

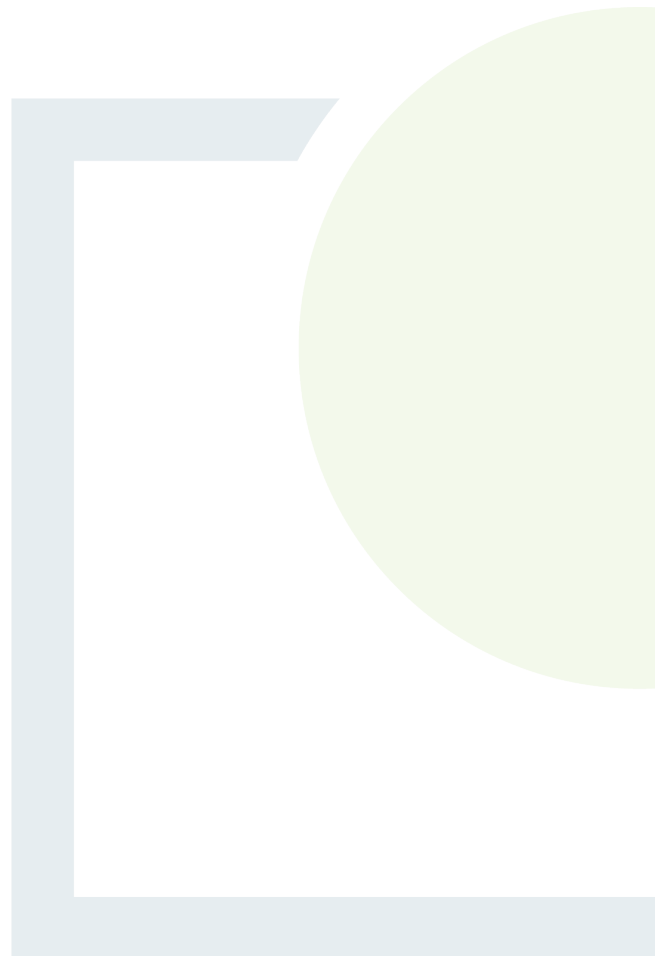


**FEHILY
TIMONEY**

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 3

Avian Ecology



1 Methodology

Avian field surveys at the Site comprised of the following: multi-season vantage point surveys, breeding season Avian field surveys at the site comprised of the following: multi-season vantage point surveys, breeding season Hen Harrier hinterland surveys, general breeding and wintering season transect and point count surveys and a Red Grouse *Lagopus lagopus* survey. Survey design and extent was based on the professional knowledge of the project team and refined through the scoping and consultation process and with reference to a review of desktop information. Detailed survey methodologies are provided below.

In addition to the field surveys, a desktop study was also undertaken by consulting the National Biodiversity Data Centre (NBDC) online mapping database⁶ to identify additional avian species historically recorded within the relevant W38 10km national grid square overlapping the terrestrial biodiversity study area.

The conservation status of bird species was considered in respect of the following: Irish Wildlife Acts (1976 – 2012 as amended); Birds of Conservation Concern in Ireland (BoCCI) Red, Amber and Green lists (see Gilbert *et al.* 2021); EU Birds Directive (2009/147/EC) Annex I list.

Consultation was also undertaken with the Development Applications Unit. Supplementary information on Hen Harrier nesting activity in the hinterland was received from the local National Parks and Wildlife Services (NPWS) Ranger and information on Barn Owl *Tyto alba* nests in the area was received from Birdwatch Ireland. It is very important to note that such consultation only involved discussion of the relevant species relative to the location/locality in question to inform Ecology Ireland's EIA assessment and did not constitute an opinion from the consultation parties on the proposed project under consideration here.

1.1 Vantage Point Survey

Standard vantage point (VP) field surveys were undertaken with due regard to NPWS VP methodology recommendations and guidance by Scottish Natural Heritage (SNH 2017).

SNH 2017 guidelines recommend that breeding/winter season surveys for target bird species be completed as part of assessments of proposed wind farm sites, with typically 6 hours of coverage per month from each VP location per season, resulting in 36-hours of survey effort per VP in each survey season (SNH 2017). Target species here included raptors, waterbirds and other high conservation value species, such as Hen Harrier (a qualifying species of the nearby Mullaghanish to Musheramore Mts. SPA) and any other Annex I species such as Peregrine Falcon *Falco peregrinus*, Merlin *Falco columbarius* and Golden Plover *Pluvialis apricaria*. A total of six vantage point locations were initially used for the VP surveys completed at the site in 2017 and 2018 (see outline below), however the study area was increased during the 2019 breeding season in response to an expansion of the study area boundary as follows; an additional two VPs (VP7 and VP8) were incorporated from March 2019 and a further two VPs (VP9 and VP10) were incorporated in July and August 2019. These 10 VPs were utilised for all subsequent VP surveys at the study area (see summary below and Figure 1).

⁶ <https://maps.biodiversityireland.ie/Map>

The VP surveys completed at the terrestrial biodiversity study area are outlined as follows (see Tables 7 to 18 for survey schedules):

Summer/Breeding Season VP Surveys (March to August inclusive):

- Summer 2017 (6 VPs, 36 hours survey effort + 5km hinterland survey)
- Summer 2018 (6 VPs, 36 hours survey effort + 5km hinterland survey)
- Summer 2019 (8 VPs from March to August inclusive, 36 hours survey effort + 5km hinterland survey; additional 2VPs in July & August with a total of 12 hours survey effort for these two additional VPs in Summer 2019)
- Summer 2020 (10 VPs, 36 hours survey effort + 5km hinterland survey)

Winter Season VP Surveys (October to March inclusive):

- Winter 2017/2018 (6 VPs, 35.5 hours survey effort due to very inclement weather conditions where visibility became severely compromised)
- Winter 2018/2019 (6 VPs, 36 hours survey effort)
- Winter 2019/2020 (10 VPs, 36 hours survey effort)
- Winter 2020/2021 (10 VPs, 36 hours survey effort)

All bird species heard or seen during the VP watches were noted. Detailed field records were taken of target species (heard or seen) with as much of the following information recorded as possible:

- Species and estimated number
- Time first observed; Duration of observation; Estimated time on-site; Estimated time off-site (note that the expanded study area boundary was used for calculations of on and off-site times in all survey seasons including 2017 and 2018).
- Flight-line – drawn on a field map and numbered to link with associated field notes
- Estimated flight height – initial height estimate and any marked change noted during period of observation: 0-5m AGL (Close to ground) 5-25m AGL (Low Flight) 25-100m AGL (Medium Flight height) 0>100m AGL (High Flight Height)
- Any other observations of note: behaviour, association or interaction with other species *etc.*

Field surveys were undertaken using appropriate survey equipment as required (*e.g.*, GPS units, binoculars, scope, notebooks *etc.*) and during suitable weather conditions. All field observers communicated with two-way radios/mobile phones to allow co-ordination in the event that a Hen Harrier, or other noteworthy (*i.e.*, Annex I) species, was observed at or close to the site. The December and January 2017/2018 winter VP surveys (6 VPs across three dates from December 2017 to January 2018) overlapped with the onset of sunset/dusk that allowed an opportunity to note any Hen Harrier winter roosting activity.

Dr. Gavin Fennessy (Ecology Ireland) is an authority on collision risk and birds. He carried out Post-Doctoral research on collision risk and aircraft and has presented papers at a number of international conferences on wildlife hazard. He is retained as the advisor to Dublin Airport Authority on management of bird-strike risk at airports in Ireland. He is critical of the reliance of Collision Risk Modelling (CRM) which is prevalent in the UK.

The 'Band' model which is widely used in avian collision risk assessments for wind farms is not evidence based and the driver of the model ('avoidance rate') is generally derived without any observational data. The weaknesses inherent on a reliance on CRM are recognised (e.g., Madsen & Cook 2016) but the methodology is still widely used, albeit less so in Ireland than in the UK. We prefer instead to describe the occurrence and flight behaviour of the birds at the proposed wind farm with a knowledge of the ecology and behaviour of the species.

Data are presented in this report as flightline observation tables with corresponding flightline maps. In addition, the proportion of time spent by Hen Harriers and other Annex I species on and off the site during the survey is calculated. Specific data/mapping relating to sensitive nest site locations will not be displayed in this report.

1.2 Hinterland Survey

Early and late season hinterland surveys (Hardey *et al.* 2013) were also completed in each of the four breeding season surveys to record any Hen Harrier nest sites within 5km of the terrestrial biodiversity study area. This involved a survey of Hen Harrier occupancy within 5km of the site during the bird breeding season. Suitable Hen Harrier nesting and foraging habitats within 5km of the study area were also noted. These areas, together with known historical nest sites, were then observed for Hen Harrier activity using a combination of transects and viewing points (see Tables 7 to 18 for survey schedule).

As for the VP surveys, the hinterland surveys also recorded other species of conservation importance such as Annex I species.

1.3 General Bird Transect/Point Count Surveys

Standard general breeding bird transect and point count surveys (Bibby *et al.* 2000) were undertaken at the terrestrial biodiversity study area as follows (Figure 2; where additional transects and point counts were added in 2019 due to an expansion of the study area boundary):

Summer/Breeding Season General Bird Surveys (Early and Late Season):

- Summer 2017 (5 transects, 6 point counts)
- Summer 2018 (5 transects, 6 point counts)
- Summer 2019 (7 transects, 8 point counts)
- Summer 2020 (7 transects, 8 point counts)

Winter Season General Bird Surveys:

- Winter 2017/2018 (5 transects, 6 point counts, 3 surveys)
- Winter 2019/2020 (7 transects, 8 point counts, 2 surveys)

Transects were c. 500m in length and located in open habitats, while point-counts were of 5 minute duration and were located in closed/forestry habitats. These were established throughout the study area to survey the baseline general bird assemblage in the study area (see Figure 2). These transects/point counts were surveyed twice in each breeding season (*i.e.*, early and late periods of the nesting season) and 2 - 3 times in each wintering season surveyed.

At each transect/point count, all bird species encountered (seen or heard) within 100m of the observer were recorded and their abundance noted. The total number of birds per species was derived by adding abundance data from all transects from each survey visit; this allowed a measure of relative abundance to be examined for all bird species recorded during the transect study. The same was done with the point count data. The maximum count per visit was then derived for each species and used for subsequent analysis and interpretation of results.

Bird species occurring more than 100m from the observer or flying over the site and not using it during the transect/point count surveys, noted when walking between transects/point counts or casually noted during other aspects of the biodiversity field study (*e.g.*, VP surveys), were not included in subsequent abundance analysis, but were considered as 'additional' species for subsequent consideration. This approach allowed a current taxa list of the birds present at/near the study area to be generated.

Figure 7: Terrestrial Biodiversity Study Area. The proposed turbine layout and the Vantage Points (VPs) used in breeding and winter bird surveys are shown for reference.

