APPENDIX 7-2

BIRD SURVEY RESULTS – BREEDING SEASON 2019

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Bird Survey Report Breeding Season 2019

BIRD SURVEY REPORT

BREEDING SEASON 2019

Seven Hills Wind Farm Phase I and II

Prepared for: Seven Hills Wind Farm Ltd

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1.0 Introduction

SLR Consulting Ireland (SLR) was commissioned by Seven Hills Wind Farm Ltd. in April 2019 to carry out a breeding bird survey programme for the proposed Seven Hills Wind Farm Phases I and II during the breeding season in 2019. There are two phases within the current iteration of the wind farm design, hereafter referred to as Wind Farm I and Wind Farm II.

1.1 Background to the Commission

Planning permission was originally granted by An Bord Pleanála (ABP) for both of these developments (Phase 1 ABP Planning Ref: PL 20.244346 / 20.239759; Phase 2 ABP Planning Ref: PL 20.244347 / 241069), it was subsequently refused following the appeal process. The main reasons for refusal of planning for each of the developments cited by An Bord Pleanála are the issues relating to the lack of certainty in relation to the impact of the proposed development on European Sites in the vicinity of the proposed developments and the qualifying interests for which those European Sites are designated.

1.2 Site Description

The dominant habitat within the boundaries of the proposed Seven Hills Wind Farm I development site is improved agricultural grassland and the site is not designated for nature conservation.

The proposed Seven Hills Wind Farm II development site is a slightly more diverse area in terms of habitat composition with dominant habitats present being improved agricultural grassland, dry calcareous grassland and scrub. The site also does not hold any designations for nature conservation.

There are several Natura 2000 designated sites relating to birds of conservation concern located in 15km of each site. Please see Table 3-1 for further details of these.

1.3 Purpose of the Report

The aim of this report is to provide robust baseline ornithological survey data for the breeding period 2019 at both phases of the proposed wind farm. These data will be used to inform the ecological impact assessment and appropriate assessment for the proposed wind farm. The assessment of potential impacts is beyond the scope of this report.

2.0 Methodology

2.1 Desk-based Review

The majority of available data on both proposed wind farm sites relates to wintering birds with limited previous data available on breeding birds. The desk-based review collated all the available information to date on the breeding birds in and around the proposed wind farm development sites. This included a review of the following EIS documents submitted as part of the planning application:

- Proposed Seven Hills Windfarm Site: Ornithological Assessment Report June 2010. Forest, Environmental Research and Services Ltd. Included as Appendix 8.1 of the EIS (FERS, 2010); and
- Proposed Seven Hills Wind Farm (Phase II): Ornithological Assessment Report July 2011. Forest, Environmental Research and Services Ltd. Included as Appendix 8.1 of the EIS (FERS, 2011).

The websites of the National Parks and Wildlife Service (NPWS) www.npws.ie and the National Biodiversity Data Centre (NBDC) http://maps.biodiversityireland.ie/#/Map were accessed for information on sites designated for nature conservation.

2.2 Field Surveys

The scope of breeding bird surveys for the proposed wind farm is based on recommendations given in Scottish Natural Heritage (SNH) 2017[1]. This survey methods guidance is recognised as standard best practice guidance through the UK and Ireland for surveying birds to inform impact assessment of onshore wind farms.

2.2.1 Field Survey Team: Evidence of Technical Competence and Experience

Sarah Ingham (SI) – Project Manager and Lead Ornithologist

Sarah is a Senior Ecologist with SLR and holds a BSc in Zoology from Anglia Ruskin University, Cambridge, UK and an MSc in Biodiversity and Conservation from Trinity College Dublin. She is an Associate member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Sarah is a highly skilled and experienced bird surveyor with 11 years' post graduate experience as a professional consultant ecologist/ornithologist. Sarah managed this project through liaison with the client, coordination of the survey team, supervision of the health and safety of the team, carrying out various bird surveys onsite throughout the survey season, collating, quality controlling and assessing the survey data and writing this report.

Daniel Hulmes (DH) – Bird Surveyor

Daniel is a Senior Field Ornithologist and Terrestrial Ecologist. He has worked on a wide range of projects involving the survey and monitoring of birds in the UK, Ireland and internationally. Furthermore, as part of his previous work as an Ecologist, he gained experiencing in managing projects which included a large amount of report writing, survey planning and client interaction.

Supervised by Sarah Ingham, Daniel assisted with bird surveys at Seven Hills Wind Farm during the breeding 2019 survey season.

Daniel Alexander (DA) –Bird Surveyor

Daniel has been working as a field surveyor on numerous projects for the last ten years. During this time, he has gained a breadth of experience conducting, planning, and supporting ecological surveys. Daniel has expertise in undertaking bird surveys, both breeding and wintering, and in recent years has been responsible for monitoring the breeding bird assemblage of a large ecological restoration project as part of the Mersey Gateway Project in

[1] SNH (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms*. Version 2.

the UK. During this work, Daniel gained experience in drafting ecological reports and digitising data for map creation.

Daniel now works for SLR as a Project Ecologist. Supervised by Sarah Ingham, Daniel assisted with bird surveys at Seven Hills Wind Farm during the breeding 2019 survey season.

Ciaran Cronin PDip. (CC) – Bird Surveyor

Ciaran Cronin is a professional ecologist with over 30 years' experience in identifying animals and plants in Ireland and the UK. Since 2008 he has operated as a freelance ecological consultant, undertaking fieldwork to inform Ecological Impact Assessments. Ciaran possesses a wide ranging and very significant expertise in applying scientific methods, conducting surveys and reporting using best practice and an evidence-based approach.

Ciaran worked as an independent sub-consultant bird surveyor on this project.

2.2.2 Flight Activity Surveys

Vantage point (VP) locations were the same as those used in winter 2018-19, which were initially chosen based on locations used during previous surveys (see Section 3.1). The adequacy of these VPs was checked by carrying out a desk-based viewshed analysis using a bespoke GIS tool for calculating the visible area from each vantage point (VP). The Zones of Theoretical Visibility (ZTV) from each VP were calculated using ArcMAP 10.5.1 Spatial Analyst. The ZTVs were calculated with a surface offset of 30m and from a viewing height of 1.8m above ground level. The terrain model was derived from EU-DEM data with a vertical accuracy of ± 7m. VP locations and viewing arcs are shown in Figure 1 and VP viewsheds are shown in Figure 2. The proposed site layout is also shown in Figures 1 and 2.

A total of 36 hours of watches were undertaken at each of the six VP locations during the breeding season (monthly visits April - September inclusive) in 2019. This equates to a total of six hours per VP per month. The VP survey effort undertaken during the breeding season of 2019 is given below in Table 2-1.

Table 2-1: VP survey effort undertaken for VP at the Seven Hills Wind Farm I and II sites April 2019 to September 2019 (hrs : mins)

Month	WFI VP1	WFI VP2	WFII VP1	WFII VP2	WFII VP3	WFII VP4
April	6:00	6:00	6:00	6:00	6:00	6:00
May	6:00	6:00	6:00	6:00	6:00	6:00
June	6:00	6:00	6:00	6:00	6:00	6:00
July	6:00	6:00	6:00	6:00	6:00	6:00
August	6:00	6:00	6:00	6:00	6:00	6:00
September	6:00	6:00	6:00	6:00	6:00	6:00
Total hrs	**36:00**	**36:00**	**36:00**	**36:00**	**36:00**	**36:00**
VP grid locations (**Figure 1**)	587337 E 748665 N	585834 E 746017 N	588967 E 745061 N	587372 E 743512 N	590643 E 743279 N	592160 E 743701 N

It is good practice to ensure that where possible each monthly six-hour survey period should be split over more than a single day and spread across the day. As such, the six-hour survey periods were divided into three-hour blocks which were alternated across consecutive days e.g. on day 1, VP1 would be completed in the morning and VP2 would be completed in the afternoon and on day 2, VP2 would be completed in the morning and VP1 in the afternoon. In this way, it was possible to glean a clear picture of bird movements from each VP across the diurnal

period. Details of survey dates, times and observers are provided in Appendix I and a record of weather conditions during surveys is provided in Appendix II.

VP watches aimed to quantify the flight activity of primary and secondary target species (as defined in Section 2.2.2.1) within the study area.

The main purpose of VP watches is to collect data on primary target species that will enable estimates to be made of:

- The time spent flying over the site;
- The relative use by birds of different parts of the site;
- The proportion of flying time spent within the provisional upper and lower risk height limits as determined by the potential rotor diameter and rotor hub height; and
- Ultimately, the analysis of the potential risk of collision of birds with rotating turbines.

For each primary target species observation, the following details were recorded:

- Time of observation;
- Duration of flying bout;
- Species, age and sex (where determinable);
- Time spent within each height band and;
- Notes on observation.

In the absence of detailed information regarding turbine specifications at the time of undertaking the surveys, the recording height bands were determined based on the turbine specifications included in the previous application (tip height 135m, lowest rotor swept height 35m) plus a bit extra to allow some flexibility. Flight heights were therefore attributed to three distinct height bands as follows:

- 1 = < 30m (below the likely rotor swept area);
- 2 = 30m to 150m (the likely rotor swept area);
- 3 = > 150m (above the likely rotor swept area).

In addition, a summary of observations of secondary target species (see Section 2.2.2.1) was recorded at the end of each five-minute period during each VP watch to provide an index of flight activity for secondary target species within the site, in accordance with current SNH guidance. Data collected on secondary species included:

- The five-minute period start and end time;
- Species;
- Number of birds observed;
- If flying, the height band in which birds were observed flying;
- Whether birds were observed onsite, in the 500m buffer or beyond;
- Flight behaviour; and
- Notes on observation.

2.2.2.1 Target Species

Target species for the surveys were defined by legal and/or conservation status and vulnerability to impacts caused by wind turbines, as defined in SNH Guidance (2017).

Primary Target Species

The list of primary target species was limited to species upon which effects are most likely to be potentially significant in EIA terms, thereby enabling recording to focus on the species of greatest importance.

SNH guidelines state that "*in most circumstances the target species will be limited to those species which are afforded a higher level of legislative protection*." Kestrel, buzzard and sparrowhawk are not subject to a higher level of legislative protection than any other bird species and were therefore not recorded as primary target species during the 2019 breeding season surveys.

