were located further north than in 2017 and may have subsequently moved away. Additional golden plover flocks were seen at Dunragh, Lough Mourne, Lough Nillan, Donegal Bay and east of Lough Derg in the spring and again were considered to be migrants at these locations.

There were 35 snipe territories within the Survey Area and 500 m Survey Area in 2018, of which 28 were within the 500 m existing turbine buffer and 31 within the 500 m proposed turbine buffer (**Figure 7.41**). The 400 m buffer of snipe territory locations (see Pearce-Higgins et al., 2009) (**Figure 7.41**) shows that all of the 25 existing turbines are within 400 m of snipe territories and 12 of the 13 proposed turbines are also within the 400 m buffer of snipe territories (**Figure 7.41**). Many of the snipe territories, including pairs with young, were observed immediately adjacent to both tracks and turbines of the Operational Barnesmore Windfarm. A small number of snipe (and red grouse) were recorded in the wider Survey Areas (10 km) during hen harrier or golden eagle monitoring.

Within the Site there were five to six pairs of common sandpiper, along lough edges and/or a short distance away from loughs and some of these locations were consistent between years.

7.3.5.6.4 Other species surveys

Ring ouzel were again recorded to the north of the Site at a slightly shifted location since 2017, a singing male was recorded and a pair were recorded together on one occasion but there was no further evidence of breeding. Two pairs of ravens were recorded just beyond the Survey Area and 500 m buffer (**Figure 7.39 – 7.43**).

A number of species were recorded during March which were late wintering records e.g. whooper swan and some golden plover records of birds still on migration and also some information from wintering visits to Donegal Bay area with some records of sanderling, curlew, light bellied brent geese, lapwing and some gulls >10 km away from the Site and were not indicative of breeding records (**Figure 7.39 – 7.43**).

Lesser black-backed gulls were again recorded either in suitable breeding habitat and/or with evidence of breeding at Lough Eske and Lough Derg. Some were recorded loafing on the water at Lough Mourne and at Dunragh. Herring gull were recorded at Lough Derg with juveniles also recorded there and also recorded at Lough Mourne, Lough Eske and Donegal Bay but no breeding behaviours were observed at those localities. A pair of greater black-backed gull were recorded at Lough Derg and indicative breeding behaviours were observed (**Figure 7.39 – 7.43**).

Heron, mute swan, cormorant, mallard, tufted duck, goldeneye, were recorded at a variety of locations (**Figure 7.39 – 7.43**) and cormorants breeding at Lough Derg and (predominately) Lough Eske are considered to be the origin of the birds foraging within the Operational Barnesmore Windfarm based on flight trajectories and observations of movements in the wider hinterland (**Figure 7.39 – 7.43**). A further origin site may be located to the north but was not identified during surveys. The species is not breeding on the Operational Barnesmore Windfarm but rather fishing.

Table 7.73 Details of breeding priority species searches (PSS), including survey dates and species detected.

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	2km / 5km	7	3	2018	EA, PE, RN, K.	PE pair present near 2017 site, EA soaring over and towards 2017 breeding area. RN 3 calling from nest site along cliff face within Gap. K. male hunting along ridge and perched on rock with prey