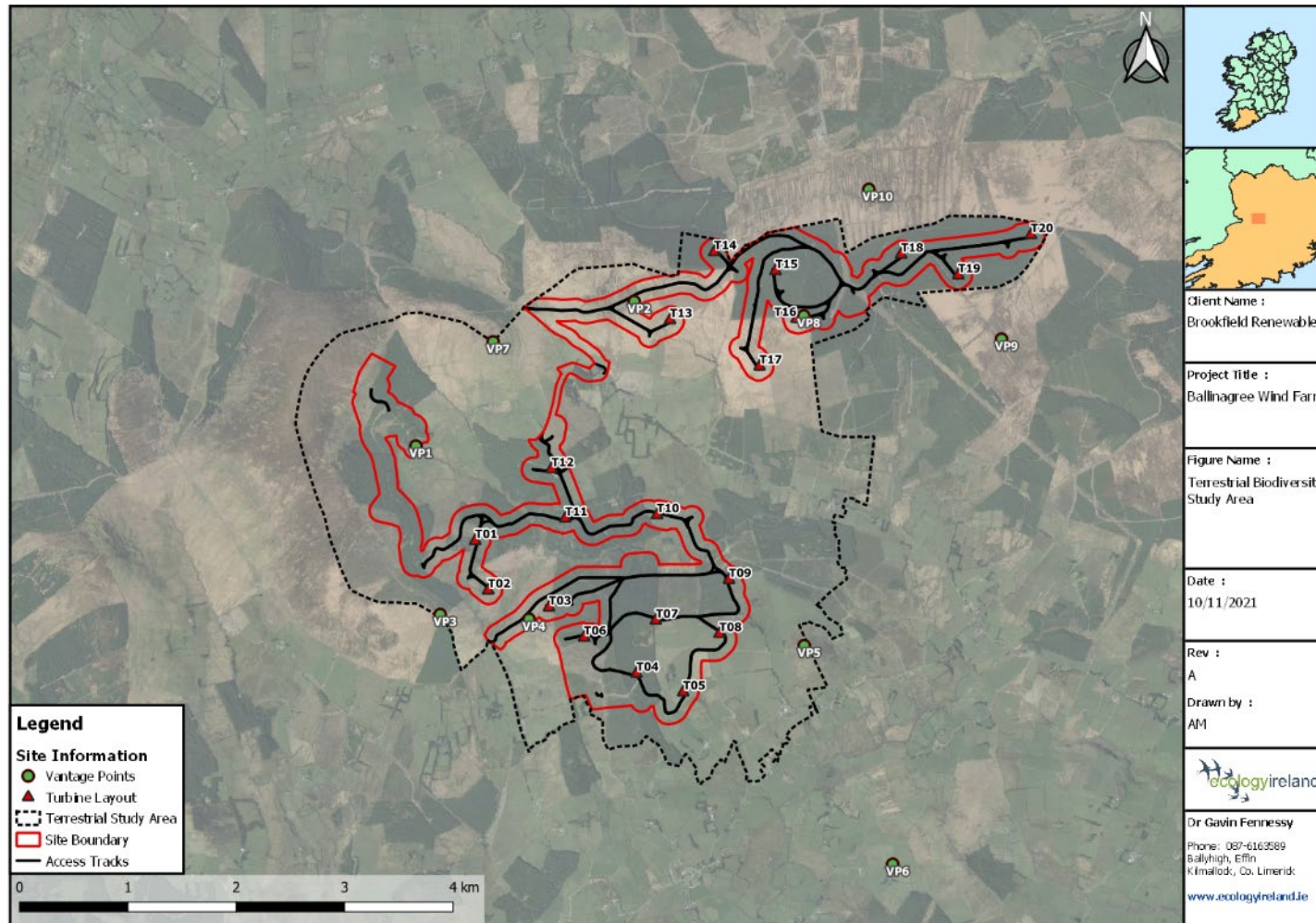
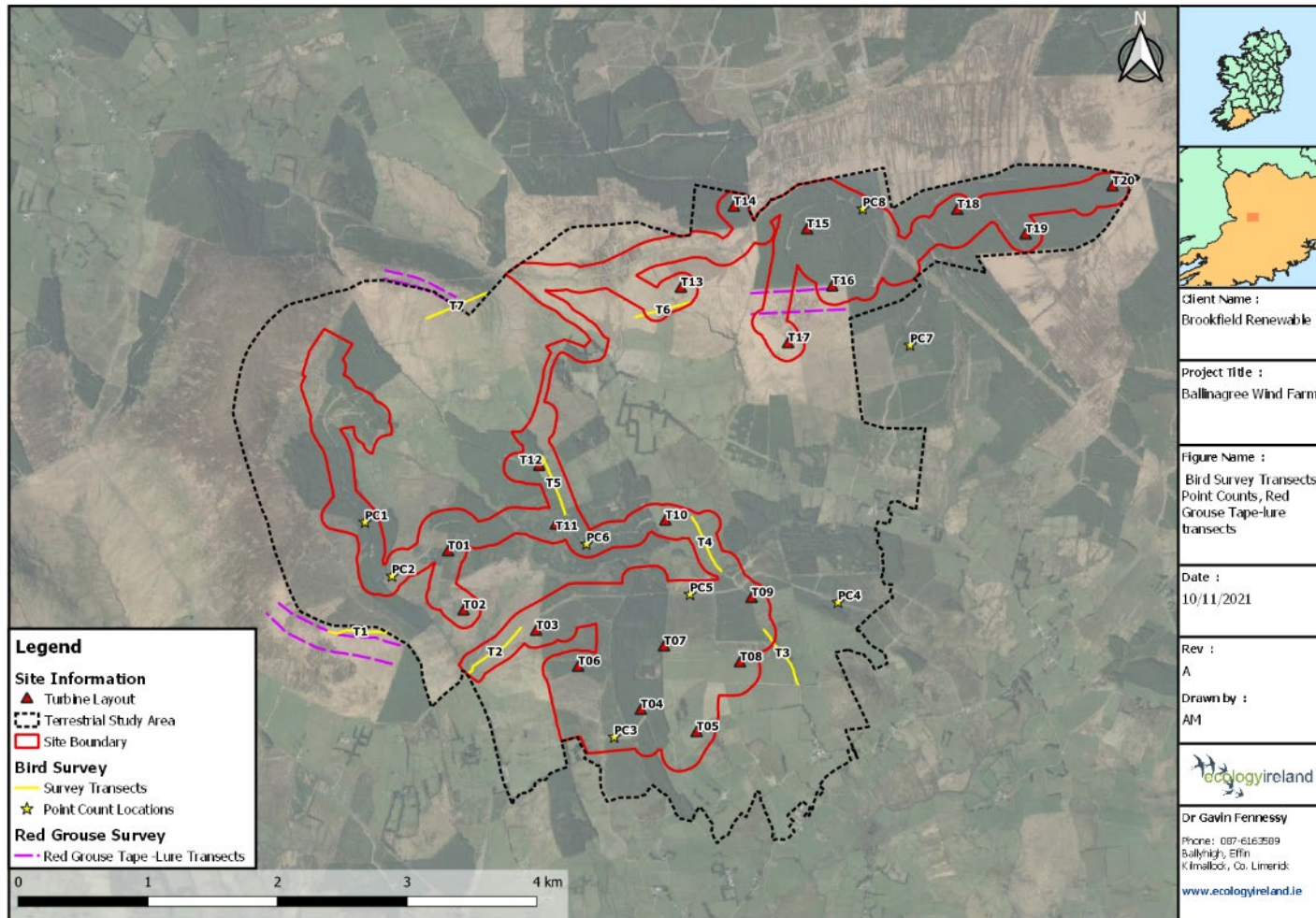


Figure 8: Terrestrial Biodiversity: Birds. Map shows the location of bird survey transects and point count locations as well as the Red Grouse Tape Lure survey transects



2 Field Survey Results

2.1 Breeding Season Vantage Point Survey Results

A total of four breeding season vantage point (VP) surveys were completed at the terrestrial biodiversity study area (*i.e.*, 2017, 2018, 2018 & 2019).

Six Annex I bird species were recorded during the breeding season VP surveys; Hen Harrier *Circus cyaneus*, Peregrine Falcon *Falco peregrinus*, Golden Plover *Pluvialis apricaria*, Merlin *Falco columbarius*, Marsh Harrier *Circus aeruginosus* and White-tailed Sea Eagle *Haliaeetus albicilla*.

2.1.1 Hen Harrier Activity

Hen Harriers were recorded during all four breeding season vantage point surveys, with the number of flightlines recorded per season ranging from 4 to 13. Activity levels on site were relatively low (< 1.5% of the total survey time, see Table 1) during all VP surveys and primarily related to foraging and commuting, generally at heights <30m (see Tables 19 to 23). Individuals were recorded successfully catching and/or carrying prey on a number of occasions (see Tables 19 to 23). No courtship/display behaviour was noted during the VP surveys and no nesting activity took place at the study area or within 2km of the study area boundary in any of the survey years. Activity was relatively broadly distributed at the site, with no areas of high or focused activity noted. Relatively regular flightlines were noted in the Dooneen Hill area to the southeast of the site, outside of the terrestrial biodiversity study area boundary in association with a known nest site in the wider area. Male Hen Harrier accounted for the bulk of the flightline activity at the site, although at least one Ringtail Hen Harrier (female or immature) flightline was recorded each season. Hen Harriers were generally present in all survey months, with no clear temporal pattern of activity noted. The predominant habitat where Hen Harriers were recorded was heath/bog, conifer plantation and grassland.

A comparison of Hen Harrier activity recorded on-site (*i.e.*, within the study area boundary) and off-site (outside the study area boundary but within view of the vantage points) during the breeding season surveys is presented below in Table 1 and Plate 1. Data are presented as the percentage of total VP survey time that Hen Harrier were present on the site. Note that the number of vantage points used increased from six (in 2017 and 2018) to 10 in the 2019 and 2020 breeding seasons as a result in an expansion of the study area boundary. An increase in observations might therefore be expected as a result in the increase in area covered. No such trend is apparent however and an overall decline in Hen Harrier activity on the site was in fact observed throughout the study period (Table 1 and Plate 1).

This Annex I species is *Amber-Listed* on the Birds of Conservation Concern in Ireland list (BOCCI List) due to moderate breeding population decline and due to its unfavourable status in Europe (after Gilbert et al. 2021). Hen Harrier is a special conservation interest species of the adjacent Mullaghanish to Musheramore Mountains SPA (NPWS 2021; www.npws.ie).

Table 11: Percentage of VP Survey time that Hen Harrier was recorded on/off site during the breeding season surveys.

Breeding Season Summary	% Total of VP Survey Time			
Hen Harrier Activity	2017	2018	2019	2020
On Site	1.00	1.33	0.19	0.57
Off Site	0.46	0.64	0.21	0.06
VP Study Survey effort	36 HRS	36 HRS	36 HRS	36 HRS
No. of VPs	6 VPs	6 VPs	8-10 VPs	10 VPs

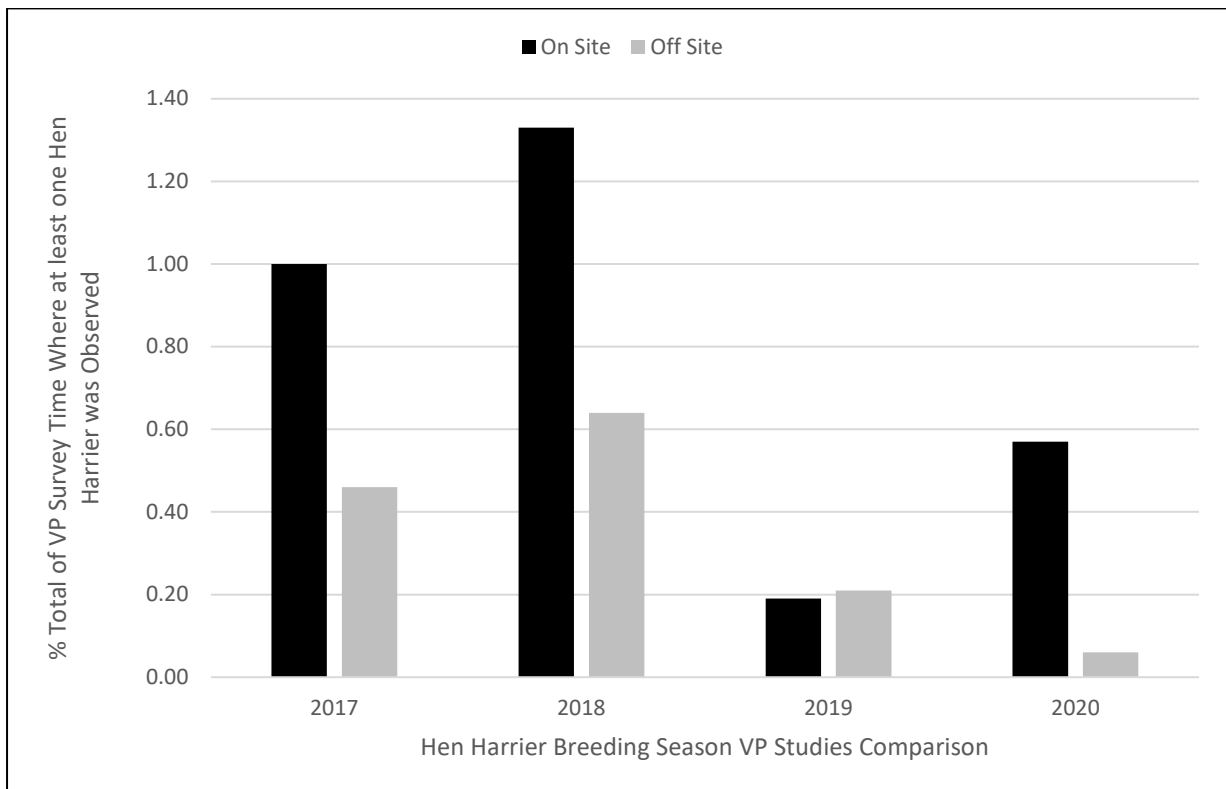


Plate 41: Comparison of percentage Hen Harrier activity recorded during the four breeding VP surveys.