Furthermore, primary target species were specifically limited to species upon which effects are most likely to be potentially significant in EIA terms, e.g. breeding species forming qualifying features for nearby SPAs or species listed on Annex I of the Birds Directive.. This enabled recording to focus on the species of greatest importance without the distraction of having to record detailed flight data for a larger number of more common species. A precautionary approach was taken to the inclusion of Annex 1 species as primary target species with all Annex 1 raptor/owl species with any realistic potential to be present included as primary target species, although it was recognised that the likelihood of some of these species breeding in the vicinity of the sites was very low. As such, the primary target species for these VP surveys included the following bird species:

- peregrine falcon *Falco peregrinus*;
- hen harrier *Circus cyaneus;*
- merlin *Falco columbarius;*
- short-eared owl *Asio flammeus*;
- golden plover *Pluvialis apricaria;* and
- curlew *Numenius arquata.*

Although curlew is not listed under Annex I of the Birds Directive, they are Red-listed in Ireland under the Birds of Conservation Concern 2014-2019 (Colhoun and Cummins, 2013) as numbers of breeding pairs within the Irish landscape have suffered a serious decline in recent years. As such, any observations of curlew were also recorded as a target species during the summer months.

Secondary Target Species

Secondary target species included:

- Any other wildfowl and wader species;
- Buzzard *Buteo buteo;*
- Sparrowhawk *Accipiter nisus*;
- Kestrel *Falco tinnunculus;*
- Raven *Corvus corax*;
- Grey heron *Ardea cinerea;*
- Cormorant *Phalacrocorax carbo;* and
- Gulls *Larus sp*.

2.2.3 Breeding Wader Surveys

Breeding wader surveys followed methodology described in O'Brien and Smith (1992). The survey involved a walked transect to which covered all habitat potentially suitable for breeding waders within the wind farm site.

Following a desktop assessment, it was determined that given that Wind Farm I is dominated by improved agricultural grassland habitat, Wind Farm I is not suitable for breeding waders and breeding wader surveys were therefore not undertaken there. Conversely, parts of Wind Farm II comprises a mosaic of wet grassland and rough, semi- improved agricultural grassland which is more suited to breeding waders. As such, a walked transect was undertaken covering potentially suitable habitat within the Wind Farm II site and a 500m buffer zone. The same transect was repeated three times across the 2019 breeding season on 19 April, 16 May and 26 June.

The location, movement and behaviour of all wader species were recorded onto the field maps using standard BTO species codes. The following criteria was recorded for each species:

- Lapwing *Vanellus vanellus* – the total numbers of birds seen from the transect;

- Snipe *Gallinago gallinago* – the number of drumming plus chipping birds heard or seen from the transect; and
- Other species – the number of pairs (where 'pairs' = (paired individuals/2), displaying birds, nests or broods and other single birds not in flocks).

Please see Figure 4 for an outline of the walked transect and the results of the surveys. Metadata relating to these surveys are available in Appendices I and II.

2.2.4 Breeding Raptor Surveys

The survey methodology for breeding raptors used a driven transect with regular stops, to carry out watches of suitable habitat from appropriate viewpoints to identify potential nesting territories. A total of seven stops were made along the driven transect around both wind farm sites overlooking potentially suitable breeding habitat.

A driven survey was used due to limitations to access to third party land within the 2 km buffer zone and the availability of a good road network in the vicinity of the site. It is also noted that suitable breeding habitat for Annex 1 raptors within the sites and 2 km buffer is very limited and visibility from the survey route was sufficient to cover the vast majority of potentially suitable breeding habitat within the survey area.

Suitable breeding habitat differs for each raptor species (Hardey *et al*., 2013) and was limited within the survey area. Table 2-2 presents the habitats within the 2km buffer zone of the sites and the locations of these, which were focused on during the breeding raptor survey for each species.

Table 2-2: Potentially suitable habitats for breeding raptors within the study area, the viewpoints the habitats can be seen from and the target raptor species which could be expected within these habitats.

Raptor Viewpoint No. (RVP)	Habitat type	Target raptor species
RVP1	Mixed deciduous woodland	Buzzard, sparrowhawk
RVP2; RVP3	Lowland heather moor	Hen harrier, merlin
RVP3; RVP5	Wet grassland with dense rush or bracken cover	Hen harrier
RVP6	Mature forestry plantation	Buzzard, sparrowhawk
RVP4	Quarries	Peregrine falcon, kestrel
RVP7	Rocky outcrops	Peregrine falcon, merlin, kestrel, buzzard

It is noted that the Cam Quarry lies adjacent to the Wind Farm II site to the north. Although the quarry faces could not be viewed from the driven transect, the quarry could be partially viewed from the R363 road to the north (RVP4). It is also noted that the airspace above the quarry lies within the viewshed of WFII VP1. If breeding peregrine falcons were present in the quarry, it is therefore expected that evidence would have been recorded during the breeding raptor survey and/or the VP surveys.

Survey timings followed those in Hardey *et al*. (2013), as per SNH guidelines. This survey was repeated along the same route monthly from April to July inclusive. The location, movement and behaviour of all raptor species were recorded onto the field maps using standard BTO species codes.

The outline of the driven survey route together with the locations of the viewpoints and the results of the surveys are presented in Figure 5. Please see Appendices I and II for metadata relating to these surveys.

2.3 Survey Limitations

As shown in Figure 2, a small area at the western end of Wind Farm I and two small areas within the 500m buffer zone for Wind Farm II were not within the 2km viewsheds from any of the VPs. All proposed turbine locations, plus the vast majority of the 500m buffer were visible from at least one VP however, and the gaps in coverage are therefore not considered to represent a significant limitation.

The majority of vantage point surveys were undertaken in optimal weather conditions. However, there were 15 hours out of the total of 216 during which the visibility was recorded as moderate i.e. 1-3km and two hours in which the visibility, at least in part, was recorded as poor (<1km but greater than 500m when survey would have been suspended). This comprises just 7.9% of the total survey season and in most cases all of the relevant 2km viewing arc was visible. As such, this does not significantly affect the validity of the data collected.

3.0 Results

3.1 Desk-based Review

3.1.1 Natura 2000 Sites

There are no Special Protection Areas (SPA) within the proposed wind farm sites. However, there are a total of five SPAs within a 15 km[2] radius of the survey area.

The five SPAs within 15km are shown in Table 3-1, which also shows the species of special conservation interest (SSCI) for each site. The majority of SSCIs for which these sites are designated are wintering species. As such, for the purposes of this report which deals specifically with breeding birds, SSCI which are only present during the wintering season have been excluded from Table 3-1.

Corncrake *Crex crex* is a SSCI of the Middle Shannon Callows SPA. Upon their arrival to suitable breeding habitat in Ireland following migration from sub-Saharan Africa, corncrake then become sedentary and site faithful, rarely if ever, moving from the habitat they have chosen for breeding (Duffy, 2018). As such, given that the Middle Shannon Callows SPA is situated 11.4km from the proposed wind farm sites, dedicated corncrake surveys were not deemed necessary. There is also a lack of suitable habitat for corncrake (hay meadows) within the proposed wind farm sites.

Table 3-1: SPAs within 15km of Seven Hills Wind Farms I and II and their qualifying interests (species present during the breeding period only)

Site Name	Site Code	Distance/ Direction from Site Boundary	Features of Interest
Lough Croan Turlough SPA	004139	1.5km north	• Shoveler *Anas clypeata* • Wetland and Waterbirds
River Suck Callows SPA	004097	1.7km west	• Wetland and Waterbirds
Four Roads Turlough SPA	004140	1.9km north	• Wetland and Waterbirds
Lough Ree SPA	004064	8km east	• Tufted Duck *Aythya fuligula* • Common Scoter *Melanitta nigra* • Common Tern *Sterna hirundo* • Black-headed Gull *Chroicocephalus ridibundus* • Wetland and Waterbirds
Middle Shannon Callows SPA	004096	11.4km southeast	• Corncrake *Crex crex* • Lapwing • Black-tailed Godwit *Limosa limosa* • Wetland and Waterbirds

3.1.2 Existing Site Data

To our knowledge, the only existing breeding season bird survey data available relating to the two proposed wind farm sites were collected on six site visits during the period April to June 2009 (FERS, 2010; FERS, 2011). Surveys

[2] 15 km is the distance typically applied when considering wildfowl ranging from roost sites to foraging sites.

involved a walkover survey on each date, although precise survey area boundaries are unclear. The ornithological assessment for Phase I reports that 28 species were recorded within the (Phase I) wind farm site and buffer zone (the size of the buffer zone is not stated), of which 21 showed evidence of breeding. These included four species defined as 'important' species[3], namely black-headed gull (red-listed), swallow *Hirundo rustica*, house sparrow *Passer domesticus* and starling *Sturnus vulgaris* (each amber-listed). Black-headed gull was not recorded as breeding within the site or buffer zone.

The ornithological assessment for Phase II reports that 57 species were recorded within the 'greater survey area', of which 53 showed evidence of breeding. The greater survey area is not defined but is thought to include both wind farm sites plus some of the surrounding area. 18 'important' species were recorded within the greater survey area including the red-listed species curlew, redshank *Tringa totanus* and black-headed gull and the amber listed mute swan *Cygnus olor*, teal *Anas crecca*, tufted duck, coot *Fulica atra*, snipe and kestrel. Of these, mute swan, teal, coot, curlew, snipe and redshank (a pair at Lough Feacle) showed evidence of breeding. A further nine amber listed passerine species were also recorded within the greater survey area.

3.2 Flight Activity Surveys

Flight lines of target species recorded at both wind farm sites throughout the breeding season are mapped in Figure 3.

3.2.1 Primary Target Species

3.2.1.1 Wind Farm I: Vantage Points 1 and 2

In total, one primary target species was recorded flying through the site during the six-month survey period. The target species is shown in Table 3-2 together with the total number of birds seen from both VPs and the total number of flights recorded.

Table 3-2: Target species and flights recorded from WFI VPs 1 and 2 - April to September 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Peregrine falcon	1	1
Total	**1**	**1**

A single sighting of peregrine falcon was the only one target species recorded at Wind Farm 1 throughout the 2019 breeding season. This male bird spent a total of 45 seconds of its flight in the likely rotor swept area of 30m to 150m.

3.2.1.2 Wind Farm II: Vantage Points 1 – 4

In total, two primary target species were recorded flying through the site during the six-month survey period. The primary target species are shown in Table 3-3 together with the total number of birds seen from both VPs and the total number of flights recorded.

[3] i.e. species listed on the red or amber lists of birds of conservation concern (Birdwatch Ireland) in place at that time.

Table 3-3: Primary target species and flights recorded from WFII VP1 – VP4 – April to September 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Peregrine falcon	2	2
Curlew	5	2
Total	**7**	**4**

The two sightings of peregrine were recorded in July and August, which is late in the peregrine breeding season and there were no sightings prior to this. No evidence indicative of breeding peregrine was recorded during the flight activity surveys and the levels of activity recorded during the flight activity surveys would be expected to be much greater if peregrine had bred within the quarry adjacent to VP1 in 2019. Both birds were recorded flying below the CRZ.