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	5km / 10km / 20km	15	3	2018	BZ, RN, SH, WS, PB, GP, PE, CU, L., SS, GB, LB, HG, MA, GN, CM, RK	BZ(2), RN(9), SH. Durnesh - WS, PB(69), GP(100+), PE hunting GP, CU(2), L.(15), SS(15), GB(6), LB(2), HG(1), CM (7), RK (19). RN, MA, MS, GN at Lough Eske.
PSS	2km / 5km / 10km	21	3	2018	ML, HG, EA, BZ, K., RN, CU	13:50 - ML flying, hunting over peatlands, rough grassland low flight from forest then back again. 16:12 - HG flying over. EA soaring along ridge lost to view over ridge BZ out to west and K. near previous breeding site. RN calling from high point on crag, nest appears out of sight on crevice. Single curlew along river gully towards 2017 breeding site
PSS	5km	21	3	2018	HH, BZ, GP, SN, PE	HH pair present near the 2017 site, mobbing hooded crow and pair of buzzards nearby, GP (17) calling from Lough Mourne and circling repeatedly. SN (2) chipping and calling south of vantage point. PE hunting along ridge brief sighting only
PSS	10km	21	3	2018	HG, RN,H., SN, BZ	HG flew to east side of lough and flew east, RN pair along forest edge calling from probably nest site. H. flying east along river corridor. SN calling along river edge from rush pasture and BZ pair circling over forest
PSS	2km / 5km / 10km	28	3	2018	WS, MS, TU, CA, HG, BZ, RN, MA, SH, LB	L. Eske - MS, TU (3+2), CA (3), HG (2), LB (2) WS. BZ flying. MA (3) flying into L. Mourne, RN (2) and RN (5) flying over Killeter. SH flying through gap. WS on ground near junction to Castlederg
PSS	5km / 10km	29	3	2018	EA, PE	EA circling and PE over top of ridge went north
PSS	2km	29	3	2018	RN, SN, SH, RG	11:03 - RN(2) flying together; 11:41 SN (1) calling along with RG which flew and SH pair flying over conifers at 11:52
PSS	500m / 2km	30	3	2018	SN, RG, K.	RG (x 5), SN (x 6) and K. recorded on landownership towards crag section to west of windfarm
PSS	2km / 5km	1	4	2018	CU, HH, SN, BZ, RN	Two pairs of HH near 2017 sites and SN calling repeatedly along river gully. BZ pair displaying at conifer block edge and seen carrying prey towards third bird. BZ at Fifth Corgary, Slievedoo and RN with fledged young near

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
						Ardnamona. CU pair calling along river at traditional site
RGS / SNS	500m	6	4	2018	RG, SN, CS	SN commenced calling at 22:16 with final bird recorded 22:58. RG (x 8) separate locations, wind elevated and hard to hear in parts, CS (x 3) repeatedly calling
PSS	5km	12	4	2018	RN, SH, HH, BZ	14:19 - RN (1) flying over towards nest site, SH flying into trees near quarry site. HH male seen perched up along tree line and chased by buzzard. Second pair of BZ displaying and undulating to the east
RGS / SNS	500m / 2km	18	4	2018	RG, SN, CS, MA, CU	RG - 21:00. SN - 4 separate locations calling, chipping, drumming, CS x 2 calling intermittently, MA on lough. CU calling to north side but not seen
PSS	2km / 5km	21	4	2018	EA, RN, BZ, PE, LB	EA single adult seen chasing crows and PE, latter went over ridge to north also RN and BZ in valley below chasing each other. LB (2) on water near small island and CA fishing on water and went to perch in trees at edge near suitable breeding habitat. TU recorded in bay at the edge of lough
PSS	500m / 2km / 5km / 10km	25	4	2018	RN, EA	RN flying over Croaghloughslug, RN (2 juveniles). EA pair present soaring and one disappeared to ledge
PSS	500m / 2km / 5km / 10km	25	4	2018	K.,H., RN, HH	K. flying in Barnesmore Gap, RN (2) flying over Killeter Forest, H. flying along river east of Killeter. HH male perched up at northern site on trees and female seen briefly to ground
RGS / SNS	500m	26	4	2018	SN, RG, GP, CS	Shooting heard earlier in day to the north. GP calling to the north in evening further north than in 2017, SN x 12; RG x 17
RGS / SNS	500m	27	4	2018	SN, RG, RN	22:07 - chipping - 23:05 (x 8); RG x 4, RN along road beyond Site boundary calling
PSS	2km	27	4	2018	SH	17:27 - SH female hunting, flying south and into woods
PSS	2 km / 5 km	27	4	2018	HH, ML, PE, K.	PE in gully, male hunting from pylons and along ridge. K. pair in ridge (second site) chasing each other and perching up. HH male