2.1.2 Marsh Harrier Activity

A female Marsh Harrier was recorded in May 2019 flying over heath/bog in the northeast of the site for 120 seconds (see Tables 19 to 23). It was flying at a height of 5-25m above ground level (AGL) for one minute and 25-100m AGL for one minute and was chased by Hooded Crow. This was the only record of this species at the terrestrial biodiversity study area during the VP study (as well as all other ecological surveys at the site).

This Annex I species is *Amber-Listed* on the Birds of Conservation Concern in Ireland list (BOCCI List) as it is a breeding rarity in Ireland (after Gilbert *et al.* 2021).

2.2 Breeding Season Hen Harrier Hinterland Survey Results

Hinterland surveys were completed in all four breeding seasons (2017-2020), with survey schedules provided in Tables 7 to 18 and flightline observations provided in Tables 19 to 23. Details of nest site locations, which are known to NPWS, are not disclosed here due to the sensitive nature of this information.

In the 2017, 2018 and 2019 breeding seasons no nest site or evidence of breeding was recorded on the study area or within 2km of the study area. Two active nest sites were recorded between 2.5 and 5km from the study area boundary, one to the southwest and one to the southeast. The same nest sites were used in all three breeding seasons. Both nest sites were recorded as successfully producing young in the 2017 and 2018 survey seasons, however in the 2019 survey season one of the nest sites (the south-eastern nest) appeared to have failed.

An increase in Hen Harrier nesting activity within the 5km hinterland area was confirmed during the 2020 breeding season. A total of five nest sites were recorded, including the two historically used nest sites (2017-2019) and three newly confirmed nest sites. Four of the five nests were recorded as successfully producing at least one chick. Supplementary information on these nest sites such as nesting success was received from the local NPWS ranger.

In summary, the number of Hen Harrier nests sites in the 5km hinterland area of the study area has varied during the survey period from 1-2 and up-to 5 more recently, with no nest sites located at or within 2km of the study area. Overall, the Hen Harrier population in the Mullaghanish to Musheramore Mountains SPA has undergone serious decline in the last 10 years, however an increase in numbers of nesting pairs in the SPA was noted in 2020 (Hen Harrier Project 2020).

2.3 Winter Season Vantage Point Survey Results

A total of four winter season VP surveys (2017/2018, 2018/2019, 2019/2020 & 2020/2021) were undertaken at the terrestrial biodiversity study area. Survey results are presented below for each season. The survey schedule is provided in Tables 7 to 18 with flightline observations provided in Tables 24 to 27.

Six Annex I Bird species were recorded during the breeding season VP surveys; Hen Harrier, Peregrine Falcon, Golden Plover, Merlin, Red Kite *Milvus milvus* and White-tailed Sea Eagle.

Hen Harrier Activity

Hen Harriers were recorded during all four winter season vantage point surveys with the number of flightlines ranging from 7 to 11. Activity levels on site were low (< 0.7% of the total survey time, see Table 1) during all VP surveys and related primarily to foraging and commuting, generally at heights of <25m (see Tables 19 to 23). Individuals were regularly recorded being mobbed by Corvids, particularly Hooded Crow and Raven (see Tables 19 to 23).

Activity was relatively dispersed at the site, with no areas of high or focused activity noted. Male Hen Harrier accounted for the bulk of the flightline activity at the site, although at least two Ringtail Hen Harrier (female or immature) flightlines were recorded in each season, apart from the winter of 2019/2020 when all observations comprised male Hen Harriers. During the 2018/2019 season a number of ringtail flightlines were noted in the Dooneen Hill area to the southeast of the site, outside of the study area boundary in association with a known nest site in the wider area. Hen Harriers were generally present in all survey months, with no clear temporal pattern of activity noted. The predominant habitat where Hen Harriers were recorded was heath/bog, conifer plantation and grassland. No roosting activity was noted on/near the study area during the December and January 2017/2018 VP surveys that overlapped with the onset of the sunset/dusk period, where the study area supports limited areas of potentially suitable winter roosting habitat.

A comparison of Hen Harrier activity recorded on-site (*i.e.*, within the study area boundary) during the winter season surveys is presented below in Table 2 and Plate 2, where data are presented as the percentage of total VP survey time that Hen Harrier were present on the site. Note that the number of vantage points used increased from six (in 2017/2018 and 2018/2019) to 10 in the 2019/2020 and 2020/2021 winter seasons as a result of an expansion of the study area boundary. An increase in observations might therefore be expected as a result in the increase in area covered. Overall Hen Harrier winter season activity levels appeared to be relatively stable at the study area throughout the study period until a drop with on-site activity in 2020/2021 (Table 2 and Plate 2). Note that the off-site activity was relatively high in the 2020/2021 season (*i.e.*, almost 13 minutes recorded) however indicating the Hen Harriers were still active in the general area.

Table 12: Percentage of VP Survey time that Hen Harrier were recorded on/off site during the winter season surveys.

Winter Studies Comparison	% Total of VP Survey Time			
	2017/2018	2018/2019	2019/2020	2020/2021
Hen Harrier (both sexes/ages)				
On Site	0.51	0.51	0.64	0.16
Off Site	0.40	0.00	0.08	0.60
VP Study Survey effort	35.5 HRS	36 HRS	36 HRS	36 HRS
No. VPs	6 VPs	6 VPs	10 VPs	10 VPs

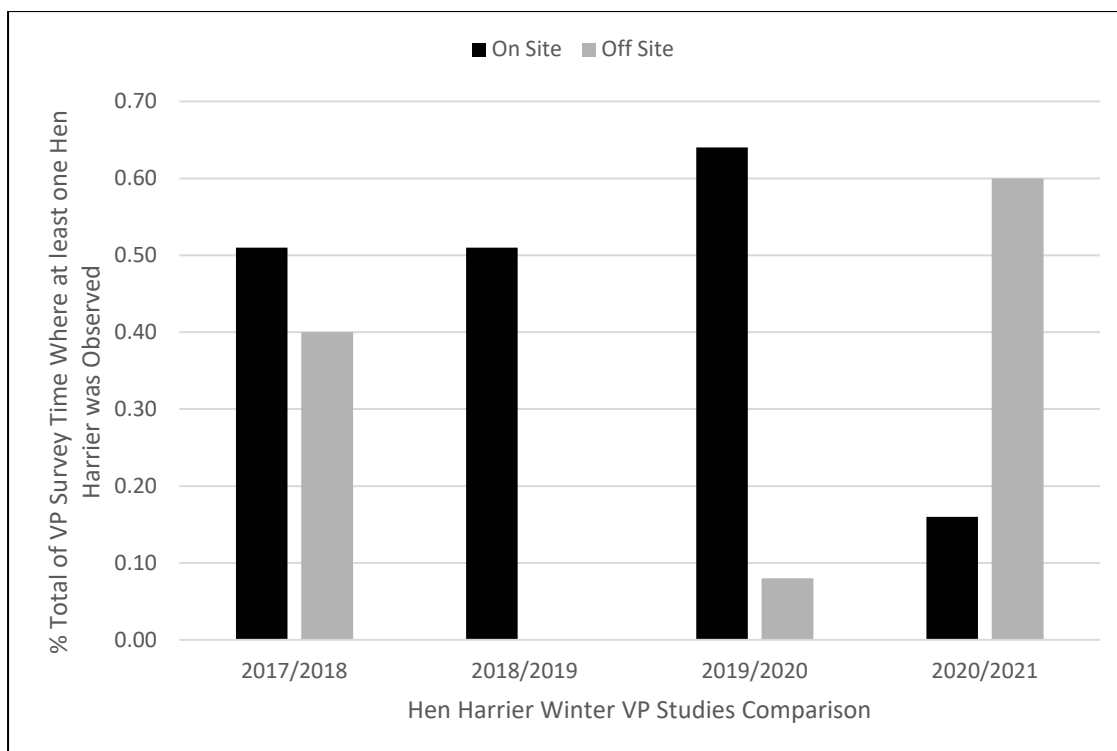


Plate 42: Figure 8A.12 Comparison of percentage Hen Harrier activity recorded during the four winter VP surveys.

2.4 Breeding Season Transect & Point Count Results

A total of 44 avian species were recorded during the dedicated breeding season transect and point count surveys (see Table 3). The maximum count for each species across all seasons for transect and point count data separately is shown in Table 3, with a break-down of counts for each season available in Tables 28 to 33. It is important to remember that these data do not include birds that were present more than 100m from the observer or birds flying over and not using the site during the transect/point count surveys.

The species with the highest maximum abundance on the transect surveys was Meadow Pipit with a maximum count of 42 individuals recorded across the seven transects, followed by Woodpigeon (38) and Skylark (36; see Table 3). These species were present on the site in all four survey seasons. It should be noted that the high Woodpigeon numbers is attributed to one early season count in 2019 when relatively higher numbers were noted at two transects, where the maximum count for this species was generally lower (< 18). Other relatively abundant species recorded during the transect surveys were Chaffinch, Rook (28 each) and Wren (21).

While Jackdaw had the highest maximum abundance during the point count surveys (50, see Table 3), this high count comprised a single flock at PC5 in 2018 where this species was generally not present or present in very low numbers during the point count surveys overall. After Jackdaw, the species with the highest maximum count was Chaffinch (22), followed by Wren (16), Willow Warbler (12) and Robin (10) (see Table 3). These species were present on the site in all four survey seasons.

Table 13: Maximum abundance of bird species recorded during the transect and point count surveys during the four breeding bird seasons (2017, 2018, 2019 and 2020).