There was a single sighting of four curlew on passage through Wind Farm II in April and a further sighting of one curlew passing through the site in September. There were no further sightings of this species during the breeding season, suggesting that these birds were non-breeders (or birds which bred elsewhere) moving between waterbodies in the vicinity of the site.

3.2.2 Secondary Target Species

Summary details of the nine secondary target species recorded throughout the season at Wind Farm I are presented in Table 3-4.

Raven was the most abundantly recorded secondary target species at Wind Farm I with 30 observations and a total of 54 birds. The majority (76%) of these sightings were recorded from VP1 to the east of which this species was observed nesting in a stand of Scots pine.

In addition to peregrine, two secondary raptor species were recorded at Wind Farm I during the breeding season, namely buzzard and sparrowhawk. Five of the seven (71%) sightings of secondary raptor species recorded at Wind Farm I were observed at heights of less than 30m or greater than 150m, thus outside the likely rotor swept area.

Four species of gull were recorded through the season (black-headed gull *Chroicocephalus ridibundus*, lesser black-backed gull *Larus fuscus*, herring gull *Larus argentatus* and common gull *Larus canus*), with lesser black-backed gull being the most recorded (nine observations of 15 birds). There was a single observation of 15 lapwing (*Vanellus vanellus*) on passage through the site in September below the likely rotor swept area.

Table 3-4: Secondary target species and flights recorded from WFI VPs 1 and 2 - April to September 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Black-headed gull	2	1
Lesser black-backed gull	15	9
Herring gull	5	4
Common gull	4	1
Lapwing	15	1
Grey heron	1	1

Target Species	Total number of birds recorded	Total number of flights recorded
Buzzard	5	5
Sparrowhawk	2	2
Raven	54	30
Total	**89**	**53**

Similar to Wind Farm I, raven was the most abundantly recorded secondary species at Wind Farm II with 95 observations of 309 individuals. Flocks of between two and 18 birds were recorded as on passage between breeding sites, with several juveniles recorded within these flocks. This suggests that raven bred in the vicinity of the site.

There was a total of 12 observations of buzzard (n=13), 10 of kestrel and three of sparrowhawk recorded at Wind Farm II. These birds were either on passage through the site or hunting onsite with 98% of observation recorded as being below the likely rotor swept area.

There were three species of gull recorded through the season (black-headed gull, lesser black-backed gull and herring gull), with lesser black-backed being the most abundant gull (52 observations of 79 birds). Other secondary species recorded during the breeding season vantage point surveys at Wind Farm II were snipe *Gallinago gallinago* (n = 1), mallard *Anas platyrhynchos* (n = 18), common scoter *Melanitta nigra* (n = 1) and grey heron *Ardea cinerea* (n = 6).

Summary details of the 11 secondary target species recorded throughout the season at Wind Farm II are presented in Table 3-5.

Table 3-5: Secondary target species and flights recorded from WFII VPs 1 - 4 - April to September 2019

Target Species	Total number of birds recorded	Total number of flights recorded
Black-headed gull	47	24
Lesser black-backed gull	79	52
Herring gull	9	8
Common scoter	1	1
Mallard	18	2
Grey heron	6	6
Snipe	1	1
Buzzard	13	12
Kestrel	10	10
Sparrowhawk	3	3
Raven	309	95
Total	**496**	**214**

3.2.3 Breeding Wader Surveys

The wader walkover surveys at WF2 yielded very few records of possible breeding waders onsite with snipe being the only species observed, a total of four times within the 500m buffer of the site. Each of these sightings of snipe were recorded as the surveyors flushed the birds from their roosts within suitable breeding habitat. Given that these birds were flushed from suitable breeding habitat, it is possible that snipe were breeding within the vicinity, although no definitive behaviours indicative of breeding such as drumming or display flights, were recorded during the observations of snipe.

A single lapwing was observed from the transect, however, it was to the south of the 500m buffer and thus, outside the survey area.

Please see Figure 4 for locations of recorded sightings.

3.2.4 Breeding Raptor Surveys

A total of three species of raptor was recorded during the surveys. There was no raptor activity recorded during the April survey.

The majority of activity for the season was recorded during the May survey with two sightings of two pairs of buzzard recorded within the 2 km buffer to the north and northwest of WF1. The individuals in each pair were observed interacting with each other and engaging in courtship displays suggesting possible breeding within this area. The remaining sightings recorded during May were of single individual buzzard (n = 1), kestrel (n = 4) and sparrowhawk (n = 2) engaging in foraging and hunting behaviour.

Raptor activity in June was low with two sightings of kestrel, one of sparrowhawk and another sighting of a pair of buzzard engaged in display behaviour. There were no sightings of raptors during the survey in July.

There were no sightings of peregrine during these breeding raptor surveys throughout the entire 2019 breeding season.

Please see Figure 5 for locations of recorded sightings.

4.0 Conclusions

Records of primary target species at both wind farm sites during the 2019 breeding season were low, with peregrine falcon being the Annex I bird species recorded (three flights recorded at Wind Farms I and II combined). Curlew was the only other primary target species observed with two flights, of four birds and one bird, recorded at Wind Farm II.

The targeted breeding raptor surveys throughout the season yielded similarly low results. There were two probable buzzard breeding territories were identified to the north of Wind Farm I where two pairs of buzzard were observed in courtship display during May surveys. The absence of peregrine records during these surveys and the relatively low number of peregrine flights recorded during VP surveys suggest that breeding did not occur at the adjacent active quarry (or elsewhere within the 2km survey area) during the 2019 breeding season.

The four records of snipe during the walked breeding wader surveys showed no definitive behaviours indicative of breeding such as drumming or display flights. Although these birds were recorded within suitable breeding habitat, breeding territories could not be confirmed.

Direct comparison of survey results from 2019 with previous breeding season survey results from 2009 is difficult due to potential differences in the areas surveyed and the survey methods used. It is notable however that curlew, snipe and redshank were all recorded breeding within the 'greater survey area' in 2009 whereas there were only records for curlew (non-breeding) and snipe (in suitable habitat but no evidence of breeding recorded) in 2019 and no records of redshank in 2019. This could either indicate a decline in breeding wader populations since 2009 or it could simply reflect differences in the survey areas between years. No Annex I raptors were recorded breeding during either the surveys in 2009 or the surveys in 2019.

5.0 References

Colhoun and Cummins (2013) Birds of Conservation Concern in Ireland 2014–2019. Irish Birds 9: 523-544

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6.0 Figures

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

Lough Croon

Cuilleenirwon Lough

Curraghboy

Dysart

L2013 L2016 L2015 L2018 L2028 L2025

R357 R363 R362

County Roscommon

County Galway

N

LEGEND

Turbine Location

Site Infrastructure

Vantage Point

Vantage Points 2km View Arc

Ballyhaunis Castlerea Strokestown Newtownforbes Longford Edgeworthstown Roscommon Ballymahon Mountbellew Athlone Moate Ballinasloe Athenry Ferbane Cloghan Loughrea Banagher Kilcormac Clara Tullamore

0 1 2

Kilometres

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ORNITHOLOGY

SEVEN HILLS WIND FARM SUMMER BREEDING SEASON REPORT 2019

FIGURE 1 - VANTAGE POINT LOCATIONS AND VIEWING ARCS

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.00116.0 Vantage Point Locations and Viewing Arc - Breeding Season 2019

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

Lough Croan

Cuilleenirwon Lough

Curraghboy

Dysart

County Roscommon

County Galway

Shruh

L2013 L2016 L2015 L2018 L2028 L2025

R357 R363 R362

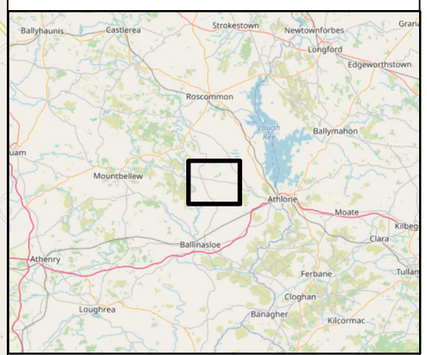
N

NOTE

1. The Zones of Theoretical Visibility (ZTV) was calculated using ArcMAP 10.5.1 Spatial Analyst. The ZTV is calculated with a surface offset 30m & from a viewing height of 1.8m above ground level. The terrain model is derived from EU-DEM data with a vertical accuracy of ± 7m.

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Site Infrastructure 1 km Buffer
- Vantage Point
- Distance of Viewing Arc
- Theoretical Visibility from Wind Farm 1 VP1
- Theoretical Visibility from Wind Farm 1 VP2
- Theoretical Visibility from Wind Farm 2 VP1
- Theoretical Visibility from Wind Farm 2 VP2
- Theoretical Visibility from Wind Farm 2 VP3
- Theoretical Visibility from Wind Farm 2 VP4



0 1 2

Kilometres

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SEVEN HILLS WIND FARM SUMMER BREEDING SEASON REPORT 2019

FIGURE 2 - VANTAGE POINT VIEWSHEDS

Scale: 1:35,000 @ A3

Date: MAY 2022

02036.00633.0034.0 Vantage Point Viewsheds

584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

Lough Croan

Cuilleenirwon Lough

Curraghboy

Dysart

L2013 L2016 L2015 L2018 L2028 L2025

R357 R362 R363

County Roscommon

County Galway

Sucka

N

LEGEND

Turbine Location

Site Infrastructure

Site Infrastructure 500 m Buffer

Species Recorded - 2019

Curlew

Peregrine

Ballyhaunis Castlerea Strokestown Newtownforbes Longford Edgeworthstown Roscommon Ballymahon Mountbellew Athlone Moate Ballinasloe Athenry Ferbane Clara Cloghan Loughrea Banagher Kilcormac

0 1 2

Kilometres

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FIGURE 3 - VANTAGE POINT SURVEY RESULTS

Scale 1:35,000 @ A3

Date MAY 2022

02036.00633.0019.0 Vantage Point Survey Results - Breeding Season 2019

588000 590000 592000

746000

744000

N

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 500 m Buffer
- Walked Transect