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
						seen away from site, foraging no female seen. ML heard calling and heading east towards block.
PSS	500m / 2km	11	5	2018	K.	K. west of windfarm calling and chasing crows
PSS		11	5	2018	HH, K.	HH female, mobbing kestrels and calling near historical site (further west than sighting earlier in April). K. at edge of lough (pair calling) and additional bird seen western side of lough hunting
PSS	5km	22	5	2018	BZ	BZ active breeding site with food carrying adult observed into woodland, additional pair soaring beyond and interacting with first birds
RGS / SNS	500m	22	5	2018	CS, RG, SN	CS - calling from three locations. RG - calling from 2 locations. SN - from 9 separate locations calling chipping
PSS	5km	23	5	2018	CA, SN	20:52 - CA flying from lough, 21:11 - SN calling.
RGS / SNS	500m	23	5	2018	SN	23:00 - SN chipping until 23:45
RGS / SNS	500m	25	5	2018	SN	22:50 - chipping until 23:19
RGS / SNS	500m	28	5	2018	RG, SN	RG (12) SN (7), SN (2) SN (3) all calling
PSS	5km / 10km	29	5	2018	EA, SH, HH, K.	EA active nest site, male perched up and flew across valley, HH seen visiting nest in river gully near 2017 site and SH hunting from woodland caught prey and went into wood suspected nest site. K. pair still active along skyline
PSS	2 km / 5 km	1	6	2018	SH, BZ, ML, SN	SH calling from woodland and BZ defending areas near previous HH site, ML carrying prey near previous site. SN chipping along river edge. BZ four sites identified within Killeter forest
PSS	2 km / 5 km	1	6	2018	HH, GP, LB, HG, TU, SH	HH seen on historical nest site, lower down valley. HG (3), LB (5) seen on lough alongside TU (4) GP. SH pair high circling at edge of lough. No RD seen in second area, GP (2) heard calling
RGS / SNS	500m	12	6	2018	NIL	No sightings; poor weather
PSS	5km / 10km	16	6	2018	BZ, SH	BZ soaring, SH into woodland carrying prey and second pair of BZ calling and chasing MG. Third

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
						pair of buzzards active at historical site
PSS	5km / 10km	15	6	2018	BZ, SH	Activity recorded near previous sites along border with calling and defending of BZ pair just beyond border. SH in clearing, lots of forest activity earlier in the year. Additional pair located towards Meenadreen not far from roadside
RGS / SNS	500m / 2km	18	6	2018	SN, K.	22:33 - chipping (1 bird), K. nest site active to the west hunting pair and delivering prey
PSS	500m / 2km	11	7	2018	GP, PE	No signs of CU, GP calling from ridge to north (only a single bird). PE (juvenile) flying along ridge line
PSS	2km / 5km	17	7	2018	BZ, SH, K.	No signs of HH but BZ and SH both remain active and K. site along Gap
PSS	2km / 5km	17	7	2018	RN, ML	RN family party recorded with 3 juveniles. Pine marten seen crossing road. ML single chick recorded moving in / out of small isolated stand of taller conifers flew out along roadway calling
PSS	500m / 2km	23	7	2018	RN	19:52 - RN (2+1) flying south.
PSS	500m / 2km / 5km	24	7	2018	BZ, SH, ML	No signs of activity at HH sites again - no young fledged. Failed. BZ with 2 + young, second site 1+ young, ML calling at edge of plantation
PSS	500m / 2km / 5km	25	7	2018	BZ, K, SH	K. with flying young at both sites along gap, hunting separate directions. PE at second site, no signs of chicks. SH carrying food into woodland beside road and young heard calling
PSS	500m / 2km / 5km	25	7	2018	HG, LB, K.	K. with 2+ young in flight and hunting; HG (6) and LB (4 + 2 juveniles) on water and perched on rocks
PSS	500m / 2km / 5km	26	7	2018	EA, RN, K., SH	EA single chick seen flying and moving short distances. Adult in with prey and on to ground. RN family party (6) flying over ridge and K. with 1+ young in flight. SH young heard calling
PSS	500m / 2km / 5km	12	8	2018	BZ, MA, RN, K., SH	BZ. MA (2). RN, RN, RN. L.Slug. K. at 2 separate locations including juveniles. SH female carrying prey towards wood