Species Name	Scientific Name	Max. Abundance Transects 2017-2020	Max. Abundance Point Counts 2017-2020	Conservation Status BoCCI*
Blackbird	<i>Turdus merula</i>	6	6	GREEN
Blackcap	<i>Sylvia atricapilla</i>	3	5	GREEN
Blue Tit	<i>Cyanistes caeruleus</i>	8	4	GREEN
Bullfinch	<i>Pyrrhula pyrrhula</i>	2	1	GREEN
Chaffinch	<i>Fringilla coelebs</i>	28	22	GREEN
Chiffchaff	<i>Phylloscopus collybita</i>	3	6	GREEN
Coal Tit	<i>Parus ater</i>	2	5	GREEN
Crossbill	<i>Loxia curvirostra</i>	1	1	GREEN
Dunnock	<i>Prunella modularis</i>	2	2	GREEN
Goldcrest	<i>Regulus regulus</i>	14	7	AMBER
Goldfinch	<i>Carduelis carduelis</i>	3	0	GREEN
Grasshopper Warbler	<i>Locustrella naevia</i>	1	1	GREEN
Great Tit	<i>Parus major</i>	1	2	GREEN
Greenfinch	<i>Carduelis chloris</i>	1	2	AMBER
Grey Heron	<i>Ardea cinerea</i>	1	0	GREEN
Hen Harrier	<i>Circus cyaneus</i>	1	0	AMBER
Hooded Crow	<i>Corvus cornix</i>	14	3	GREEN
House Martin	<i>Delichon urbica</i>	5	0	AMBER
Jackdaw	<i>Corvus monedula</i>	6	50	GREEN
Jay	<i>Garrulus glandarius</i>	0	1	GREEN
Kestrel	<i>Falco tinnunculus</i>	1	0	RED
Lesser Redpoll	<i>Carduelis cabaret</i>	5	2	GREEN
Long-tailed Tit	<i>Aegithalos caudatus</i>	0	4	GREEN
Magpie	<i>Pica pica</i>	6	4	GREEN
Meadow Pipit	<i>Anthus pratensis</i>	42	7	RED
Mistle Thrush	<i>Turdus viscivorus</i>	1	2	GREEN
Pheasant	<i>Phasianus colchicus</i>	3	3	N/A
Pied Wagtail	<i>Motacilla alba</i>	2	1	GREEN
Raven	<i>Corvus corax</i>	8	2	GREEN
Reed Bunting	<i>Emberiza schoeniclus</i>	1	1	GREEN
Robin	<i>Erithacus rubecula</i>	9	10	GREEN
Rook	<i>Corvus frugilegus</i>	28	1	GREEN
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	0	1	GREEN
Siskin	<i>Carduelis spinus</i>	2	10	GREEN
Skylark	<i>Alauda arvensis</i>	36	0	AMBER

Species Name	Scientific Name	Max. Abundance Transects 2017-2020	Max. Abundance Point Counts 2017-2020	Conservation Status BoCCI*
Song Thrush	<i>Turdus philomelos</i>	3	3	GREEN
Spotted Flycatcher	<i>Muscicapa striata</i>	1	0	AMBER
Starling	<i>Sturnus vulgaris</i>	5	0	AMBER
Stonechat	<i>Saxicola torquata</i>	1	0	GREEN
Swallow	<i>Hirundo rustica</i>	11	1	AMBER
Whitethroat	<i>Phylloscopus trochilus</i>	1	1	GREEN
Willow Warbler	<i>Phylloscopus trochilus</i>	8	12	AMBER
Woodpigeon	<i>Columba palumbus</i>	38	6	GREEN
Wren	<i>Troglodytes troglodytes</i>	21	16	GREEN

*After Gilbert *et al* 2021, Birds of Conservation Concern in Ireland List (BoCCI List).

An additional 22 avian species were recorded on a casual basis during other terrestrial biodiversity surveys on the study area (primarily during VP surveys) or were 'off-transect' (i.e., recorded >100m from the observer or flying over, see Table 4⁷). The presence/absence of the additional species during the survey seasons are outlined in Table 4 below. This includes many species which are typically recorded in flight such as Buzzard, House Sparrow, Lesser Black-backed Gull, Sand Martin, Sparrowhawk and Swift. Other species that were casually recorded at the terrestrial biodiversity study area across all survey seasons included Feral Pigeon, Grey Wagtail, Linnet, Mallard and Snipe. Mallard is a special conservation interest (SCI) species of the Gearagh SPA. It is worth noting that such casually recorded Mallard were infrequently observed in very low numbers (<5 individuals, typically 1-2 at any one time) and that the study site does not support foraging, loafing or roosting features of significance for this species due to the absence of suitable habitats (*e.g.*, wetlands, lakes).

Tables 3 and 4 also display the conservation status of the avian species recorded according to the BoCCI list (after Gilbert *et al.* 2021). A total of six *Red-Listed* species of high conservation concern in Ireland have been recorded at the study area during the dedicated transect/point count surveys or on a casual basis during the four breeding seasons; Grey Wagtail, Kestrel, Meadow Pipit, Redwing, Snipe and Swift. A total of 18 of the species recorded are *Amber-Listed* on the BoCCI list (see Tables 3 and 4).

⁷ Note that Table 4 excludes target species of the VP survey which have already been described above or not included in this assessment report.

Table 14: Additional bird species recorded on a casual basis during other terrestrial biodiversity surveys at the study area during the 2017, 2018, 2019 and 2020 breeding seasons.

Common Name	Scientific Name	2017	2018	2019	2020	BoCCI List*
Black-headed Gull	<i>Limosa lapponica</i>			x		AMBER
Buzzard	<i>Buteo buteo</i>	x	x	x	x	GREEN
Collared Dove	<i>Streptopelia decaocto</i>	x	x			GREEN
Cuckoo	<i>Cuculus canorus</i>	x	x		x	GREEN
Dipper	<i>Cinclus cinclus</i>			x		GREEN
Feral Pigeon	<i>Columba livia</i>	x	x	x	x	N/A
Fieldfare	<i>Turdus pilaris</i>		x		x	GREEN
Grey Wagtail	<i>Motacilla cinerea</i>	x	x	x	x	RED
Gull species	<i>Larus sp.</i>	x	x			AMBER
House Sparrow	<i>Passer domesticus</i>	x	x	x	x	AMBER
Herring Gull	<i>Larus argentatus</i>		x	x	x	AMBER
Lesser Black-backed Gull	<i>Larus fuscus</i>	x	x	x	x	AMBER
Linnet	<i>Carduelis cannabina</i>	x	x	x	x	AMBER
Mallard	<i>Anas platyrhynchos</i>	x	x	x	x	AMBER
Redwing	<i>Turdus iliacus</i>		x		x	RED
Reed Warbler	<i>Acrocephalus scirpaceus</i>	x	x			GREEN
Sand Martin	<i>Riparia riparia</i>	x	x	x	x	AMBER
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	x	x			GREEN
Snipe	<i>Gallinago gallinago</i>	x	x	x	x	RED
Sparrowhawk	<i>Accipiter nisus</i>	x	x	x	x	GREEN
Swift	<i>Apus apus</i>		x		x	RED
Wheatear	<i>Oenanthe oenanthe</i>			x	x	AMBER

*After Gilbert et al. 2021.

2.5 Winter Season Transect & Point Count Results

A total of 33 avian species were recorded during the dedicated winter season transect and point count surveys (see Table 5). The maximum count for each species across all seasons for transect and point count data separately is shown below in Table 5, with a break-down of counts for each season available in Tables 28 to 33. It is important to remember that these data do not include birds that were present more than 100m from the observer or birds flying over and not using the site during the transect/point count surveys.

The species with the highest maximum abundance on the transect surveys was Starling with a maximum count of 120 individuals recorded across the seven transects, followed by Meadow Pipit (97) and Fieldfare (80; see Table 5).

These species were present on the site in both survey seasons and are typical species of open habitats. Other abundant species recorded during the transect surveys were Hooded Crow (55), Woodpigeon (48) and Redwing (41).

Species with the highest maximum abundance during the point count surveys were Robin, Siskin, Chaffinch and Wren (varied 10 to 18; see Table 5). All of these species, apart from Siskin were present in both survey seasons.

Table 15: Maximum abundance of bird species recorded during the transect and point count surveys during the two winter bird seasons (2017/2018 & 2019/2020).

Species Name	Scientific Name	Max Abundance Transects Winter 2017/2018 & 2019/2020	Max Abundance Point Counts Winter 2017/2018 & 2019/2020	BoCCI*
Blackbird	<i>Turdus merula</i>	12	2	GREEN
Blue Tit	<i>Cyanistes caeruleus</i>	12	4	GREEN
Bullfinch	<i>Pyrrhula pyrrhula</i>	0	3	GREEN
Chaffinch	<i>Fringilla coelebs</i>	25	12	GREEN
Coal Tit	<i>Periparus ater</i>	10	5	GREEN
Crossbill	<i>Loxia curvirostra</i>	1	2	GREEN
Dunnock	<i>Prunella modularis</i>	4	3	GREEN
Fieldfare	<i>Turdus pilaris</i>	80	0	GREEN
Goldcrest	<i>Regulus regulus</i>	12	8	AMBER
Goldfinch	<i>Carduelis carduelis</i>	18	0	GREEN
Great Tit	<i>Parus major</i>	2	1	GREEN
Hooded Crow	<i>Corvus cornix</i>	55	7	GREEN
Jackdaw	<i>Corvus monedula</i>	17	3	GREEN
Jay	<i>Garrulus glandarius</i>	1	0	GREEN
Kestrel	<i>Falco tinnunculus</i>	0	1	RED
Lesser Redpoll	<i>Carduelis cabaret</i>	4	1	GREEN
Magpie	<i>Pica pica</i>	5	3	GREEN
Mallard	<i>Anas platyrhynchos</i>	2	0	AMBER
Meadow Pipit	<i>Anthus pratensis</i>	97	4	RED
Pheasant	<i>Phasianus colchicus</i>	1	1	N/A
Pied Wagtail	<i>Motacilla alba</i>	2	1	GREEN
Raven	<i>Corvus corax</i>	19	2	GREEN
Redwing	<i>Turdus iliacus</i>	41	0	RED
Reed Bunting	<i>Emberiza schoeniclus</i>	1	1	GREEN
Robin	<i>Erithacus rubecula</i>	18	18	GREEN
Rook	<i>Corvus frugilegus</i>	30	1	GREEN

Species Name	Scientific Name	Max Abundance Transects Winter 2017/2018 & 2019/2020	Max Abundance Point Counts Winter 2017/2018 & 2019/2020	BoCCI*
Siskin	<i>Carduelis spinus</i>	4	13	GREEN
Skylark	<i>Alauda arvensis</i>	2	0	AMBER
Snipe	<i>Gallinago gallinago</i>	4	0	RED
Song Thrush	<i>Turdus philomelos</i>	4	1	GREEN
Sparrowhawk	<i>Accipiter nisus</i>	2	0	GREEN
Starling	<i>Sturnus vulgaris</i>	120	0	AMBER
Woodpigeon	<i>Columba palumbus</i>	48	1	GREEN
Wren	<i>Troglodytes troglodytes</i>	7	10	GREEN

*After Gilbert et al. 2021, Birds of Conservation Concern in Ireland List (BoCCI List).

An additional 20 avian species were recorded on a casual basis during other terrestrial biodiversity surveys at the study area (primarily during VP surveys) or were 'off-transect' (i.e., recorded >100m from the observer or flying) during the winter seasons (see Table 6⁸). The presence/absence of the additional species during the survey seasons are shown below in Table 6. This includes species which were typically recorded in flight such as Great Black-backed Gull, Lesser Black-backed Gull, House Martin and Swallow (where the summer hirundine migrants were recorded in March, a transition period between winter and summer). Other species that were consistently recorded on the terrestrial biodiversity study area during all survey seasons included Buzzard, Mistle Thrush and Stonechat.

Tables 5 and 6 also outline the conservation status of the avian species recorded (BoCCI List, after Gilbert et al. 2021). A total of eight *Red-Listed* species of high conservation concern in Ireland have been recorded at the study area during the dedicated transect/point count surveys or on a casual basis during the winter seasons; Grey Wagtail, Kestrel, Meadow Pipit, Redwing, Snipe, Song Thrush, Stock Dove and Woodcock. A total of nine of the species recorded are *Amber-Listed* on the BoCCI list (see Tables 5 and 6).

An additional Annex I species that is *Amber-Listed* on the BoCCI list was noted at two different locations in the wider area of the study area; Whooper Swan *Cygnus cygnus*. These Whooper Swan data are not included in the additional casual bird results here as they did not occur at/near the study area. A flock of 61 individuals were noted at a field (51.92927 -8.911225) >5km south of the study area in early March 2019. A flock of 13 individuals were casually observed flying north over Rylane at a height of > 150m in October 2020 c. 4km off-site.

⁸ Note that Table 6 excludes the target species of the VP survey which have already been described above or not included in this assessment report.

Table 16: Additional bird species recorded on a casual basis during other terrestrial biodiversity surveys at the study area during winter season surveys.