Breeding Wader Species

- (L) Lapwing
- (Sn) Snipe

WIND FARM 2

0 500 1,000
Metres

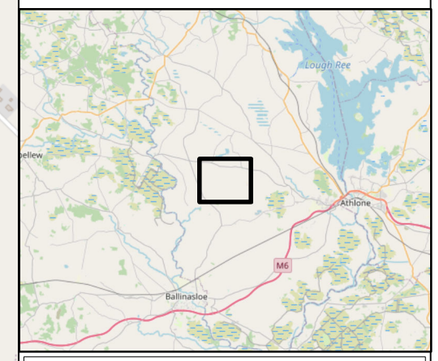

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FIGURE 4 - BREEDING WADER WALKED TRANSECT RESULTS

Scale 1:17,000 @ A3

Date MAY 2022

02036.00633.0017.0 Breeding Wader Transect Survey Results - Breeding Season 2019

582000 584000 586000 588000 590000 592000 594000

750000 748000 746000

WIND FARM 1

WIND FARM 2

RVP1 RVP2 RVP3 RVP4 RVP5 RVP6 RVP7

Lough Funshinagh Lough Croan Cullieenirwan Lough

Curraghboy Ballyforan

L2013 L2014 L2015 L2016 L2017 L2018 L2028 R357 R362 R363

N

LEGEND

- Turbine Location
- Site Infrastructure
- Site Infrastructure 2 km Buffer
- Driven transect
- Raptor Viewpoint Locations (Stopping Point)

Breeding Raptor species

- Bz Buzzard
- K Kestrel
- SH Sparrow hawk

0 1 2 Kilometres

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ORNITHOLOGY

SEVEN HILLS WIND FARM SUMMER BREEDING SEASON REPORT 2019

FIGURE 5 - BREEDING RAPTOR DRIVEN TRANSECT SURVEY RESULTS

Scale 1:40,000 @ A3

Date MAY 2022

02036.00633.0018.0 Breeding Raptor Driven Transect Survey Results - Breeding Season 2019

APPENDIX I

Survey dates, times and observers

Table AI-1: Details of VP surveys undertaken from Wind Farm I Vantage Point 1

Date	Surveyor	Start	End	Survey Duration
16/04/2019	DA	12:59	15:59	03:00
19/04/2019	DH	09:55	12:55	03:00
15/05/2019	CC	16:25	19:25	03:00
17/05/2019	CC	13:00	16:00	03:00
18/06/2019	SI	13:00	16:00	03:00
19/06/2019	SI	09:10	12:10	03:00
15/07/2019	SI	09:10	12:10	03:00
16/07/2019	SI	12:30	15:30	03:00
07/08/2019	SI	10:00	13:00	03:00
08/08/2019	SI	13:00	16:00	03:00
24/09/2019	LG	13:10	16:10	03:00
25/09/2019	LG	09:10	12:10	03:00
Total Hours				**36**

Table AI-2: Details of VP surveys undertaken from Wind Farm I Vantage Point 2

Date	Surveyor	Start	End	Survey Duration
10/04/2019	DH	09:30	12:30	03:00
17/04/2019	DA	13:03	16:03	03:00
15/05/2019	CC	12:55	15:55	03:00
17/05/2019	CC	09:30	12:30	03:00
19/06/2019	SI	13:00	16:00	03:00
19/06/2019	SI	16:30	19:30	03:00
15/07/2019	SI	13:00	16:00	03:00
16/07/2019	SI	08:50	11:50	03:00
07/08/2019	SI	13:30	16:30	03:00
08/08/2019	SI	09:00	12:00	03:00
24/09/2019	LG	10:00	13:00	03:00
25/09/2019	LG	12:30	15:30	03:00
Total Hours				**36**

Table AI-3: Details of VP surveys undertaken from Wind Farm II Vantage Point 1

Date	Surveyor	Start	End	Survey Duration
16/04/2019	DA	09:31	12:31	03:00
17/04/2019	DH	13:05	16:05	03:00
14/05/2019	CC	10:55	13:55	03:00
16/05/2019	CC	07:20	10:20	03:00
20/06/2019	SI	09:30	12:30	03:00
24/06/2019	SI	09:30	12:30	03:00
17/07/2019	SI	09:00	12:00	03:00
18/07/2019	SI	13:00	16:00	03:00
09/08/2019	SI	09:00	12:00	03:00
13/08/2019	SI	13:45	16:45	03:00
24/09/2019	SI	10:30	13:30	03:00
25/09/2019	SI	12:30	15:30	03:00
Total Hours				**36**

Table AI-4: Details of VP surveys undertaken from Wind Farm II Vantage Point 2

Date	Surveyor	Start	End	Survey Duration
17/04/2019	DA	09:30	12:30	03:00
19/04/2019	DH	13:45	16:45	03:00
14/05/2019	CC	14:25	17:25	03:00
16/05/2019	CC	16:45	19:45	03:00
20/06/2019	SI	13:00	16:00	03:00
24/06/2019	SI	13:00	16:00	03:00
17/07/2019	SI	13:00	16:00	03:00
18/07/2019	SI	08:55	11:55	03:00
09/08/2019	SI	12:30	15:30	03:00
13/08/2019	SI	10:00	13:00	03:00
29/09/2019	SI	13:45	16:45	03:00
30/09/2019	SI	09:45	12:45	03:00
Total Hours				**36**

Table AI-5: Details of VP surveys undertaken from Wind Farm II Vantage Point 3

Date	Surveyor	Start	End	Survey Duration
16/04/2019	DH	13:05	16:05	03:00
19/04/2019	DA	09:30	12:30	03:00
15/05/2019	CC	09:25	12:25	03:00
27/05/2019	CC	11:36	14:36	03:00
17/06/2019	CC	11:44	14:44	03:00
18/06/2019	CC	10:50	13:50	03:00
19/07/2020	SI	09:00	12:00	03:00
24/07/2019	SI	14:00	17:00	03:00
14/08/2019	SI	09:00	12:00	03:00
15/08/2019	SI	12:30	15:30	03:00
24/09/2019	SI	14:00	17:00	03:00
25/09/2019	SI	09:00	12:00	03:00
Total Hours				**36**

Table AI-6: Details of VP surveys undertaken from Wind Farm II Vantage Point 4

Date	Surveyor	Start	End	Survey Duration
10/04/2019	DH	13:30	16:30	03:00
17/04/2019	DH	09:25	12:25	03:00
14/05/2019	CC	07:25	10:25	03:00
27/05/2019	CC	15:06	18:06	03:00
17/06/2019	CC	08:14	11:14	03:00
18/06/2019	CC	07:15	10:15	03:00
19/07/2019	SI	13:00	16:00	03:00
24/07/2019	SI	10:00	13:00	03:00
14/08/2019	SI	13:00	16:00	03:00
15/08/2019	SI	08:45	11:45	03:00
29/09/2019	SI	09:15	12:15	03:00
30/09/2019	SI	13:15	16:15	03:00
Total Hours				**36**

Table AI-7: Details of breeding wader surveys undertaken at Wind Farm II during the 2019 bird breeding season

Date	Surveyor	Start	End	Survey Duration
19/04/2019	DH	08:00	12:00	4
16/05/2019	CC	10:25	14:25	4
26/06/2019	SI	08:00	12:00	4
Total Hours				**12**

Table AI-8: Details of breeding raptor surveys undertaken at Wind Farms I and II during the 2019 bird breeding season

Date	Surveyor	Start	End	Survey Duration
23/04/2019	DH	13:00	16:00	3
28/05/2019	CC	07:15	10:15	3
17/06/2019	CC	15:00	18:00	3
12/07/2019	SI	10:00	13:00	3
Total Hours				**12**

APPENDIX II

Weather Data

Table AII-1: Weather data collected during flight activity surveys undertaken at WFI VP1

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
16/04/2019	DA	12:59	15:59	1	2	SE	0	7	1	2	0	0	20
16/04/2019	DA	12:59	15:59	2	1	SE	0	7	1	2	0	0	20
16/04/2019	DA	12:59	15:59	3	2	SE	0	4	2	2	0	0	20
19/04/2019	DH	09:55	12:55	1	3		0	6	2	2	0	0	17
19/04/2019	DH	09:55	12:55	2	3		0	5	2	2	0	0	19
19/04/2019	DH	09:55	12:55	3	3		0	5	2	2	0	0	20
15/05/2019	CC	16:25	19:25	1	2	SE	0	4	2	2	0	0	21
15/05/2019	CC	16:25	19:25	2	2	SE	0	5	2	2	0	0	21
15/05/2019	CC	16:25	19:25	3	2	SE	0	7	2	2	0	0	19
17/05/2019	CC	13:00	16:00	1	2	E	0	7	2	2	0	0	16
17/05/2019	CC	13:00	16:00	2	2	E	0	7	2	2	0	0	19
17/05/2019	CC	13:00	16:00	3	2	E	0	7	2	2	0	0	19
18/06/2019	SI	13:00	16:00	1	1	SW	0	4	2	2	0	0	18
18/06/2019	SI	13:00	16:00	2	2	SW	0	3	2	2	0	0	16

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
18/06/2019	SI	13:00	16:00	3	1	SW	0	3	2	2	0	0	16
19/06/2019	SI	09:10	12:10	1	0	SW	1	8	1	1	0	0	13
19/06/2019	SI	09:10	12:10	2	0	SW	0	7	2	2	0	0	14
19/06/2019	SI	09:10	12:10	3	1	SW	3	8	1	1	0	0	13
15/07/2019	SI	09:10	12:10	1	0	E	0	2	2	2	0	0	16
15/07/2019	SI	09:10	12:10	2	0	E	0	2	2	2	0	0	16
15/07/2019	SI	09:10	12:10	3	0	E	0	2	2	2	0	0	16
16/07/2019	SI	12:30	15:30	1	1	W	0	1	2	2	0	0	19
16/07/2019	SI	12:30	15:30	2	1	W	0	0	NA	2	0	0	20
16/07/2019	SI	12:30	15:30	3	1	W	0	0	NA	2	0	0	21
07/08/2019	SI	10:00	13:00	1	1	W	0	6	2	2	0	0	17
07/08/2019	SI	10:00	13:00	2	1	W	0	5	2	2	0	0	18
07/08/2019	SI	10:00	13:00	3	1	W	0	3	2	2	0	0	18
08/08/2019	SI	13:00	16:00	1	2	E	0	2	2	2	0	0	20
08/08/2019	SI	13:00	16:00	2	3	E	0	3	2	2	0	0	20

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
08/08/2019	SI	13:00	16:00	3	3	E	0	3	2	2	0	0	20
24/09/2019	LG	13:10	16:10	1	3	SSE	1	8	1	2	0	0	17
24/09/2019	LG	13:10	16:10	2	3	SSE	0	8	1	2	0	0	17
24/09/2019	LG	13:10	16:10	3	2	SSE	1	7	1	2	0	0	17
25/09/2019	LG	09:10	12:10	1	1	SW	0	8	2	1	0	0	14
25/09/2019	LG	09:10	12:10	2	1	S	0	8	2	1	0	0	14
25/09/2019	LG	09:10	12:10	3	1	SW	1	8	1	1	0	0	16