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
RGS	500m	14	8	2018	RG, SN	RG at three locations, including one pair with 3 young walking along track, SN (x 3)
RGS	500m	22	8	2018	RG, SN, RN	RG calling and flew east during walkover, RN flew west and down to scavenge
RGS	500m	24	8	2018	RG, RN, CS, H., SN	H. along lough edge, SN flew at 4 x locations, with flock of 5 (including juveniles). CS family party along edge of Meenabrock (5 birds)

7.3.5.7 Wintering Priority Species Surveys 2018 - 2019

During the winter of 2018 to 2019 (September 2018 to February 2019), there were 138 hours spent searching adjacent habitats within the Survey Areas (**Figure 7.1**) for priority species (**Table 7.1; Table 7.74**) with efforts concentrated on hen harrier wintering sites and whooper swan during the wintering season. Survey times ranged between 05.55hrs to 19.10hrs and covered a wide range of weather conditions (**Table 7.74**).

Table 7.74 Details of wintering priority species searches (PSS), including survey dates and species detected.

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	500m / 2km / 5km / 10km	21	9	2018	06:00	08:45	02:45	6	600	NW	3	IHR	3
PSS	2km / 5km / 10km	21	9	2018	15:30	19:00	03:30	9	800	NW	3	IHR	3
WRS	5km	22	9	2018	05:55	07:15	01:20	10	700	W	1	NIL	5
PSS	5km / 10km	22	9	2018	10:45	11:45	01:00	10	800	W	2	NIL	5
PSS	5 km / 10km	24	10	2018	09:45	17:30	07:45	10	1000	W	3	CLR/NIL	3
PSS	10km	26	10	2018	10:50	19:10	08:20	6	600	NW	2	IHR-NIL	5
PSS	20km	26	10	2018	11:20	19:10	07:50	5	600	NW	1	NIL	3
PSS	500m / 2km / 5km / 10km	30	10	2018	06:05	08:35	02:30	4	1000	E	3	NIL	5
PSS	10km / >10km	30	10	2018	15:10	18:10	03:00	10	800	E	2	NIL	5
PSS	500m / 2km / 5km	30	10	2018	13:10	15:10	02:00	10	800	E	3	NIL	5
PSS	500m / 2km / 5km / 10km	5	11	2018	10:35	14:50	04:15	10	300	SE	2	CLR	5
PSS	10km	29	11	2018	13:50	17:10	03:20	10	600	SW	3	ILR	5
PSS	>10km	29	11	2018	13:20	18:45	05:25	6	600	SW	1	NIL	5