Common Name	Scientific Name	2017 / 2018	2018 / 2019	2019 / 2020	2020 / 2021	BoCCI*
Buzzard	<i>Buteo buteo</i>	X	X	X	X	GREEN
Chiffchaff	<i>Phylloscopus collybita</i>				X	GREEN
Cormorant	<i>Phalacrocorax carbo</i>	X				AMBER
Feral Pigeon	<i>Columba livia</i>	X	X	X		GREEN
Great Black-backed Gull	<i>Larus marinus</i>			X		GREEN
Greenfinch	<i>Carduelis chloris</i>	X				AMBER
Grey Heron	<i>Ardea cinerea</i>			X	X	GREEN
Grey Wagtail	<i>Motacilla cinerea</i>		X	X	X	RED
House Sparrow	<i>Passer domesticus</i>			X		AMBER
Jack Snipe	<i>Lymnocyptes minimus</i>	X		X	X	GREEN
Lapwing	<i>Vanellus vanellus</i>				X	RED
Lesser Black-backed Gull	<i>Larus fuscus</i>			X		AMBER
Linnet	<i>Carduelis cannabina</i>	X		X	X	AMBER
Long-tailed Tit	<i>Aegithalos caudatus</i>	X		X	X	GREEN
Mistle Thrush	<i>Turdus viscivorus</i>	X	X	X	X	GREEN
Stock Dove	<i>Columba oenas</i>				X	RED
Stonechat	<i>Saxicola torquata</i>	X	X	X	X	GREEN
Swallow	<i>Hirundo rustica</i>				X	AMBER
Treecreeper	<i>Certhia familiaris</i>				X	GREEN
Woodcock	<i>Scalopax rusticola</i>	X		X		RED

*After Gilbert *et al.* 2021, BoCCI List.

2.6 Desktop Study Results

A total of six additional avian species have been recorded historically within the W38 10km national grid square overlapping the terrestrial biodiversity study area (after NBDC database accessed on 10th May 2021). The additional species are as follows; Brambling *Fringilla montifringilla*, Moorhen *Gallinula chloropus*, Curlew *Numenius arquata*, Long-eared Owl *Asio otus*, Short-eared Owl *Asio flammeus*, and Yellowhammer *Emberiza citrinella*. Curlew and Yellowhammer are *Red-Listed* as birds of high conservation concern in Ireland (Gilbert *et al.* 2021), where Curlew have experienced a drop in breeding population of 96% since the 1980's (O'Donoghue 2020). The terrestrial biodiversity study area is not located within the current breeding range of Curlew (Balmer *et al.* 2013) and there is limited suitable foraging habitat (*i.e.*, cereal crops) at the study area for Yellowhammer that is a grain/cereal food dependent species.

The remaining species may occur at the study area from time to time, although the study area lacks significant wetland habitat to support Moorhen and Short-eared Owl is a rare and sporadic breeding species (Balmer *et al.* 2013) where the historical record here dates back to the 1980s.

Information on the current known distribution of Barn Owl nest sites (including all active sites recorded over the past ten-year period) was received from Birdwatch Ireland (BWI) in relation to the study area at Ballinagree (email from John Lusby on 5th August 2021). There are no known Barn Owl sites within the boundary of the study area (where the study area is shown on Figure 8A.1). The closest known Barn Owl site (an active nest site) is over 2km from the study area boundary. There are no other Barn Owl sites on the BWI database which are within 5km of the study area boundary, but several are located within 10km. It is important to note that BWI do not have information on all Barn Owl sites in this area, and the information provided should not be treated as a complete assessment of Barn Owl sites in this area.

3 Avifauna Results (Full)

3.1 Vantage Point (VP) and Hinterland Survey Schedules (March 2017 – March 2020)

Table 17: VP Survey Schedule Ballinagree, Breeding Season Survey 2017

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
30.03.17	1	10.00 - 13.30	3hrs 30 mins	Dry initially then Mist/Rain; F3-4; Good to Poor Visibility;8/8 Okta
30.03.17	2	11.30 - 12.45	1hr 15mins	Dry initially then Mist/Rain; F3-4; Good to Poor (from 12.15hrs) Visibility;8/8 Okta
30.03.17	3	n/a	0hrs 0mins	Mist/Rain; F4; Moderate to Poor Visibility;8/8 Okta
30.03.17	4	10.45 - 13.30	2hrs 45mins	Dry initially then Mist/Rain; F3-4; Good to Poor (from 12.55hrs) Visibility;8/8 Okta
30.03.17	5	11.05 - 13.30	2 hrs 25mins	Dry; F3; Good Visibility;8/8 Okta
30.03.17	6	11.20 - 12.00 & 12.50 - 13.25	1hr 15mins	Dry initially then Mist/Rain; F1; Moderate to Poor Visibility;8/8 Okta
20.04.17	1	09.30 - 16.15	6hrs 45mins	Dry; F0-3; Good Visibility; 0-7/8 Okta
20.04.17	2	09.35 - 16.20	6hrs 45 mins	Dry; F0-1; Good Visibility; 3-7/8 Okta
21.04.17	3	09.45 - 16.30	6hrs 45mins	Dry; F1-2; Good Visibility; 1-8/8 Okta
21.04.17	4	09.45 - 16.50	7hrs 5mins	Dry; F1-3; Good Visibility; 1-6/8 Okta
21.04.17	5	09.45 - 16.50	7hrs 5mins	Dry; F2; Good Visibility; 2/8 Okta
21.04.17	6	10.00 - 16.55	6hrs 45mins	Dry; F1; Good Visibility; 4/8 Okta
26.04.17	2	10.00-11.00	1hr 0mins	Dry; F3-4; Good Visibility; 6-7/8 Okta
26.04.17	3	11.20-13.35	2hrs 15mins	Dry; F3-4; Good Visibility; 6-7/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
26.04.17	6	15.30-16.30	1hr 0mins	Dry; F3-4; Good Visibility; 7/8 Okta
12.05.17	1	09.25 - 15.50	6hrs 25mins	Dry; F3; Moderate - Good Visibility; 7/8 Okta
12.05.17	2	09.35 - 16.20	6hrs 45mins	Dry; F2-4; Moderate - Good Visibility; 8/8 Okta
12.05.17	3	09.45 - 16.30	6hrs 45mins	Dry; F3-4; Good Visibility; 7/8 Okta
12.05.17	4	09.45 - 16.15	6hrs 30mins	Dry; F3-4; Moderate - Good Visibility; 6-8/8 Okta
12.05.17	5	10.05 - 16.40	6hrs 35mins	Dry; F4; Good Visibility; 8/8 Okta
12.05.17	6	09.40 - 15.40 & 16.00 - 16.45	6hrs 45mins	Dry; F2-3; Moderate - Good Visibility; 8/8 Okta
15.06.17	1	09.40 - 14.05	6hrs 25mins	Light rain; F2-3; Good Visibility; 7/8 Okta
16.06.17	2	10.00 - 16.45	6hrs 45mins	Dry; F3; Good Visibility; 2-7/8 Okta
15.06.17	3	09.50 - 16.35	6hrs 45mins	Dry; F5; Good Visibility; 7/8 Okta
15.06.17	4	09.45 - 16.15	6hrs 30mins	Dry with occ. showers; F4; Good Visibility; 8/8 Okta
16.06.17	5	10.40 - 17.15	6hrs 35mins	Dry; F2-4; Good Visibility; 7-8/8 Okta
16.06.17	6	10.05 - 16.50	6hrs 45mins	Dry; F2-3; Good Visibility; 3/8 Okta
13.07.17	1	10.30 - 16.55	6hrs 25 mins	Dry; F0-1; Good Visibility; 6/8 Okta
12.07.17	2	09.25 - 16.10	6hrs 45mins	Dry; F0-3; Good Visibility; 0-6/8 Okta
13.07.17	3	10.45 - 17.30	6hrs 45mins	Dry; F1-3; Good Visibility; 8/8 Okta
13.07.17	4	11.00 - 17.30	6hrs 30mins	Dry; Good Visibility; 6/8 Okta
12.07.17	5	09.55 - 16.30	6hrs 35mins	Dry; Good Visibility; 2-3/8 Okta
12.07.17	6	09.30 - 16.15	6hrs 45mins	Dry; F1; Good Visibility; 1-2/8 Okta
23.08.17	1	09.40 - 16.10	6hrs 30 mins	Occ. light mist); F1-2; Good Visibility; 6-8/8 Okta
23.08.17	2	09.40 - 16.25	6hrs 45mins	Occ. Rain; F3; Good Visibility; 8/8 Okta
24.08.17	3	11.05 - 17.50	6hrs 45mins	Occ. Light Mist; F2-4; Moderate - Good Visibility; 4-8/8 Okta
23.08.17	4	09.45 - 16.20	6hrs 35mins	Occ. Light Mist; Good Visibility; 4-8/8 Okta
23.08.17	5	09.50 - 16.30	6hrs 40mins	Occ. Showers; F3; Good Visibility; 6-8/8 Okta
23.08.17	6	09.45 - 16.30	6hrs 45mins	Occ. Showers; F1-2; Good Visibility; 7-8/8 Okta

Table 18: Hinterland Survey Schedule Ballinagree, Breeding Season Survey 2017

Date	Time (24hrs)	Survey Effort (hrs & mins)	Weather
15.04.17	10.00 - 16.10	6 hrs 10 mins	Dry (one shower); F2-4; Good Visibility; 6-8/8 Okta
26.04.17	15.00-15.15	0hrs 15mins	Dry; F3-4; Good Visibility; 8/8 Okta
13.07.17	10.20 - 17.20	7 hrs	Dry; F3; Good Visibility; 4-7/8 Okta