Rain/ Precipitation

None 0
Drizzle 1
Light showers/snow 2
Heavy showers/snow 3
Heavy rain/snow 4

Cloud Cover

Expressed in oktas (n/8)

Cloud Height

Height of cloud above average height of viewshed
<150m 0
150-500m 1
>500m 2

Visibility

Poor (<1km) 0
Moderate (1-3km) 1
Good (>3km) 2

Lying Snow

None 0
On site 1
On higher ground 2

Frost

None 0
Ground 1
All day 2

Table AII-2: Weather data collected during flight activity surveys undertaken at WFI VP2

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
10/04/2019	DH	09:30	12:30	1	2	SW	0	8	2	2	0	0	9
10/04/2019	DH	09:30	12:30	2	2	SW	0	8	2	2	0	0	10
10/04/2019	DH	09:30	12:30	3	2	SW	0	5	2	2	0	0	12
17/04/2019	DA	13:03	16:03	1	3	NW	0	8	2	2	0	0	
17/04/2019	DA	13:03	16:03	2	3	NW	0	7	2	2	0	0	
17/04/2019	DA	13:03	16:03	3	3	NW	0	6	2	2	0	0	
15/05/2019	CC	12:55	15:55	1	3	SE	0	4	2	2	0	0	20
15/05/2019	CC	12:55	15:55	2	3	SE	0	4	2	2	0	0	21
15/05/2019	CC	12:55	15:55	3	3	SE	0	3	2	2	0	0	24
17/05/2019	CC	09:30	12:30	1	2	E	0	5	2	2	0	0	14
17/05/2019	CC	09:30	12:30	2	2	E	0	5	2	2	0	0	15
17/05/2019	CC	09:30	12:30	3	2	E	0	4	2	2	0	0	16
19/06/2019	SI	13:00	16:00	1	2	SW	0	7	2	2	0	0	15
19/06/2019	SI	13:00	16:00	2	1	SW	0	6	2	2	0	0	15

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
19/06/2019	SI	13:00	16:00	3	1	SW	0	5	2	2	0	0	15
19/06/2019	SI	16:30	19:30	1	0	SW	0	7	2	2	0	0	16
19/06/2019	SI	16:30	19:30	2	0	SW	0	8	2	2	0	0	15
19/06/2019	SI	16:30	19:30	3	0	SW	0	8	2	2	0	0	15
15/07/2019	SI	13:00	16:00	1	0	NE	0	2	2	2	0	0	20
15/07/2019	SI	13:00	16:00	2	0	NE	0	2	2	2	0	0	20
15/07/2019	SI	13:00	16:00	3	0	NE	0	2	2	2	0	0	18
16/07/2019	SI	08:50	11:50	1	0	W	0	1	2	2	0	0	16
16/07/2019	SI	08:50	11:50	2	1	W	0	1	2	2	0	0	16
16/07/2019	SI	08:50	11:50	3	1	W	0	1	2	2	0	0	17
07/08/2019	SI	13:30	16:30	1	1	W	2	4	2	2	0	0	18
07/08/2019	SI	13:30	16:30	2	1	W	2	4	2	2	0	0	19
07/08/2019	SI	13:30	16:30	3	1	W	2	5	2	2	0	0	19
08/08/2019	SI	09:00	12:00	1	2	NE	0	2	2	2	0	0	15
08/08/2019	SI	09:00	12:00	2	2	NE	0	2	2	2	0	0	15

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
08/08/2019	SI	09:00	12:00	3	2	NE	0	2	2	2	0	0	15
24/10/2019	LG	10:00	13:00	1	2	S	0	4	1	2	0	0	15
24/10/2019	LG	10:00	13:00	2	2	S	0	6	1	2	0	0	16
24/10/2019	LG	10:00	13:00	3	2	S	0	8	1	2	0	0	16
25/10/2019	LG	12:30	15:30	1	2	SSW	0	8	1	1	0	0	16
25/10/2019	LG	12:30	15:30	2	2	SSW	0	8	1	1	0	0	17
25/10/2019	LG	12:30	15:30	3	2	SSW	1	8	0	0	0	0	16

Rain/ Precipitation

None 0
Drizzle 1
Light showers/snow 2
Heavy showers/snow 3
Heavy rain/snow 4

Cloud Cover

Expressed in oktas (n/8)

Cloud Height

Height of cloud above average height of viewshed
<150m 0
150-500m 1
>500m 2

Visibility

Poor (<1km) 0
Moderate (1-3km) 1
Good (>3km) 2

Lying Snow

None 0
On site 1
On higher ground 2

Frost

None 0
Ground 1
All day 2

Table AII-3: Weather data collected during flight activity surveys undertaken at WFII VP1

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
16/04/2019	DA	09:31	12:31	1	2	E	0	8	1	2	0	0	12
16/04/2019	DA	09:31	12:31	2	2	E	0	8	1	2	0	0	13
16/04/2019	DA	09:31	12:31	3	2	E	0	7	1	2	0	0	14
17/04/2019	DH	13:05	16:05	1	4	NE	0	6	2	2	0	0	12
17/04/2019	DH	13:05	16:05	2	2	NE	0	5	2	2	0	0	15
17/04/2019	DH	13:05	16:05	3	2	NE	0	4	2	2	0	0	14
14/05/2019	CC	10:55	13:55	1	2	SW	0	4	2	2	0	0	19
14/05/2019	CC	10:55	13:55	2	2	SW	0	5	2	2	0	0	20
14/05/2019	CC	10:55	13:55	3	3	S	0	3	2	2	0	0	20
16/05/2019	CC	07:20	10:20	1	2	E	0	8	2	2	0	0	13
16/05/2019	CC	07:20	10:20	2	2	E	0	8	1	2	0	0	13
16/05/2019	CC	07:20	10:20	3	2	E	0	8	1	2	0	0	14
20/06/2019	SI	09:30	12:30	1	0	S	0	3	0	2	0	0	13
20/06/2019	SI	09:30	12:30	2	0	S	0	3	0	2	0	0	14

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
20/06/2019	SI	09:30	12:30	3	0	S	0	3	0	2	0	0	14
24/06/2019	SI	09:30	12:30	1	0	E	0	3	0	2	0	0	12
24/06/2019	SI	09:30	12:30	2	0	E	0	4	0	2	0	0	13
24/06/2019	SI	09:30	12:30	3	0	E	0	4	0	2	0	0	15
17/07/2019	SI	09:00	12:00	1	2	NW	0	8	1	1	0	0	15
17/07/2019	SI	09:00	12:00	2	1	NW	0	8	1	2	0	0	15
17/07/2019	SI	09:00	12:00	3	1	NW	0	8	1	1	0	0	15
18/07/2019	SI	13:00	16:00	1	0	W	0	3	2	2	0	0	17
18/07/2019	SI	13:00	16:00	2	1	W	0	3	2	2	0	0	18
18/07/2019	SI	13:00	16:00	3	0	W	0	2	2	2	0	0	18
09/08/2019	SI	09:00	12:00	1	3	SE	2	8	2	2	0	0	15
09/08/2019	SI	09:00	12:00	2	3	SE	0	8	2	2	0	0	16
09/08/2019	SI	09:00	12:00	3	3	SE	0	8	2	2	0	0	17
13/08/2019	SI	13:45	16:45	1	2	N	0	7	2	2	0	0	16
13/08/2019	SI	13:45	16:45	2	3	S	2	8	2	2	0	0	16

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
13/08/2019	SI	13:45	16:45	3	2	S	0	7	2	2	0	0	16
24/09/2019	SI	10:30	13:30	1	3	SW	0	3	1	2	0	0	15
24/09/2019	SI	10:30	13:30	2	4	SW	0	6	1	2	0	0	15
24/09/2019	SI	10:30	13:30	3	2	SW	1	8	1	2	0	0	15
25/09/2019	SI	12:30	15:30	1	1	SW	0	7	1	2	0	0	14
25/09/2019	SI	12:30	15:30	2	1	SW	2	8	1	2	0	0	13
25/09/2019	SI	12:30	15:30	3	1	SW	0	8	1	2	0	0	13

Rain/ Precipitation		**Cloud Cover**	**Visibility**	**Lying Snow**	**Frost**
None	0	Expressed in oktas (n/8)	Poor (<1km) 0	None 0	None 0
Drizzle	1	**Cloud Height**	Moderate (1-3km) 1	On site 1	Ground 1
Light showers/snow	2	Height of cloud above	Good (>3km) 2	On higher ground 2	All day 2
Heavy showers/snow	3	average height of viewshed			
Heavy rain/snow	4	<150m 0			
		150-500m 1			
		>500m 2			

Table AII-4: Weather data collected during flight activity surveys undertaken at WFII VP2

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
17/04/2019	DA	09:30	12:20	1	0	S	0	2	0	2	0	0	18
17/04/2019	DA	09:30	12:20	2	0	S	0	2	0	2	0	0	17
17/04/2019	DA	09:30	12:20	3	0	E	0	4	0	2	0	0	18
19/04/2019	DA	13:22	14:55	1	2	E	0	7	1	2	0	0	15
19/04/2019	DA	13:22	14:55	2	0	S	0	3	0	2	0	0	18
19/04/2019	DA	13:22	14:55	3	0	S	0	3	0	2	0	0	18
14/05/2019	CC	14:25	17:25	1	0	E	0	3	0	2	0	0	18
14/05/2019	CC	14:25	17:25	2	0	E	0	4	0	2	0	0	17
14/05/2019	CC	14:25	17:25	3	2	S	2	8	1	2	0	0	16
16/05/2019	CC	16:45	19:45	1	2	S	1	8	1	2	0	0	17
16/05/2019	CC	16:45	19:45	2	2	S	0	7	1	2	0	0	17
16/05/2019	CC	16:45	19:45	3	1	W	0	4	2	2	0	0	15
20/06/2019	SI	13:00	16:00	1	1	W	0	4	2	2	0	0	15
20/06/2019	SI	13:00	16:00	2	1	W	0	3	2	2	0	0	16