Survey Type	Survey Area	Day	Month	Year	Start time	End time	Duration	Cloud	Height	Wind dir.	Wind strength	Prec.	Vis. (km)
PSS	>10km	29	11	2018	12:15	17:15	05:00	8	500	SW	3	IHR	4
PSS	>10km	30	11	2018	13:30	16:50	03:20	7	700	W	3	IHH	4
PSS	10km / >10km	6	12	2018	08:15	13:35	05:20	8	500	SW	3	CLR-NIL	5
WRS	2 km / 5 km	12	12	2018	07:15	08:55	01:40	9	400	SE	2	NIL	5
PSS	10km	19	12	2018	09:50	17:10	07:20	10	600	S	2	NIL	5
PSS	5km	19	12	2018	10:15	17:05	06:50	8	600	S	2	NIL	5
PSS	5km	21	12	2018	11:15	15:05	03:50	10	350	SW	1	NIL	5
PSS	5 km / 10km	31	12	2018	07:00	11:00	04:00	9	800	SW	2	NIL	5
PSS	10km	22	1	2019	15:05	17:50	02:45	5	400	NW	2	NIL	5
PSS	500m / 2km / 5km / 10km	23	1	2019	07:35	09:45	02:10	10	600	W	2	NIL	5
PSS	2 km / 5 km / 10 km / >10 km	25	1	2019	08:25	13:00	04:35	8	200	W	3	ILR	5
PSS	500m / 2km / 5km / 10km / 20km	27	1	2019	07:15	10:55	03:40	6	800	NW	3	NIL	5
PSS	5km / 10km	29	1	2019	08:20	11:55	03:35	10	200	W	2	CLR-NIL-ILR	2
PSS	5km / 10km	29	1	2019	15:00	18:05	03:05	9	700	NW	1	IHS	5
PSS	5km / 10km	29	1	2019	09:20	14:00	04:40	8	600	NW	1	ILS - NIL-CLS	4
PSS	500m / 2km	30	1	2019	14:10	18:10	04:00	7	450	NW	3	NIL	5
PSS	10km / >10km	31	1	2019	11:40	15:30	03:50	9	600	NE	2	NIL	4
PSS	500m / 2km	18	2	2019	13:45	14:35	00:50	10	400	W	5	CHR	5
PSS	500m	20	2	2019	16:20	18:50	02:30	9	700	S	3	NIL	5
PSS	500m / 2km	20	2	2019	13:45	15:50	02:05	9	600	S	3	ILR	4
PSS	500m / 2km	26	2	2019	15:40	17:40	02:00	5	800	E	2	NIL	5
PSS	5km / 10km	27	2	2019	06:00	10:00	04:00	8	600	SE	1	ILM-NIL	2
PSS	10km / >10km	28	2	2019	06:05	10:00	03:55	8	400	W	2	ILM-NIL	3

There were 33 target species recorded; namely buzzard, cormorant, Canada goose, common gull, curlew, greater black-backed gull, golden eagle, goldeneye, golden plover, heron, herring gull, hen harrier, kestrel, lesser black-backed gull, little grebe, mallard, moorhen, mute swan, oystercatcher, light bellied brent goose, peregrine, red grouse, raven, ring ouzel, sparrowhawk, snipe, sanderling, teal, tufted duck, white-tailed eagle, white-fronted goose, wigeon and whooper swan (**Table 7.75**).

The sightings from all surveys were aggregated to identify key wintering locations of target species (**Table 7.1**) and in particular to identify hen harrier, golden eagle, white-fronted goose and whooper swan locations within the core Survey Areas (**Figures 7.44 - 7.45**).

Within the 500 m Survey Area a range of species were recorded including cormorant, golden plover, red grouse, ring ouzel, snipe and small numbers of whooper swan again recorded on the two loughs at Golagh and Nalagheany (**Figures 7.44 - 7.45**). Other wintering priority species were recorded within 2 km including golden eagle and raven in various locations including near known breeding locations (**Figures 7.39 – 7.44**) and ravens including which were again recorded roosting to the east and north and various aggregations were throughout the winter and were again noted scavenging on carrion at a number of localities. Ravens were also recorded along Barnesmore Gap roosting.

There were several swan locations recorded within the 5 km Survey Area and winter roosting, foraging or commuting routes were identified along the Barnesmore Gap (see also vantage point survey data) and also family parties of swans roosting to the south west moving from Naleaghany over Meenadreen Windfarm to Lough Cuill and foraging south of Finmore Hill as well as alternating between Cullionboy Lough, Lough Golagh and Lough Naleaghany. Additional wintering whooper swans were recorded on Lough Eske, Lough Derg, and Lough Mourne during the migration season but also over-wintering. Lough Derg swans appear to predominately head east to foraging areas towards Castlederg (**Figures 7.44 - 7.45**).

A range of goose species were recorded including Canada goose, greylag goose and feral / hybrid goose recorded again. Greenland white-fronted goose were recorded within the wider Survey Area beyond 10 km including at Lough Derg, Dunragh, Lough Nillan and Lough Eske. The closest white-fronted goose recorded were beyond 5 km (**Figures 7.44 - 7.45**).