Table 19: VP Survey Schedule Ballinagree, Winter Season Survey 2017/2018

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
24.10.17	1	09.55 - 15.55	6 hrs	Dry initially, showers from 13.00, light rain for last 45 mins; F1-2; Good to Moderate Visibility (last 45 mins);8/8 Okta
24.10.17	2	09.50 - 15.50	6 hrs	Showers; F3-4; Good to Moderate Visibility; 8/8 Okta
24.10.17	3	10.03 - 16.03	6 hrs	Showers; F3; Good to Moderate Visibility; 8/8 Okta
24.10.17	4	09.50 - 15.50	6 hrs	Occ. Drizzle; F2-3; Good Visibility; 8/8 Okta
24.10.17	5	09.58 - 15.58	6 hrs	Dry; F2-3; Good to Moderate Visibility; 8/8 Okta
24.10.17	6	10.00 - 16.00	6 hrs	Occ. Showers, light rain after 14.00; F3; Good to Moderate Visibility; 8/8 Okta
09.11.17	1	08.10 - 14.10	6 hrs	Dry; F3; Good Visibility; 3-6/8 Okta
09.11.17	2	09.15 - 15.15	6 hrs	Occ. Light mist; F5; Good Visibility; 8/8 Okta
09.11.17	3	09.15 - 15.15	6 hrs	Dry; F2-4; Good Visibility; 2-7/8
09.11.17	4	09.10 - 15.10	6 hrs	Dry; F4-5; Good Visibility; 2-8/8
09.11.17	5	09.40 - 15.40	6 hrs	Occ. Showers; F3-4; Good Visibility; 2-7/8
09.11.17	6	09.50 - 15.50	6 hrs	Dry; F3-4; Good Visibility; 6-8/8
05.12.17	1	11.01 - 16.31	5.5 hrs	Occ. Drizzle; F3-4; Good - Moderate Visibility; 8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
05.12.17	2	11.00 - 16.30	5.5 hrs	Dry but low cloud last 30 mins; F4; Good - Poor Visibility (last 30 mins); 8/8 Okta
05.12.17	3	11.00 - 16.30	5.5 hrs	Mist after 12.15; F3-5; Good - Poor Visibility; 8/8 Okta
05.12.17	4	11.00 - 16.30	5.5 hrs	Occ drizzle & low cloud; F3; Moderate to Poor Visibility; 8/8 Okta
05.12.17	5	10.50 - 16.35	5 hrs 45 mins	Occ. Showers & low cloud; F1-2; Good - Poor Visibility; 8/8 Okta
05.12.17	6	10.55 - 16.30	5 hrs 35 mins	Dry; F1; Good- Moderate Visibility; 8/8 Okta
25.01.18	1	11.30 - 17.30	6 hrs	Occ. Showers; F2-4; Good Visibility; 6-7/8
25.01.18	2	11.40 - 17.40	6 hrs	Occ. Showers; F4-5; Good - Moderate Visibility; 8/8
26.01.18	3	11.40 - 17.40	6 hrs	Light rain in last hour; F1-2; Good - Moderate Visibility (last 20 mins); 8/8
25.01.18	4	11.30 - 17.30	6 hrs	Occ. Showers; F3-4; Good - Moderate Visibility; 7/8
25.01.18	5	11.15 - 17.15	6 hrs	Occ. Showers; F2; Good Visibility; 7/8 Okta
26.01.18	6	11.30 - 17.30	6 hrs	Light rain last 1.5hrs; F1; Good Visibility; 7/8
21.02.18	1	10.17 - 16.17	6 hrs	Dry; F1; Good Visibility; 4-8/8 Okta
21.02.18	2	09.38 - 15.38	6 hrs	Dry; F2; Good Visibility; 1-7/8 Okta
21.02.18	3	10.15 - 16.15	6 hrs	Dry; F1; Good Visibility; 1-8/8 Okta
21.02.18	4	09.30 - 15.30	6 hrs	Dry; F1; Good Visibility; 2/8 Okta
26.02.18	5	09.45 - 15.45	6 hrs	Dry; F3-4; Good Visibility; 8/8 Okta
26.02.18	6	09.45 - 15.45	6 hrs	One light snow shower; F3; Good Visibility; 4-8/8 Okta
16.03.18	1	09.30 - 15.30	6 hrs	Occ. Showers; F2-3; Good Visibility; 8/8
16.03.18	2	09.30 - 15.30	6 hrs	Occ. showers; F2-3; Good to Moderate Visibility; 7/8 Okta
16.03.18	3	09.50 - 15.50	6 hrs	Occ. showers; F1-2; Good to Moderate Visibility; 7-8/8 Okta
16.03.18	4	09.50 - 15.50	6 hrs	Occ. showers; F3-4; Good Visibility; 8/8 Okta
21.03.18	5	10.05 - 16.05	6 hrs	Dry; F2-3; Good Visibility; 1-8/8 Okta
22.03.18	6	10.00 - 16.00	6 hrs	Dry; F1-2; Good Visibility; 4/8 Okta

Table 20: VP Survey Schedule Ballinagree, Breeding Season Survey 2018.

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
16.03.18	1	09.30 - 15.30	6 hrs	Occ. Showers; F2-3; Good Visibility; 8/8
16.03.18	2	09.30 - 15.30	6 hrs	Occ. showers; F2-3; Good to Moderate Visibility; 7/8 Okta
16.03.18	3	09.50 - 15.50	6 hrs	Occ. showers; F1-2; Good to Moderate Visibility; 7-8/8 Okta
16.03.18	4	09.50 - 15.50	6 hrs	Occ. showers; F3-4; Good Visibility; 8/8 Okta
21.03.18	5	10.05 - 16.05	6 hrs	Dry; F2-3; Good Visibility; 1-8/8 Okta
22.03.18	6	10.00 - 16.00	6 hrs	Dry; F1-2; Good Visibility; 4/8 Okta
11.04.18	1	09.00 - 15.00	6 hrs	Dry; F0; Moderate Visibility; 8/8 Okta
19.04.18	2	08.30 - 14.30	6 hrs	Dry; F2-3; Moderate - Good Visibility; 3-8/8 Okta
11.04.18	3	09.30 - 15.30	6 hrs	Dry; F1; Moderate - Good Visibility; 8/8 Okta
11.04.18	4	09.53 - 15.53	6 hrs	Dry; F2-3; Moderate Visibility; 8/8 Okta
19.04.18	5	09.45 - 15.45	6 hrs	Dry; F2-3; Moderate - Good Visibility; 3/8 Okta
19.04.18	6	09.35 - 15.35	6 hrs	Occ. Drizzle; F1-2; Moderate - Good Visibility; 4-8/8
10.05.18	1	09.55 - 15.55	6 hrs	Dry; F3; Good Visibility; 5/8 Okta
10.05.18	2	09.48 - 15.48	6 hrs	Dry; F3-5; Good Visibility; 5/8 Okta
25.05.18	3	09.20 - 15.20	6 hrs	Dry; F3; Good Visibility; 1-5/8 Okta
10.05.18	4	10.12 - 16.12	6 hrs	Dry; F2; Good Visibility; 6/8 Okta
25.05.18	5	09.45 - 15.45	6 hrs	Dry; F3-4; Good Visibility; 1-4/8 Okta
25.05.18	6	09.30 - 15.30	6 hrs	Dry; F3; Good Visibility; 3/8 Okta
08.06.18	1	09.35 - 15.35	6 hrs	Dry; F1-2; Good Visibility; 5/8 Okta
11.06.18	2	09.00 - 15.00	6 hrs	Dry; F3; Good Visibility; 7/8 Okta
08.06.18	3	09.20 - 15.20	6 hrs	Dry; F3; Good Visibility; 7/8 Okta
08.06.18	4	09.15 - 15.15	6 hrs	Dry; F2-3; Good Visibility; 3/8 Okta
11.06.18	5	09.10 - 15.10	6 hrs	Dry; F3; Good Visibility; 7-8/8 Okta
11.06.18	6	09.30 - 15.30	6 hrs	Dry; F3-4; Moderate - Good Visibility; 4-6/8 Okta
06.07.18	1	09.12 - 15.12	6 hrs	Dry; F2; Good Visibility; 4-8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
06.07.18	2	09.21 - 15.21	6 hrs	Occ. Showers; F3; Good Visibility; 3-8/8 Okta
06.07.18	3	09.24 - 15.24	6 hrs	Dry; F2; Good Visibility; 5/8 Okta
06.07.18	4	09.05 - 15.05	6 hrs	Dry; F2-3; Good Visibility; 4-7/8 Okta
06.07.18	5	09.30 - 15.30	6 hrs	Occ. Mist; F0-1; Good Visibility; 4-8/8 Okta
06.07.18	6	09.10 - 15.10	6 hrs	Occ. Mist; F1; Good Visibility; 4-8/8 Okta
22.08.18	1	09.25 - 15.25	6 hrs	Light mist initially; F2-4; Moderate - Good Visibility; 5-8/8 Okta
22.08.18	2	09.15 - 15.15	6 hrs	Light mist initially; F3; Moderate - Good Visibility; 5-8/8 Okta
22.08.18	3	09.30 - 15.30	6 hrs	Light mist initially; F4; Moderate - Good Visibility; 5-8/8 Okta
22.08.18	4	09.15 - 15.15	6 hrs	Light mist initially; F3-4; Moderate - Good Visibility; 5-8/8 Okta
22.08.18	5	09.30 - 15.30	6 hrs	Light mist initially; F4; Moderate - Good Visibility; 6-8/8 Okta
22.08.18	6	09.20 - 15.20	6 hrs	Light mist initially; F2-4; Moderate - Good Visibility; 4-8/8 Okta

Table 21: Hinterland Survey Schedule Ballinagree, Breeding Season 2018

Date	Time (24hrs)	Survey Effort (hrs & mins)	Weather
11.04.18	09.48 - 16.00	6 hrs 12 mins	Dry; F1; Good Visibility; 8/8 Okta
18.04.18	08.00 - 12.20	4hrs 20 mins	Occ. Showers; F5; Poor - Good Visibility; 8/8 Okta
20.07.19	09.27 - 17.59	8 hrs 30 mins	Dry; F2-3; Good Visibility; 5/8 Okta

Table 22: VP Survey Schedule Ballinagree, Winter Season Survey 2018/2019

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
17.10.18	1	08.11 - 14.55	6 hrs	Dry; F1-2; Good Visibility; 3/8 Okta
17.10.18	2	09.24 - 15.24	6 hrs	Dry; F4; Good Visibility; 2/8 Okta
17.10.18	3	09.20 - 15.20	6 hrs	Dry; F2-3; Good Visibility; 1-6/8 Okta
17.10.18	4	09.30 - 15.30	6 hrs	Dry; F5-6; Good Visibility; 1-6/8 Okta
17.10.18	5	09.30 - 15.30	6 hrs	Dry; F4-5; Good Visibility; 3/8 Okta
17.10.18	6	08.55 - 14.55	6 hrs	Dry; F3; Good Visibility; 2/8 Okta
16.11.18	1	09.15 - 15.15	6 hrs	Occasional drizzle; F5; Moderate to Poor Visibility; 8/8 Okta
22.11.18	2	09.00 - 15.00	6 hrs	Showers for last hour; F4; Good Visibility; 7/8 Okta
16.11.18	3	09.00 - 15.00	6 hrs	Mist; F4; Poor Visibility; 8/8 Okta
16.11.18	4	09.00 - 15.00	6 hrs	Mist; F3; Moderate to Poor Visibility; 8/8 Okta
22.11.18	5	09.00 - 15.00	6 hrs	Showers for last hour; F3-4; Good Visibility; 7-8/8 Okta
22.11.18	6	09.00 - 15.00	6 hrs	Showers for last hour; F3; Good Visibility; 5/8 Okta
07.12.18	1	09.02 - 15.02	6 hrs	Showers ; F4-5; Good Visibility; 5/8 Okta
10.12.18	2	08.30 - 14.30	6 hrs	Occ. Light rain; F2; Good Visibility; 8/8 Okta
07.12.18	3	09.15 - 15.15	6 hrs	Occ. Showers; F4-6; Good Visibility; 1-7/8 Okta
07.12.18	4	09.18 - 15.18	6 hrs	Occ. Showers; F4-6; Good Visibility; 1-7/8 Okta
10.12.18	5	08.48 - 14.48	6 hrs	Occ. Drizzle; F1-2; Moderate to Poor; 8/8 Okta
07.12.18	6	09.40 - 15.40	6 hrs	Showers; F4-5; Good Visibility; 3-8/8 Okta
11.01.19	1	09.00 - 15.00	6 hrs	Occ. Mist; F1-2; Good to Moderate Visibility; 7-8/8 Okta
11.01.19	2	09.00 - 15.00	6 hrs	Occ. Mist; F1-2; Good to Moderate Visibility; 7-8/8 Okta
11.01.19	3	08.55 - 14.55	6 hrs	Occ. Mist; F1; Good Visibility; 4/8 Okta
11.01.19	4	09.00 - 15.00	6 hrs	Dry; F3; Good Visibility; 5/8 Okta
11.01.19	5	08.55 - 14.55	6 hrs	Dry; F2; Good to Moderate Visibility; 4-7/8 Okta
11.01.19	6	08.50 - 15.50	6 hrs	Occ. Light drizzle; F1; Good Visibility; 4/8 Okta
15.02.19	1	09.00 - 15.00	6 hrs	Drizzle after 13.00; F3; Good to Moderate Visibility; 8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
15.02.19	2	09.00 - 15.00	6 hrs	Drizzle after 12.50; F5; Good to Moderate Visibility; 8/8 Okta
15.02.19	3	09.00 - 15.00	6 hrs	Drizzle after 12.50; F5; Good to Moderate Visibility; 8/8 Okta
15.02.19	4	09.00 - 15.00	6 hrs	Drizzle after 13.00; F3-4; Moderate - Poor Visibility; 8/8 Okta
15.02.19	5	09.25 - 15.25	6 hrs	Drizzle after 12.50; F3-4; Moderate - Poor Visibility; 8/8 Okta
15.02.19	6	08.40 - 14.40	6 hrs	Drizzle after 12.50; F1-3; Moderate - Poor Visibility; 8/8 Okta
28.03.19	1	09.40 - 15.40	6 hrs	Dry; F1-3; Good Visibility; 1/8 Okta
29.03.19	2 (new)	09.15 - 15.15	6 hrs	Dry; F1-3; Good Visibility; 4-8/8 Okta
28.03.19	3	10.15 - 16.15	6 hrs	Dry; F2-3; Good Visibility; 6/8 Okta
28.03.19	4	09.10 - 15.10	6 hrs	Dry; Good Visibility; 3/8 Okta
29.03.19	5	09.35 - 15.35	6 hrs	Dry; F3; Good Visibility; 8/8 Okta
28.03.19	6	09.45 - 15.45	6 hrs	Dry; F2; Good Visibility; 1/8 Okta

Table 23: VP Survey Schedule Ballinagree, Breeding Season Survey 2019.