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
20/06/2019	SI	13:00	16:00	3	4	SE	0	7	2	2	0	0	17
24/06/2019	SI	13:00	16:00	1	4	SE	2	7	2	2	0	0	18
24/06/2019	SI	13:00	16:00	2	4	SE	0	7	2	2	0	0	19
24/06/2019	SI	13:00	16:00	3	2	S	0	7	2	2	0	0	14
17/07/2019	SI	13:00	16:00	1	2	N	2	8	2	2	0	0	14
17/07/2019	SI	13:00	16:00	2	2	N	0	7	2	2	0	0	15
17/07/2019	SI	13:00	16:00	3	1	S	0	8	1	1	0	0	10
18/07/2019	SI	08:55	11:55	1	1	S	2	8	1	1	0	0	10
18/07/2019	SI	08:55	11:55	2	1	S	4	8	1	1	0	0	10
18/07/2019	SI	08:55	11:55	3	2	E	0	7	1	2	0	0	15
09/08/2019	SI	12:30	15:30	1	0	S	0	3	0	2	0	0	18
09/08/2019	SI	12:30	15:30	2	0	S	0	2	0	2	0	0	18
09/08/2019	SI	12:30	15:30	3	0	S	0	2	0	2	0	0	17
13/08/2019	SI	10:00	13:00	1	0	E	0	4	0	2	0	0	18
13/08/2019	SI	10:00	13:00	2	0	E	0	3	0	2	0	0	18

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
13/08/2019	SI	10:00	13:00	3	0	E	0	4	0	2	0	0	17
30/09/2019	SI	09:45	12:45	1	2	S	2	8	1	2	0	0	16
30/09/2019	SI	09:45	12:45	2	2	S	1	8	1	2	0	0	17
30/09/2019	SI	09:45	12:45	3	2	S	0	7	1	2	0	0	17

Rain/ Precipitation		**Cloud Cover**		**Visibility**		**Lying Snow**		**Frost**	
None	0	Expressed in oktas (n/8)		Poor (<1km)	0	None	0	None	0
Drizzle	1	**Cloud Height**		Moderate (1-3km)	1	On site	1	Ground	1
Light showers/snow	2	Height of cloud above		Good (>3km)	2	On higher ground	2	All day	2
Heavy showers/snow	3	average height of viewshed							
Heavy rain/snow	4	<150m	0						
		150-500m	1						
		>500m	2						

Table AII-5: Weather data collected during flight activity surveys undertaken at WFII VP3

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
16/04/2019	DH	13:05	16:05	1	1	NE	0	4	2	2	0	0	13
16/04/2019	DH	13:05	16:05	2	1	NE	0	6	2	2	0	0	13
16/04/2019	DH	13:05	16:05	3	2	NE	0	6	2	2	0	0	12
19/04/2019	DA	09:30	12:20	1	0	SW	0	0		1	0	0	12
19/04/2019	DA	09:30	12:20	2	0	SW	0	1	2	2	0	0	12
19/04/2019	DA	09:30	12:20	3	1	SW	0	2	2	2	0	0	12
15/05/2019	CC	09:25	12:25	1	3	SE	0	7	2	2	0	0	15
15/05/2019	CC	09:25	12:25	2	3	SE	0	7	2	2	0	0	16
15/05/2019	CC	09:25	12:25	3	3	SE	0	7	2	2	0	0	16
27/05/2019	CC	11:36	14:36	1	2	W	0	7	2	2	0	0	15
27/05/2019	CC	11:36	14:36	2	2	SW	0	7	2	2	0	0	15
27/05/2019	CC	11:36	14:36	3	3	SW	0	3	2	2	0	0	16
17/06/2019	CC	11:44	14:44	1	4	SW	0	5	2	2	0	0	14
17/06/2019	CC	11:44	14:44	2	4	SW	2	6	2	2	0	0	16
17/06/2019	CC	11:44	14:44	3	4	SW	0	6	2	2	0	0	17

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
18/06/2019	CC	10:50	13:50	1	3	W	0	4	2	2	0	0	16
18/06/2019	CC	10:50	13:50	2	3	W	0	5	2	2	0	0	17
18/06/2019	CC	10:50	13:50	3	3	W	0	4	2	2	0	0	17
19/07/2019	SI	09:00	12:00	1	1	S	0	3	2	2	0	0	13
19/07/2019	SI	09:00	12:00	2	1	S	0	3	2	2	0	0	14
19/07/2019	SI	09:00	12:00	3	1	S	0	4	2	2	0	0	14
24/07/2019	SI	14:00	17:00	1	0	SE	0	6	2	2	0	0	19
24/07/2019	SI	14:00	17:00	2	0	SE	0	6	2	2	0	0	20
24/07/2019	SI	14:00	17:00	3	0	SE	0	6	2	2	0	0	20
14/08/2019	SI	09:00	12:00	1	2	W	0	7	2	2	0	0	16
14/08/2019	SI	09:00	12:00	2	2	W	0	7	2	2	0	0	16
14/08/2019	SI	09:00	12:00	3	2	W	2	7	2	2	0	0	17
15/08/2019	SI	12:30	15:30	1	3	W	0	2	2	2	0	0	17
15/08/2019	SI	12:30	15:30	2	3	W	0	2	2	2	0	0	18
15/08/2019	SI	12:30	15:30	3	3	W	0	2	2	2	0	0	18

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
24/09/2019	SI	14:00	17:00	1	1	SE	0	7	1	2	0	0	15
24/09/2019	SI	14:00	17:00	2	1	SE	0	6	1	2	0	0	15
24/09/2019	SI	14:00	17:00	3	1	SE	0	6	1	2	0	0	15
25/09/2019	SI	09:00	12:00	1	1	SW	0	8	1	2	0	0	14
25/09/2019	SI	09:00	12:00	2	1	SW	0	8	1	2	0	0	14
25/09/2019	SI	09:00	12:00	3	2	SW	2	7	1	2	0	0	14

Rain/ Precipitation

None 0

Drizzle 1

Light showers/snow 2

Heavy showers/snow 3

Heavy rain/snow 4

Cloud Cover

Expressed in oktas (n/8)

Cloud Height

Height of cloud above average height of viewshed

<150m 0

150-500m 1

>500m 2

Visibility

Poor (<1km) 0

Moderate (1-3km) 1

Good (>3km) 2

Lying Snow

None 0

On site 1

On higher ground 2

Frost

None 0

Ground 1

All day 2

Table AII-6: Weather data collected during flight activity surveys undertaken at WFII VP4

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
17/04/2109	DH	09:25	12:25	1	3	NE	0	7	2	2	0	0	10
17/04/2109	DH	09:25	12:25	2	3	NE	0	8	2	2	0	0	11
17/04/2109	DH	09:25	12:25	3	3	NE	0	8	2	2	0	0	12
14/05/2019	CC	07:25	10:25	1	2	SW	0	6	2	2	0	0	11
14/05/2019	CC	07:25	10:25	2	2	S	0	5	2	2	0	0	14
14/05/2019	CC	07:25	10:25	3	2	S	0	4	2	2	0	0	18
27/05/2019	CC	15:06	18:06	1	2	SW	0	5	2	2	0	0	16
27/05/2019	CC	15:06	18:06	2	2	SW	0	6	2	2	0	0	16
27/05/2019	CC	15:06	18:06	3	2	SW	0	5	2	2	0	0	16
17/06/2019	CC	08:14	11:14	1	3	S	2	6	2	2	0	0	10
17/06/2019	CC	08:14	11:14	2	4	S	0	7	2	2	0	0	11
17/06/2019	CC	08:14	11:14	3	4	S	2	6	2	2	0	0	13
18/06/2019	CC	07:15	10:15	1	3	SW	0	4	2	2	0	0	13
18/06/2019	CC	07:15	10:15	2	3	SW	0	5	2	2	0	0	14

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
18/06/2019	CC	07:15	10:15	3	3	W	0	5	2	2	0	0	14
19/07/2019	SI	13:00	16:00	1	1	NW	0	4	2	2	0	0	18
19/07/2019	SI	13:00	16:00	2	1	NW	2	4	2	2	0	0	19
19/07/2019	SI	13:00	16:00	3	1	NW	0	4	2	2	0	0	19
24/07/2019	SI	10:00	13:00	1	0	S	0	7	2	2	0	0	17
24/07/2019	SI	10:00	13:00	2	0	S	0	7	2	2	0	0	17
24/07/2019	SI	10:00	13:00	3	0	S	0	6	2	2	0	0	18
14/08/2019	SI	13:00	16:00	1	1	W	0	6	2	2	0	0	17
14/08/2019	SI	13:00	16:00	2	1	W	0	6	2	2	0	0	17
14/08/2019	SI	13:00	16:00	3	2	W	0	6	2	2	0	0	17
15/08/2019	SI	08:45	11:45	1	3	W	0	3	2	2	0	0	16
15/08/2019	SI	08:45	11:45	2	3	W	0	3	2	2	0	0	16
15/08/2019	SI	08:45	11:45	3	3	W	0	2	2	2	0	0	17
30/09/2019	SI	13:15	16:15	1	1	S	4	8	0	0-1	0	0	10
30/09/2019	SI	13:15	16:15	2	2	S	3	8	0	1	0	0	10

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
30/09/2019	SI	13:15	16:15	3	2	S	2	8	0	1	0	0	10

Rain/ Precipitation		**Cloud Cover**		**Visibility**		**Lying Snow**		**Frost**	
None	0	Expressed in oktas (n/8)		Poor (<1km)	0	None	0	None	0
Drizzle	1	**Cloud Height**		Moderate (1-3km)	1	On site	1	Ground	1
Light showers/snow	2	Height of cloud above		Good (>3km)	2	On higher ground	2	All day	2
Heavy showers/snow	3	average height of viewshed							
Heavy rain/snow	4	<150m	0						
		150-500m	1						
		>500m	2						

Table AII-7: Weather data collected during the breeding wader surveys undertaken at WFII during the 2019 breeding season

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
19/04/2019	DH	08:00	12:00	1	1	SE	0	7	2	2	0	0	10
19/04/2019	DH	08:00	12:00	2	1	SE	0	7	2	2	0	0	10
19/04/2019	DH	08:00	12:00	3	1	SE	0	7	2	2	0	0	11
19/04/2019	DH	08:00	12:00	4	1	SE	0	6	2	2	0	0	13
16/05/2019	CC	10:25	14:25	1	2	E	0	8	2	2	0	0	13
16/05/2019	CC	10:25	14:25	1	2	E	0	8	2	2	0	0	13
16/05/2019	CC	10:25	14:25	1	2	E	0	8	2	2	0	0	15
16/05/2019	CC	10:25	14:25	1	2	E	0	8	2	2	0	0	17
26/06/2019	SI	08:00	12:00	1	2	W	1	8	2	2	0	0	12
26/06/2019	SI	08:00	12:00	2	2	W	1	8	2	2	0	0	14
26/06/2019	SI	08:00	12:00	3	2	W	1	8	2	2	0	0	15
26/06/2019	SI	08:00	12:00	4	2	W	1	8	2	2	0	0	16

Rain/ Precipitation		**Cloud Cover**	**Visibility**		**Lying Snow**		**Frost**	
None	0	Expressed in oktas (n/8)	Poor (<1km)	0	None	0	None	0
Drizzle	1	**Cloud Height**	Moderate (1-3km)	1	On site	1	Ground	1
Light showers/snow	2	Height of cloud above	Good (>3km)	2	On higher ground	2	All day	2