Hen harrier winter roost areas were not identified within the 500 m Survey Area or within the 2 km Survey Area (**Figures 7.44 - 7.45**) but a number of locations were identified within both 5 km Survey Areas and 10 km Survey Areas to the north, north-east and south. The maximum roost count was one bird (male or female) at all localities observed (**Table 7.75**). Some of these roost sites have been utilised in both winters of survey.

More widely and at Donegal Bay area there were a range of waders and gulls recorded as well as some waterfowl, grebes, gulls, cormorants and herons recorded across a range of water bodies particularly at Lough Eske and Lough Derg (**Figures 7.44 - 7.45**).

Table 7.75 Details of wintering priority species searches (PSS), including survey dates and species detected.

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	500m / 2km / 5km / 10km	21	9	2018	K., RN, HH	HH male exited roost site at 07:59 and flew north. Male K. hunting along the Gap, RN (2) flying over Killeter Forest.
PSS	2km / 5km / 10km	21	9	2018	SH, MS, TU, CA, CM, MA, H., LG, RG, SN	SH male hunting on western shore, LG, MS(2) on western edge of L.Eske, MA(7), TU(2) and CA(2) in western corner of L.Eske, CM(7) flying along eastern shore. H. and MA (5) on north side of Eske. H. and MA (3) on L. Sallagh north of Barnesmore.CA (1+1) within wind farm. RG and SN (2) on Site and to west
WRS	5km	22	9	2018	H., LB, HH, GP	Female HH lifted from ground and flew east; LB circling and H. and LG at edge of water. GP heard calling overhead

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	5km / 10km	22	9	2018	RN, LG, MA, H., CA, CM	RN(2) flying west of L. Eske, RN flying north of lough, H. on shoreline, MA(5) loafing, CA (2), CM (2+2)
PSS	5 km / 10km	24	10	2018	CA, GD, GB, HG, LB, MA, K. GP, WG, WS	Lough Derg CA (2) feeding on lough, GD (1) loafing. CA & CA juvenile. Another CA juvenile, then CA (7), HG, GB and LB on rocks, MA (2) on lake. GP (17), WG (2), K. (1) & WS (3) seen at Pettigoe, Dunragh, Golagh
PSS	10km	26	10	2018	WE, WS, CG, GP, RN, ZL, HH	Nothing sighted on Lough Hearn, Lough Cullion, and Lough Golagh. WE circled and flew NW through wind farm at Meenadreen. Lough Mourne WS (10) at end of lake, then WS (9) flew from lake heading SW, more arrived from north the WS (13) on lake, also then CG (18) arrived on to lake. ZL (6) and MA (2) on water in previous location. Four separate groups of GP over high point of Gap. RN flocks of 7 into roost along cliff edge and female HH seen briefly towards dusk
PSS	20km	26	10	2018	WS, MA, GN, CA, CM, MA, H. WS, WE, RN, HH	Tullyhorky WS (7), lifted from lough and flew N, MA pair on lough. Cornareagh GN (1) on lough. Lough Eske - CM (2 + 2). Amincheen CA (1) on lough. Lough Fad RN flying. Eske MA (9) 5 males and 4 females on lough, H. perched on shoreline, WS (7) flew from south then headed west. WE sub-adult seen circling and lost to view. HH male flying towards roost site and dropped out of view
PSS	500m / 2km / 5km / 10km	30	10	2018	BZ, RN, WS, MH, CA, LB, WN, CM, H., SH, MA, MS	BZ - circling over Killeter Forest, RN(2) over Killeter, RN flying NE from the Gap, WS(4) feeding on L. Naleaghany south of wind farm, RN(2) flying south of access track, MH(3) on small lough on way into WF, SH hunting along road at Tawnaghlaghan. L.Eske - CM (5), WS (3), H. (1), LB (1), CA (4), MS (1), WN (2) and MA (6).
PSS	10km / >10km	30	10	2018	PE, RN, WG, GP, WS, LB	PE (juvenile) seen chasing RN (3). WG (4) seen passing over to south-west. WS (7; 4A; 3J) at far side of lough. GP (22 + 13) flocks circling over ridge line and chased by PE (probably same bird as earlier). RN (9) flew east and landed. LB (9) flying along lough edge
PSS	500m / 2km / 5km	30	10	2018	WS, K. T., CA, GP, SH	WS (5 + 3 + 4) at 3 usual loughs along road side. K. hovering along skyline. T.