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
28.03.19	1	09.40 - 15.40	6 hrs	Dry; F1-3; Good Visibility; 1/8 Okta
29.03.19	2 (new)	09.15 - 15.15	6 hrs	Dry; F1-3; Good Visibility; 4-8/8 Okta
28.03.19	3	10.15 - 16.15	6 hrs	Dry; F2-3; Good Visibility; 6/8 Okta
28.03.19	4	09.10 - 15.10	6 hrs	Dry; Good Visibility; 3/8 Okta
29.03.19	5	09.35 - 15.35	6 hrs	Dry; F3; Good Visibility; 8/8 Okta
28.03.19	6	09.45 - 15.45	6 hrs	Dry; F2; Good Visibility; 1/8 Okta
29.03.19	7	09.04 - 15.04	6 hrs	Dry; F2-3; Moderate to Good Visibility; 7-8/8 Okta
29.03.19	8	09.14 - 15.14	6 hrs	Dry; F3-4; Good Visibility; 2-8/8 Okta
17.04.19	1	09.00 - 15.00	6 hrs	Drizzle Initially; F4-5; Moderate to Good Visibility; 8/8 Okta
17.04.19	2 (new)	09.03 - 15.03	6 hrs	Mist Initially; F4; Moderate to Good Visibility; 8/8 Okta
17.04.19	3	10.16 - 16.16	6 hrs	Fog Initially; F3; Poor to Good Visibility; 8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
17.04.19	4	09.20 - 15.20	6 hrs	Low Cloud Initially; F4; Poor to Good Visibility; 8/8 Okta
17.04.19	5	09.25 - 15.25	6 hrs	Low Cloud Initially; F3; Poor to Good Visibility; 8/8 Okta
17.04.19	6	08.57 - 14.58	6 hrs	Low Cloud Initially; F3; Poor to Good Visibility; 8/8 Okta
17.04.19	7	09.20 - 15.20	6 hrs	Low Cloud Initially; F5; Poor to Good Visibility; 7-8/8 Okta
17.04.19	8	09.00 - 15.00	6 hrs	Fog Initially; F3; Poor to Good Visibility; 8/8 Okta
13.05.19	1	09.05 - 15.05	6 hrs	Dry; F4-5; Moderate to Good Visibility; 3/8 Okta
13.05.19	2 (new)	09.25 - 15.25	6 hrs	Dry; F4; Good Visibility; 2-3/8 Okta
13.05.19	3	09.05 - 15.05	6 hrs	Dry; F4; Good Visibility; 3/8 Okta
13.05.19	4	09.25 - 15.25	6 hrs	Dry; F3-4; Good Visibility; 2-3/8 Okta
13.05.19	5	09.02 - 15.02	6 hrs	Dry; F4-5; Good Visibility; 3/8 Okta
13.05.19	6	09.50 - 15.50	6 hrs	Dry; F0-1; Good Visibility; 2/8 Okta
13.05.19	7	09.01 - 15.01	6 hrs	Dry; F6; Good Visibility; 1/8 Okta
13.05.19	8	08.59 - 14.59	6 hrs	Dry; F4; Good Visibility; 1/8 Okta
12.06.19	1	09.50 - 15.50	6 hrs	Showers; F2-3; Good Visibility; 8/8 Okta
12.06.19	2 (new)	09.30 - 15.30	6 hrs	Showers; F4; Good Visibility; 8/8 Okta
12.06.19	3	09.45 - 15.45	6 hrs	Showers; F3; Good Visibility; 7/8 Okta
12.06.19	4	10.00 - 16.00	6 hrs	Showers; F4; Good Visibility; 8/8 Okta
12.06.19	5	09.15 - 15.15	6 hrs	Showers; F3-4; Moderate Visibility; 8/8 Okta
12.06.19	6	09.26 - 11.50, 12.05 - 15.41	6 hrs	Showers; F3-4; Moderate Visibility; 8/8 Okta
12.06.19	7	09.05 - 15.05	6 hrs	Showers; F4-5; Moderate to Good Visibility; 8/8 Okta
12.06.19	8	09.40 - 15.40	6 hrs	Showers; F4; Moderate to Good Visibility; 8/8 Okta
23.07.19	1	09.00 - 15.00	6 hrs	Occ. Mist; F3-4; Poor to Good Visibility; 8/8 Okta
30.07.19	2 (new)	08.55 - 14.55	6 hrs	Occ. Mist; F4; Poor to Good Visibility; 6-8/8 Okta
23.07.19	3	09.15 - 15.15	6 hrs	Low Cloud; F4; Poor to Moderate Visibility; 8/8 Okta
23.07.19	4	09.00 - 15.00	6 hrs	Low Cloud; F4; Poor to Moderate Visibility; 8/8 Okta
30.07.19	5	09.00 - 15.00	6 hrs	Dry; F5-6; Good Visibility; 7/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
30.07.19	6	09.15 - 15.15	6 hrs	Dry; F3-4; Good Visibility; 5-8/8 Okta
23.07.19	7	09.01 - 15.01	6 hrs	Occ. Mist; F4-6; Poor to Moderate Visibility; 8/8 Okta
30.07.19	8	09.17 - 15.17	6 hrs	Occ. Mist; F3-4; Moderate to Good Visibility; 6-8/8 Okta
31.07.19	9	10.00 - 16.00	6 hrs	Mist Initially; F1-3; Moderate to Good Visibility; 5-8/8 Okta
31.07.19	10	10.00 - 16.00	6 hrs	Mist Initially; F1-3; Poor to Good Visibility; 8/8 Okta
21.08.19	1	07.49 - 13.49	6 hrs	Light rain initially; F4-6; Good Visibility; 8/8 Okta
21.08.19	2 (new)	07.12 - 13.12	6 hrs	Low Cloud initially; F3-6; Good Visibility; 8/8 Okta
21.08.19	3	07.32 - 13.32	6 hrs	Low Cloud initially; F6; Good Visibility; 8/8 Okta
21.08.19	4	07.55 - 13.55	6 hrs	Dry; F4; Good Visibility; 8/8 Okta
21.08.19	5	07.20 - 13.20	6 hrs	Dry; F3-4; Good Visibility; 8/8 Okta
21.08.19	6	07.20 - 13.20	6 hrs	Dry; F3-5; Moderate to Good Visibility; 8/8 Okta
21.08.19	7	07.45 - 13.45	6 hrs	Dry; F4-5; Moderate to Good Visibility; 8/8 Okta
21.08.19	8	07.40 - 13.40	6 hrs	Dry; F4-6; Moderate to Good Visibility; 8/8 Okta
21.08.19	9	07.15 - 13.15	6 hrs	Dry; F4; Poor to Good Visibility; 8/8 Okta
21.08.19	10	07.52 - 13.52	6 hrs	Dry; F3-4; Good Visibility; 8/8 Okta

Table 24: Hinterland Survey Schedule Ballinagree, Breeding Season 2019.

Date	Time (24hrs)	Survey Effort (hrs & mins)	Weather
09.04.19	13.00 - 17.00	4hrs	Dry; F2; Good Visibility; Cloud 6/8
11.04.19	14.00 - 17.45	3 hrs 45 mins	Dry; F3; Good Visibility; Cloud 5/8
27.04.19	14.00 - 17.25	3 hrs 25 mins	Dry; F2; Good Visibility; Cloud 4/8
15.07.19	08.30 - 17.00	8 hrs 30 mins	Dry; F3; Good Visibility; Cloud 7/8
23.07.19	09.15 - 17.15	8 hrs	Occ. Showers; F3; Good Visibility; Cloud 4/8
30.07.19	14.00 - 16.50	2 hrs 50 mins	Dry; F3-4; Good Visibility; Cloud 8/8

Table 25: VP Survey Schedule Ballinagree, Winter Season Survey 2019/2020.