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
Heavy showers/snow 3 Heavy rain/snow 4			average height of viewshed <150m 0 150-500m 1 >500m 2										

Table AII-8: Weather data collected during the breeding raptor surveys undertaken at WFI and II during the 2019 breeding season

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°C)
23/04/2019	DH	13:00	16:00	1	1	N	2	7	2	2	0	0	11
23/04/2019	DH	13:00	16:00	2	1	N	2	7	2	2	0	0	11
23/04/2019	DH	13:00	16:00	3	1	N	0	7	2	2	0	0	12
28/05/2019	CC	07:15	10:15	1	3	S	0	7	2	2	0	0	15
28/05/2019	CC	07:15	10:15	2	3	S	0	7	2	2	0	0	15
28/05/2019	CC	07:15	10:15	3	3	S	0	7	2	2	0	0	16
17/06/2019	CC	15:00	18:00	1	2	W	0	3	2	2	0	0	15
17/06/2019	CC	15:00	18:00	2	2	W	0	3	2	2	0	0	15
17/06/2019	CC	15:00	18:00	3	2	W	0	3	2	2	0	0	16
12/07/2019	SI	10:00	13:00	1	3	W	0	2	2	2	0	0	15
12/07/2019	SI	10:00	13:00	2	3	W	0	2	2	2	0	0	16
12/07/2019	SI	10:00	13:00	3	3	W	0	2	2	2	0	0	16

Rain/ Precipitation		**Cloud Cover**	**Visibility**		**Lying Snow**		**Frost**	
None	0	Expressed in oktas (n/8)	Poor (<1km)	0	None	0	None	0
Drizzle	1	**Cloud Height**	Moderate (1-3km)	1	On site	1	Ground	1
Light showers/snow	2	Height of cloud above	Good (>3km)	2	On higher ground	2	All day	2

Date	Surveyor	Start	End	Survey Hour	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility	Snow	Frost	Temp (°c)
Heavy showers/snow 3 Heavy rain/snow 4			average height of viewshed <150m 0 150-500m 1 >500m 2										

APPENDIX III

Flight activity survey data

Primary Target Species

Table AIII-1: Primary target species flight activity data from WFI VP1

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Likely Rotor Swept Area (Y/N)
15/07/2019	SI		PE	1	M	Ad	10:05	45	Y

NB: There were no primary target species recorded from WFI VP 2 throughout the 2019 breeding season.

Table AIII-2: Primary target species flight activity data from WFII VP1

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Likely Rotor Swept Area (Y/N)
13/08/2019	SI	29	PE	1	F	Ad	14:07	60	N

Table AIII-3: Primary target species flight activity data from WFII VP2

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Likely Rotor Swept Area (Y/N)
17/04/2019	DA	9	CU	4	U	Ad	10:59	75	N

Table AIII-4: Primary target species flight activity data from WFII VP3

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Likely Rotor Swept Area (Y/N)
24/09/2019	SI	31	CU	1	U	Ad	14:17	60	N

Table AIII-5: Primary target species flight activity data from WFII VP4

Date	Surveyor	Flight ID	Species	Num. Birds	M/F	Age	Obs. Time	Flight time (s)	Likely Rotor Swept Area (Y/N)
24/07/2019	SI	28	PE	1	F	Ad	10:20	45	N

Secondary Target Species

Table AIII-1b: Secondary target species flight activity data from WFI VP1

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
16/04/2019	12:59	15:59	RN	3	13:00	Y
16/04/2019	12:59	15:59	RN	2	13:07	Y
16/04/2019	12:59	15:59	RN	5	13:29	Y
16/04/2019	12:59	15:59	RN	1	13:38	N
16/04/2019	12:59	15:59	RN	2	15:14	N
16/04/2019	12:59	15:59	RN	2	15:21	N
16/04/2019	12:59	15:59	CM	4	15:32	Y
15/05/2019	16:25	19:25	BZ	1	17:05	N
15/05/2019	16:25	19:25	LB	2	18:20	N
17/05/2019	13:00	16:00	LB	2	13:54	N
17/05/2019	13:00	16:00	LB	1	14:00	Y
17/05/2019	13:00	16:00	RN	4	14:10	N
17/05/2019	13:00	16:00	SH	1	15:00	N
17/05/2019	13:00	16:00	RN	2	15:00	N
17/05/2019	13:00	16:00	RN	3	15:55	N
18/06/2019	13:00	16:00	RN	1	15:05	N
18/06/2019	13:00	16:00	HG	1	15:25	N
18/06/2019	13:00	16:00	HG	2	15:30	N
19/06/2019	09:10	12:10	LB	1	09:55	N
15/07/2019	09:10	12:10	BZ	1	10:25	N
16/07/2019	12:30	15:30	RN	2	13:00	N
16/07/2019	12:30	15:30	HG	1	14:10	N
16/07/2019	12:30	15:30	RN	1	14:55	N
07/08/2019	10:00	13:00	RN	3	10:00	N
07/08/2019	10:00	13:00	H.	1	11:10	Y
07/08/2019	10:00	13:00	RN	1	11:50	N
08/08/2019	13:00	16:00	RN	3	14:05	N
24/09/2019	13:10	16:10	BZ	1	15:40	Y
25/09/2019	09:10	12:10	RN	1	09:10	Y
25/09/2019	09:10	12:20	L	15	09:20	N

Table AIII-2b: Secondary target species flight activity data from WFI VP2

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
10/04/2019	09:30	12:30	RN	1	12:05	Y
17/04/2019	13:03	16:03	RN	1	13:15	Y
17/04/2019	13:03	16:03	LB	2	13:54	Y
17/04/2019	13:03	16:03	RN	1	14:25	Y
17/04/2019	13:03	16:03	RN	1	14:28	N
17/04/2019	13:03	16:03	RN	1	14:37	N
17/04/2019	13:03	16:03	LB	3	14:48	N
17/04/2019	13:03	16:03	RN	1	14:53	Y
17/04/2019	13:03	16:03	RN	2	15:14	Y
17/04/2019	13:03	16:03	RN	1	15:35	N
17/04/2019	13:03	16:03	RN	2	15:52	Y
15/05/2019	12:55	15:55	SH	1	12:55	N
15/05/2019	12:55	15:55	LB	2	13:20	N
15/05/2019	12:55	15:55	LB	1	13:40	N
15/05/2019	12:55	15:55	BZ	1	14:55	Y
15/05/2019	12:55	15:55	BZ	1	15:00	N
15/05/2019	12:55	15:55	RN	1	15:00	N
17/05/2019	09:30	12:30	RN	3	09:45	N
17/05/2019	09:30	12:30	RN	2	09:55	N
17/05/2019	09:30	12:30	RN	1	10:40	N
17/05/2019	09:30	12:30	BH	2	10:40	N
17/05/2019	09:30	12:30	RN	4	12:00	N
19/06/2019	16:30	19:30	HG	1	17:00	N
15/07/2019	13:00	16:00	LB	1	13:35	N

Table AIII-3b: Secondary target species flight activity data from WFII VP1

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
17/04/2019	13:05	16:05	RN	1	13:20	N
17/04/2019	13:05	16:05	RN	1	13:40	N
17/04/2019	13:05	16:05	RN	1	13:50	N
17/04/2019	13:05	16:05	RN	1	14:15	N

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
17/04/2019	13:05	16:05	RN	1	14:30	N
17/04/2019	13:05	16:05	RN	1	14:50	N
17/04/2019	13:05	16:05	RN	1	15:00	N
17/04/2019	13:05	16:05	RN	1	15:10	N
17/04/2019	13:05	16:05	RN	1	15:25	N
17/04/2019	13:05	16:05	RN	1	15:35	N
17/04/2019	13:05	16:05	RN	2	15:55	N
16/04/2019	09:31	12:31	RN	1	09:51	Y
16/04/2019	09:31	12:31	RN	1	10:36	Y
16/04/2019	09:31	12:31	LB	1	10:38	Y
16/04/2019	09:31	12:31	RN	1	10:46	Y
16/04/2019	09:31	12:31	LB	1	10:57	N
16/04/2019	09:31	12:31	RN	1	11:46	N
16/04/2019	09:31	12:31	RN	1	12:25	Y
14/05/2019	10:55	13:55	LB	1	12:05	Y
14/05/2019	10:55	13:55	RN	1	12:10	N
14/05/2019	10:55	13:55	LB	1	12:20	N
14/05/2019	10:55	13:55	RN	2	12:20	N
14/05/2019	10:55	13:55	LB	5	12:25	N
14/05/2019	10:55	13:55	LB	2	12:25	Y
14/05/2019	10:55	13:55	LB	2	12:25	N
14/05/2019	10:55	13:55	RN	1	12:25	N
14/05/2019	10:55	13:55	RN	1	13:10	Y
14/05/2019	10:55	13:55	LB	1	13:20	Y
14/05/2019	10:55	13:55	LB	1	12:30	N
14/05/2019	10:55	13:55	LB	1	12:50	N
14/05/2019	10:55	13:55	RN	4	12:50	N
14/05/2019	10:55	13:55	LB	2	12:50	N
16/05/2019	07:20	10:20	RN	2	07:40	N
16/05/2019	07:20	10:20	RN	12 OR 14	07:55	N
16/05/2019	07:20	10:20	RN	6	08:35	N
16/05/2019	07:20	10:20	RN	2	09:00	N
16/05/2019	07:20	10:20	LB	2		N
16/05/2019	07:20	10:20	LB	1		Y

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
16/05/2019	07:20	10:20	RN	3	10:00	N
16/05/2019	07:20	10:20	RN	2	10:20	N
20/06/2019	09:30	12:30	RN	1	11:00	N
20/06/2019	09:30	12:30	RN	2	11:35	N
24/06/2019	09:30	12:30	LB	1	09:50	N
24/06/2019	09:30	12:30	BZ	1	11:15	N
17/07/2019	09:00	12:00	K.	1	09:30	N
17/07/2019	09:00	12:00	RN	2	09:45	N
17/07/2019	09:00	12:00	HG	1	10:20	N
17/07/2019	09:00	12:00	RN	1	11:05	N
18/07/2019	13:00	16:00	SN	1	14:00	N
13/08/2019	13:45	16:45	RN	2	14:20	N
13/08/2019	13:45	16:45	LB	1	15:10	N
13/08/2019	13:45	16:45	K.	1	16:20	N
24/09/2019	13:30	13:30	LB	1	12:25	N
25/09/2019	12:30	15:30	MA	10	12:40	N