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
						(2) on water. CA (2), GP (14) and SH (chased SC) at shore line
PSS	500m / 2km / 5km / 10km	5	11	2018	RN, SH, MA, WS, K., MH, H., CM,	RN(2 + 4 + 4) flying at entrance to windfarm at Croaghloughslug, SH male hunting. WS 3 on lake and 1 WS on Cullionboy. MA 23 on lake and MH, CM (2 + 2), H. (1 + 1). K. along roadside, perched on powerline.
PSS	10km	29	11	2018	RN, PE, EA	14:47 - RN(2) flying NW of L.Eske and PE seen on post. EA (adult) along ridge soaring
PSS	>10km	29	11	2018	RN, SN, WS, HH	Nothing sighted Letterkillew, RN(1) flying @ Croveenanaia, RN(1) flying @ Lough Nagreal, SN 1 @ Clogher North / Croveenananta. WS (2) on lough, GP along ridge line with RN (2) and possible male HH seen flying low
PSS	>10km	29	11	2018	RN, RG, SN, MA, MH, GP	RN 1, RG 1, SN 1, MA 2, RN 2, RN 2, RN 6, MA 1, MH 2, RN 1, GP 7, GP 4
PSS	>10km	30	11	2018	PE, RN, SN, SH	Lough Ea PE(1) flying over marsh, RN(2), RN (3), RN (1), RN (2), SN(1), SH (1)
PSS	10km / >10km	6	12	2018	LB, SS, GP, OC, RK, CM, MS, H., WS, MA, T., PB, CA, RN, K., BZ	LB and SS along strand, WS (3) and MS (2+1) at Durnesh along with T. & MA. GP along north strand with PB (11) and groups of RK, OC., CM, LB, T. and BZ soaring (2) inland. 4 MS at Eske. RN and K. along roadside. Other PB (9+3) and GP (13) further north and T. (2) along edge of field with lone WS (possibly injured) and both CA and H. observed in flight
WRS	2 km / 5 km	12	12	2018	SH, BZ, GP, HH	GP (along plateau), SH (alongside road) RN (3) and BZ (1 + 1) soaring. HH (male x 1) from roost site 08:37
PSS	10km	19	12	2018	PE, BZ, WG, GN, SN, K., RG, CG, CA, MA, MS, WS	Essan PE (2) juveniles chasing each other, BZ (1) hunting over hill. Nothing Tievetooey, CA (1+1+2+1), MA, MS (2), WS (2) on Derg. Dunragh WG & CG on lake, GN pair, SN over lake. Dunragh Lough Middle adult and juvenile K. seen hunting also whitewash and pellets. Lough Golagh RG calling, SN calling after dark, WG (heard calling at dusk from south, not seen
PSS	5km	19	12	2018	WS, MA, H., RN, HH, BZ	Lough Cuill WS (2), MA (3), H. (1), RN (2). No sightings Croaghanenaia. RN L. Sallagh. Clogher Hill HH juvenile hunting tops of conifers, dropped into forest out of sight, H. flying, BZ gliding towards Lough Sallagh, RN(2) flying