Table AIII-4b: Secondary target species flight activity data from WFII VP2

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
19/04/2019	13:45	16:45	RN	1	14:40	N
19/04/2019	13:45	16:45	RN	2	15:10	N
19/04/2019	13:45	16:45	RN	3	15:35	Y
19/04/2019	13:22	14:55	LB	1	13:27	Y
19/04/2019	13:22	14:55	LB	1	14:13	Y
19/04/2019	13:22	14:55	RN	1	14:47	Y
17/04/2019	09:30	12:30	LB	1	10:06	Y
17/04/2019	09:30	12:30	LB	3	10:19	Y
17/04/2019	09:30	12:30	LB	2	11:02	N
17/04/2019	09:30	12:30	RN	2	11:57	N
14/05/2019	14:25	17:25	RN	5	15:05	N
14/05/2019	14:25	17:25	RN	3	15:15	Y
14/05/2019	14:25	17:25	LB	1	15:15	Y

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
14/05/2019	14:25	17:25	LB	2	16:10	Y
16/05/2019	16:45	19:45	RN	3	16:50	N
16/05/2019	16:45	19:45	RN	1	16:55	N
16/05/2019	16:45	19:45	SH	1	16:55	N
16/05/2019	16:45	19:45	RN	3	17:20	N
16/05/2019	16:45	19:45	LB	2	17:45	N
16/05/2019	16:45	19:45	RN	2	18:15	N
16/05/2019	16:45	19:45	RN	5	19:00	N
20/06/2019	13:00	16:00	K.	1	13:25	N
24/06/2019	13:00	16:00	HG	1	13:20	N
24/06/2019	13:00	16:00	RN	2	13:55	N
24/06/2019	13:00	16:00	RN	3	14:20	N
24/06/2019	13:00	16:00	RN	1	14:40	N
24/06/2019	13:00	16:00	HG	1	15:30	N
18/07/2019	08:55	11:55	BZ	1	09:10	N
18/07/2019	08:55	11:55	H.	1	09:35	N
18/07/2019	08:55	11:55	K.	1	10:30	N
09/08/2019	12:30	15:30	H.	1	13:15	N

Table AIII-5b: Secondary target species flight activity data from WFII VP3

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
16/04/2019	13:05	16:05	BH	1	13:15	N
16/04/2019	13:05	16:05	BH	3	13:25	N
16/04/2019	13:05	16:05	BH	3	13:50	N
16/04/2019	13:05	16:05	BH	4	14:00	N
16/04/2019	13:05	16:05	RN	1	14:20	Y
16/04/2019	13:05	16:05	RN	2	14:40	N
16/04/2019	13:05	16:05	BH	8	14:55	N
16/04/2019	13:05	16:05	RN	2	15:10	Y
16/04/2019	13:05	16:05	BH	3	15:15	N
16/04/2019	13:05	16:05	LB	1	15:30	Y
16/04/2019	13:05	16:05	BH	2	15:40	N

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
19/04/2019	09:30	12:30	BH	1	09:46	N
19/04/2019	09:30	12:30	BH	1	09:59	N
19/04/2019	09:30	12:30	LB	2	10:09	N
19/04/2019	09:30	12:30	BH	1	10:09	N
19/04/2019	09:30	12:30	BH	2	10:28	N
19/04/2019	09:30	12:30	BH	2	10:51	N
19/04/2019	09:30	12:30	MA	8	11:00	N
19/04/2019	09:30	12:30	BH	1	11:29	N
19/04/2019	09:30	12:30	BH	2	11:40	N
19/04/2019	09:30	12:30	RN	1	11:55	Y
19/04/2019	09:30	12:30	BH	2	11:56	N
19/04/2019	09:30	12:30	RN	1	12:14	N
19/04/2019	09:30	12:30	BH	2	12:20	Y
19/04/2019	09:30	12:30	RN	1	12:22	Y
19/04/2019	09:30	12:30	LB	1	12:27	Y
15/05/2019	09:25	12:25	LB	1	09:35	N
15/05/2019	09:25	12:25	RN	2	10:05	N
15/05/2019	09:25	12:25	LB	1	10:15	N
15/05/2019	09:25	12:25	RN	1	10:20	N
15/05/2019	09:25	12:25	H.	1		N
15/05/2019	09:25	12:25	LB	1	10:55	N
15/05/2019	09:25	12:25	RN	2	11:45	N
27/05/2019	11:36	14:36	LB	3	11:56	N
27/05/2019	11:36	14:36	LB	3	12:16	N
27/05/2019	11:36	14:36	RN	2	12:31	N
27/05/2019	11:36	14:36	RN	3	13:21	Y
27/05/2019	11:36	14:36	RN	8	13:26	Y
27/05/2019	11:36	14:36	RN	3	14:01	N
17/06/2019	11:44	14:44	SH	1	12:14	N
17/06/2019	11:44	14:44	RN	1	12:39	N
17/06/2019	11:44	14:44	RN	2	12:49	N
17/06/2019	11:44	14:44	BH	1	13:24	N
17/06/2019	11:44	14:44	BH	1	13:44	N
17/06/2019	11:44	14:44	RN	1	14:04	N

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
17/06/2019	11:44	14:44	BH	1	14:29	N
18/06/2019	10:50	13:50	BH	1	10:50	N
18/06/2019	10:50	13:50	BH	1	11:05	N
18/06/2019	10:50	13:50	RN	18	12:40	Y
18/06/2019	10:50	13:50	BZ	1	12:40	Y
18/06/2019	10:50	13:50	RN	18	12:45	Y
18/06/2019	10:50	13:50	BZ	1	12:45	Y
18/06/2019	10:50	13:50	BZ	1	13:15	N
19/07/2019	09:00	12:00	BZ	1	09:25	N
19/07/2019	09:00	12:00	LB	1	09:50	N
19/07/2019	09:00	12:00	LB	1	10:15	N
19/07/2019	09:00	12:00	H.	1	11:05	N
19/07/2019	09:00	12:00	SH	1	11:40	N
24/07/2019	14:00	17:00	H.	1	14:20	N
24/07/2019	14:00	17:00	HG	2	15:05	N
24/07/2019	14:00	17:00	RN	5	15:40	N
24/07/2019	14:00	17:00	K.	1	16:45	N
14/08/2019	09:00	12:00	K.	1	11:05	N
14/08/2019	09:00	12:00	RN	2	11:30	N
15/08/2019	12:30	15:30	K.	1	13:15	N
15/08/2019	12:30	15:30	BZ	1	14:35	Y
15/08/2019	12:30	15:30	RN	5	15:00	N
24/09/2019	14:00	17:00	HG	1	14:15	N
24/09/2019	14:00	17:00	HG	1	14:20	N
24/09/2019	14:00	17:00	RN	1		N
24/09/2019	14:00	17:00	CX	1	14:45	N
24/09/2019	14:00	17:00	LB	1	15:05	N
25/09/2019	09:00	12:00	RN	2	09:15	N
25/09/2019	09:00	12:00	LB	2	10:05	N

Table AIII-6b: Secondary target species flight activity data from WF2 VP4

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
17/04/2019	09:25	12:25	LB	1	10:10	N
17/04/2019	09:25	12:25	LB	1	10:45	N
17/04/2019	09:25	12:25	LB	1	11:35	N
14/05/2019	07:25	10:25	RN	2	07:25	N
14/05/2019	07:25	10:25	RN	6	07:30	N
14/05/2019	07:25	10:25	RN	6	07:35	N
14/05/2019	07:25	10:25	RN	6	07:50	N
14/05/2019	07:25	10:25	BH	1	08:10	N
14/05/2019	07:25	10:25	LB	1	08:15	N
14/05/2019	07:25	10:25	RN	6	08:15	N
14/05/2019	07:25	10:25	RN	6	08:20	N
14/05/2019	07:25	10:25	RN	6	08:25	N
14/05/2019	07:25	10:25	LB	1	08:25	Y
14/05/2019	07:25	10:25	RN	6	08:30	N
14/05/2019	07:25	10:25	RN	6	08:35	N
14/05/2019	07:25	10:25	RN	6	08:40	N
14/05/2019	07:25	10:25	RN	6	08:45	N
14/05/2019	07:25	10:25	LB	1	08:45	N
14/05/2019	07:25	10:25	RN	6	09:00	N
14/05/2019	07:25	10:25	RN	6	09:15	N
14/05/2019	07:25	10:25	RN	6	09:20	N
14/05/2019	07:25	10:25	LB	2	09:20	N
14/05/2019	07:25	10:25	BH	1	09:20	N
14/05/2019	07:25	10:25	RN	6	09:25	N
14/05/2019	07:25	10:25	LB	1	09:45	Y
14/05/2019	07:25	10:25	RN	2	10:10	N
14/05/2019	07:25	10:25	LB	2	10:20	N
27/05/2019	15:06	18:06	RN	5	15:06	N
17/06/2019	08:14	11:14	LB	1	08:34	Y
17/06/2019	08:14	11:14	RN	6	08:49	N
17/06/2019	08:14	11:14	RN	6	08:54	N
17/06/2019	08:14	11:14	BH	2	08:54	N
17/06/2019	08:14	11:14	BZ	1	10:04	Y
17/06/2019	08:14	11:14	BZ	2	11:04	N

Date	Survey start	Survey end	Species	Count	5 min period	Likely Rotor Swept Area (Y/N)
18/06/2019	07:15	10:15	RN	3	07:20	Y
18/06/2019	07:15	10:15	LB	2	07:20	Y
18/06/2019	07:15	10:15	RN	3	07:40	Y
18/06/2019	07:15	10:15	RN	2	08:05	N
18/06/2019	07:15	10:15	LB	5	09:05	N
18/06/2019	07:15	10:15	RN	8	09:45	N
18/06/2019	07:15	10:15	K.	1	09:50	N
18/06/2019	07:15	10:15	LB	2	10:10	N
19/07/2019	13:00	16:00	BZ	1	14:00	N
19/07/2019	13:00	16:00	K.	1	14:25	N
19/07/2019	13:00	16:00	H.	1	15:40	N
19/07/2019	13:00	16:00	LB	1	15:50	N
19/07/2019	13:00	16:00	LB	1	15:50	N
24/07/2019	10:00	13:00	BZ	1	10:50	N
24/07/2019	10:00	13:00	LB	1	12:00	N
14/08/2019	13:00	16:00	HG	1	13:35	N
14/08/2019	13:00	16:00	RN	3	13:55	N
14/08/2019	13:00	16:00	K.	1	14:15	N
15/08/2019	08:45	11:45	BZ	1	09:30	Y
15/08/2019	08:45	11:45	RN	1	09:55	N
15/08/2019	08:45	11:45	HG	1	13:35	N

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