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
						either side of road. Maheralough RN flying and no sightings on Lough Boyle
PSS	5km	21	12	2018	RG	RG calling at L. Mulreaw and L. Golagh
PSS	5 km / 10km	31	12	2018	RG, SN, WS, GP, SH, WE	RG calling and 2 SN flew past. WS flew towards foraging site along river, GP seen over plateau and SH male hunting along hedge / road. WE seen near Site entrance
PSS	10km	22	1	2019	WS, CA, TU, MS, MA, CA, TU	No sightings Kellys Island. Lough Derg WS(4) 2 adult, 2 juveniles on lough. MS (2), MA (4), CA (1) and TU (3)
PSS	500m / 2km / 5km / 10km	23	1	2019	H., WN, MA, MS, RD, CM, RN, GP	L. Eske - H. (1+1), WN(3), MA(5),MA (2), MA (3), MA (4), MS(2), MS (2A) RD (1) and CM(8). RN(2) flying at Croaghmeen, RN(1) flying through the Gap, RN(7) flying over L. Mourne and GP heard calling
PSS	2 km / 5 km / 10 km / >10 km	25	1	2019	RN, GP, EA, ML, MA, CA, PE	RN (2 + 2 + 1) calling and tumbling, GP (17 + 9) circling around ridge. ML (across road). EA (juvenile) seen heading north. RN (4 + 2) north of Eske and CA seen flying east towards Site. RN (3 parties along Gap). PE perched on crag (ringed)
PSS	500m / 2km / 5km / 10km / 20km	27	1	2019	SS, GP, MS, WS, BG, LB, CU, T., OC, H., HG, GB, PB, CM, RK, MA, WN, BZ, PE	MS(6), WS juvenile BG(18), CU(3), LB(1), GP (3 + 17), OC(5), SS (3+4+3), WN(5), H. (1), MA(3), MS(2), H. (1), MA (2), WN (3), MA (7), PB (7), BZ (1), CM (3), GB (2), HG (2), RK (2&2), PE perched on mud
PSS	5km / 10km	29	1	2019	LB, MA, MS, CM, H., LG, HH, GN	LB, H. Lough Mourne nothing on Lough Allive, 4 MA on L. Eske, 2 MA, 2GN and 2 MS all on water on L. Eske, additional MA and 2 MA, 3LB, H. x 2, 1 LG, 1 LG. Male HH hunting to the east low level
PSS	5km / 10km	29	1	2019	GP, RN, SN, BZ, MA	GP (60) flying, RN flying, SN calling, 17:49 - SN calling. BZ pair circling separately. MA heard
PSS	5km / 10km	29	1	2019	RN, GP, BZ	No sightings Mulreavy, Sallagh, Finmore Hill, Lough Cuill, Clogher Hill, 12GP and 2RN near Binna Hill. BZ circling over forest x 2
PSS	500m / 2km	30	1	2019	RN, WK, SH	15:11 - RN flying over Croaghmeen, 15:12 - RN seen again. WK flew along track and short time later SH.
PSS	10km / >10km	31	1	2019	RN, CA, MA, TU, WS	L. Derg CA (2) flying over lough, MA (2), TU (2). RN flying at Crocknacunny. L. Derg again to dusk WS heard calling after dark from east / north-east

Survey Type	Survey Area	Day	Month	Year	Species detected	Notes
PSS	500m / 2km	18	2	2019	WS, RG, SN	3 WS on Golagh. No swan sightings Nabrackboy, Maweelagh, Naleaghany, Cullionboy. RG and SN seen near track
PSS	500m	20	2	2019	RN, GP, H., MA, WN	RN 5 sightings Barnesmore, Gap, Lough Mourne MA (5), WN (3) and GP heard calling, H. along edge
PSS	500m / 2km	20	2	2019	EA, RN	13:55 EA blue / white tags. 15:20 RN
PSS	500m / 2km	26	2	2019	RG, RZ, GP	8 different RG encountered. RZ seen near usual site. GP (12).
PSS	5km / 10km	27	2	2019	CA, WS, GP, EA	Early watch at Lough Eske / Edergole - no swans / geese. CA flying across lake and WS (6) seen moving north through Gap and GP (3 flocks over ridgeline) with EA brief sighting flying east
PSS	10km / >10km	28	2	2019	WG, H., GP	WG (9) flew north at 08:19; H. perched up along edge and GP (23) circling