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
11.10.19	1	09.33 - 15.33	6 hrs	Dry; F1-3; Good Visibility; 5-8/8 Okta
11.10.19	2 (new)	09.10 - 15.10	6 hrs	Dry; F3; Good Visibility; 5-8/8 Okta
11.10.19	3	09.30 - 15.30	6 hrs	Dry; F4; Good Visibility; 7/8 Okta
11.10.19	4	09.25 - 15.25	6 hrs	Dry; F4; Good Visibility; 4-8/8 Okta
22.10.19	5	09.30 - 15.30	6 hrs	Dry; F1-2; Good Visibility; 8/8 Okta
22.10.19	6	09.04 - 15.04	6 hrs	Dry; F1; Good Visibility; 8/8 Okta
11.10.19	7	09.30 - 15.30	6 hrs	Dry; F3; Good Visibility; 6/8 Okta
22.10.19	8	09.59 - 15.59	6 hrs	Occ. Showers; F3-4; Good Visibility; 8/8 Okta
22.10.19	9	09.45 - 15.45	6 hrs	Occ. Drizzle; F2-3; Good Visibility; 8/8 Okta
22.10.19	10	09.15 - 15.15	6 hrs	Dry; F2-3; Good Visibility; 8/8 Okta
19.11.19	1	09.30 - 15.30	6 hrs	Dry; F3; Good Visibility; 1-7/8 Okta
19.11.19	2 (new)	09.34 - 15.34	6 hrs	Dry; F3-4; Good Visibility; 0-6/8 Okta
19.11.19	3	09.14 - 15.14	6 hrs	Dry; F3-4; Good Visibility; 1-6/8 Okta
19.11.19	4	09.30 - 15.30	6 hrs	Dry; F2-3; Good Visibility; 2-7/8 Okta
22.11.19	5	09.15 - 15.15	6 hrs	Dry; F3; Good Visibility; 8/8 Okta
22.11.19	6	09.35 - 15.35	6 hrs	Dry; F3; Good Visibility; 7-8/8 Okta
19.11.19	7	09.06 - 15.06	6 hrs	Dry; F2; Good Visibility; 2/8 Okta
22.11.19	8	09.00 - 15.00	6 hrs	Dry; F4; Poor to Moderate Visibility; 8/8 Okta
22.11.19	9	09.23 - 15.23	6 hrs	Dry; F2-3; Good Visibility; 8/8 Okta
22.11.19	10	08.55 - 14.55	6 hrs	Dry; F2-3; Poor to Moderate Visibility; 8/8 Okta
17.12.19	1	09.00 - 15.00	6 hrs	Dry; F1; Good Visibility; 2/8 Okta
17.12.19	2 (new)	09.20 - 15.20	6 hrs	Dry; F1-2; Good Visibility; 2-5/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
17.12.19	3	10.05 - 16.05	6 hrs	Dry; F1-2; Good Visibility; 3/8 Okta
17.12.19	4	09.03 - 15.03	6 hrs	Dry; F2; Good Visibility; 2/8 Okta
16.12.19	5	09.25 - 15.25	6 hrs	Dry; F2; Good Visibility; 0/8 Okta
16.12.19	6	09.11 - 15.11	6 hrs	Dry; F1; Good Visibility; 1/8 Okta
17.12.19	7	09.40 - 15.40	6 hrs	Dry; F2-3; Good Visibility; 3-5/8 Okta
16.12.19	8	09.00 - 15.00	6 hrs	Dry; F2; Good Visibility; 3-5/8 Okta
16.12.19	9	09.59 - 15.59	6 hrs	Dry; F2-3; Good Visibility; 1/8 Okta
16.12.19	10	09.55 - 15.55	6 hrs	Dry; F2; Good Visibility; 1/8 Okta
21.01.20	1	09.30 - 15.30	6 hrs	Dry; F1-4; Good Visibility; 8/8 Okta
20.01.20	2 (new)	10.06 - 16.06	6 hrs	Dry; F1-4; Fair to Good Visibility; 1-3/8 Okta
21.01.20	3	09.50 - 15.50	6 hrs	Dry; F1; Good Visibility; 8/8 Okta
21.01.20	4	08.50 - 14.50	6 hrs	Dry; F1; Good Visibility; 7/8 Okta
20.01.20	5	10.10 - 16.10	6 hrs	Dry; F1-2; Good Visibility; 1-2/8 Okta
20.01.20	6	09.50 - 15.50	6 hrs	Dry; F1; Good Visibility; 1-3/8 Okta
21.01.20	7	09.26 - 15.26	6 hrs	Dry; F2; Good Visibility; 8/8 Okta
20.01.20	8	10.15 - 16.15	6 hrs	Dry; F1-2; Good Visibility; 8/8 Okta
20.01.20	9	09.30 - 15.30	6 hrs	Dry; F1-3; Good Visibility; 0-3/8 Okta
20.01.20	10	09.30 - 15.30	6 hrs	Dry; F3-4; Good Visibility; 1-3/8 Okta
20.02.20	1	09.00 - 15.00	6 hrs	Dry; F2-3; Fair to Good Visibility; 2-8/8 Okta
20.02.20	2 (new)	09.00 - 15.00	6 hrs	Occ. Snow showers; F4-5; Moderate to Good Visibility; 2-8/8 Okta
20.02.20	3	09.10 - 15.10	6 hrs	Occ. Snow/sleet showers; F3-4; Good Visibility; 4-6/8 Okta
20.02.20	4	09.00 - 15.00	6 hrs	Occ. showers; F3-5; Good Visibility; 6-8/8 Okta
27.02.20	5	08.58 - 14.58	6 hrs	Dry; F2-4; Good Visibility; 3/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
27.02.20	6	09.35 - 14.35	6 hrs	Dry; F2; Good Visibility; 4/8 Okta
20.02.20	7	09.00 - 15.00	6 hrs	Occ. Snow showers; F2; Fair to Good Visibility; 2-8/8 Okta
24.02.20	8	09.05 - 15.05	6 hrs	Dry; F3-4; Good Visibility; 2/8 Okta
27.02.20	9	09.30 - 15.30	6 hrs	Dry; F3; Good Visibility; 1-5/8 Okta
27.02.20	10	09.22 - 15.22	6 hrs	Dry; F1; Good Visibility; 1/8 Okta
18.03.20	1	09.05 - 15.05	6 hrs	Dry; F1; Good Visibility; 8/8 Okta
18.03.20	2 (new)	09.10 - 15.10	6 hrs	Dry; F1-2; Good Visibility; 8/8 Okta
18.03.20	3	09.36 - 15.36	6 hrs	Dry; F1-2; Good Visibility; 8/8 Okta
18.03.20	4	08.38 - 14.38	6 hrs	Dry; F2-3; Good Visibility; 8/8 Okta
20.03.20	5	08.50 - 14.50	6 hrs	Dry; F5; Good Visibility; 0-8/8 Okta
20.03.20	6	08.48 - 14.48	6 hrs	Dry; F2-3; Good Visibility; 1-8/8 Okta
18.03.20	7	09.03 - 15.03	6 hrs	Dry; F2-3; Good Visibility; 8/8 Okta
20.03.20	8	08.55 - 14.55	6 hrs	Dry; F4-5; Good Visibility; 1-8/8 Okta
20.03.20	9	09.10 - 15.10	6 hrs	Dry; F4; Good Visibility; 1-8/8 Okta
20.03.20	10	08.48 - 14.48	6 hrs	Dry; F3; Good Visibility; 0-8/8 Okta

Table 26: VP Survey Schedule Ballinagree, Breeding Season Survey 2020.

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
18.03.20	1	09.05 - 15.05	6 hrs	Dry; F1; Good Visibility; 8/8 Okta
18.03.20	2 (new)	09.10 - 15.10	6 hrs	Dry; F1-2; Good Visibility; 8/8 Okta
18.03.20	3	09.36 - 15.36	6 hrs	Dry; F1-2; Good Visibility; 8/8 Okta
18.03.20	4	08.38 - 14.38	6 hrs	Dry; F2-3; Good Visibility; 8/8 Okta
20.03.20	5	08.50 - 14.50	6 hrs	Dry; F5; Good Visibility; 0-8/8 Okta
20.03.20	6	08.48 - 14.48	6 hrs	Dry; F2-3; Good Visibility; 1-8/8 Okta
18.03.20	7	09.03 - 15.03	6 hrs	Dry; F2-3; Good Visibility; 8/8 Okta
20.03.20	8	08.55 - 14.55	6 hrs	Dry; F4-5; Good Visibility; 1-8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
20.03.20	9	09.10 - 15.10	6 hrs	Dry; F4; Good Visibility; 1-8/8 Okta
20.03.20	10	08.48 - 14.48	6 hrs	Dry; F3; Good Visibility; 0-8/8 Okta
24.04.20	1	08.20 - 14.20	6 hrs	Dry; F1; Good Visibility; 6/8 Okta
24.04.20	2 (new)	08.56 - 14.56	6 hrs	Dry, F1-2, Good Visibility, 1-5/8 Okta
24.04.20	3	10.00 - 16.00	6 hrs	Dry, F1, Good Visibility, 6/8 Okta
24.04.20	4	08.45 - 14.45	6 hrs	Dry, F1, Good Visibility, 7/8 Okta
27.04.20	5	09.04 - 15.04	6 hrs	Dry, F1-2, Good Visibility, 6/8 Okta
27.04.20	6	08.30 - 14.30	6 hrs	Dry, F2, Good Visibility, 4-8/8 Okta
24.04.20	7	08.50 - 14.50	6 hrs	Dry, F0-1, Good Visibility, 8/8 Okta
27.04.20	8	08.25 - 14.25	6 hrs	Dry, F2-3, Good Visibility, 2-7/8 Okta
24.04.20	9	08.30 - 14.30	6 hrs	Dry, F1-2, Good Visibility, 4-8/8 Okta
24.04.20	10	08.42 - 14.42	6 hrs	Dry, F1-2, Good Visibility, 2-7/8 Okta
11.05.20	1	09.01 - 15.01	6 hrs	Dry, F4, Good Visibility, 3/8 Okta
11.05.20	2 (new)	08.40 - 14.40	6 hrs	Dry, F3-4, Good Visibility, 2/8 Okta
11.05.20	3	08.30 - 14.30	6 hrs	Dry, F4, Good Visibility, 0/8 Okta
11.05.20	4	08.20 - 14.20	6 hrs	Dry, F4, Good Visibility, 1/8 Okta
11.05.20	5	09.04 - 15.04	6 hrs	Dry, F2, Good Visibility, 3-4/8 Okta
11.05.20	6	09.10 - 15.10	6 hrs	Dry, F3-4, Good Visibility, 4/8 Okta
11.05.20	7	08.50 - 14.50	6 hrs	Dry, F4-5, Good Visibility, 3/8 Okta
11.05.20	8	09.03 - 15.03	6 hrs	Dry, F2-3, Good Visibility, 3-4/8 Okta
11.05.20	9	08.35 - 14.35	6 hrs	Dry, F2, Good Visibility, 1/8 Okta
11.05.20	10	09.05 - 15.05	6 hrs	Dry, F2-3, Good Visibility, 3/8 Okta
10.06.20	1	08.30 - 14.30	6 hrs	Showers, F3, Good Visibility, 8/8 Okta
10.06.20	2 (new)	08.36 - 14.36	6 hrs	Showers, F3-4, Good Visibility, 8/8 Okta
10.06.20	3	09.09 - 15.09	6 hrs	Showers, F3-4, Good Visibility, 8/8 Okta
10.06.20	4	08.43 - 14.43	6 hrs	Showers, F4, Good Visibility, 8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
12.06.20	5	08.36 - 14.36	6 hrs	Dry, F3-4, Good Visibility, 8/8 Okta
12.06.20	6	08.40 - 14.40	6 hrs	Dry, F4, Poor to Good Visibility, 8/8 Okta
10.06.20	7	09.10 - 15.10	6 hrs	Showers, F3, Good Visibility, 8/8 Okta
12.06.20	8	08.41 - 14.41	6 hrs	Dry, F3-4, Poor to Good Visibility, 8/8 Okta
10.06.20	9	08.25 - 14.25	6 hrs	Showers, F2, Good Visibility, 8/8 Okta
10.06.20	10	08.20 - 14.20	6 hrs	Showers, F3, Good Visibility, 8/8 Okta
16.07.20	1	08.30 - 14.30	6 hrs	Dry, F1-2, Good Visibility, 2-7/8 Okta
16.07.20	2 (new)	08.49 - 14.49	6 hrs	Dry, F3-4, Poor to Good Visibility, 2-8/8 Okta
16.07.20	3	09.10 - 15.10	6 hrs	Dry, F1, Good Visibility, 2-6/8 Okta
16.07.20	4	08.40 - 14.40	6 hrs	Dry, F2-3, Good Visibility, 4-8/8 Okta
16.07.20	5	09.20 - 15.20	6 hrs	Dry, F3, Good Visibility, 4-5/8 Okta
16.07.20	6	08.45 - 14.48	6 hrs	Dry, F2, Good Visibility, 5/8 Okta
16.07.20	7	08.45 - 14.45	6 hrs	Dry, F5, Good Visibility, 3-8/8 Okta
16.07.20	8	08.25 - 14.25	6 hrs	Dry, F0, Poor to Good Visibility, 4/8 Okta
15.07.20	9	09.00 - 15.00	6 hrs	Occ. showers, F4, Poor to Good Visibility, 4-8/8 Okta
15.07.20	10	08.53 - 14.53	6 hrs	Dry, F4, Good Visibility, 8/8 Okta
26.08.20	1	08.55 - 14.55	6 hrs	Dry, F1, Good Visibility, 3-6/8 Okta
26.08.20	2 (new)	08.45 - 14.45	6 hrs	Mist at first, F3, Poor - Good Visibility, 3-6-8/8 Okta
26.08.20	3	08.39 - 14.39	6 hrs	Dry, F2, Good Visibility, 3/8 Okta
26.08.20	4	09.20 - 15.20	6 hrs	Dry, F2-3, Good Visibility, 6-7/8 Okta
26.08.20	5	08.15 - 14.15	6 hrs	Dry, F4-5, Good Visibility, 6-8/8 Okta
26.08.20	6	09.10 - 15.10	6 hrs	Dry, F1-2, Good Visibility, 6-8/8 Okta
26.08.20	7	08.50 - 14.50	6 hrs	Dry, F4-5, Good Visibility, 4-6/8 Okta
26.08.20	8	08.31 - 14.31	6 hrs	Dry, F3, Good Visibility, 7/8 Okta
28.08.20	9	08.44 - 14.44	6 hrs	Showers, F3-4, Good Visibility, 6-8/8 Okta
28.08.20	10	09.15 - 15.15	6 hrs	Showers, F3, Good Visibility, 8/8 Okta

Table 27: Hinterland Survey Schedule Ballinagree, Breeding Season 2020.

Date	Time (24hrs)	Survey Effort (hrs & mins)	Weather
27.04.20	09.00 - 15.40	6 hrs 40 mins	Dry; F2; Good Visibility; Cloud 6/8
20.05.20	12.15 - 14.15	2 hrs	Dry; F3-4; Good Visibility; Cloud 4-6/8
26.07.20	09.30 - 17.05	7 hrs 35 mins	Occasional light showers; F3-4; Good Visibility; Cloud 7-8/8

Table 28: VP Survey Schedule Ballinagree, Winter Season Survey 2020/2021.

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
15.10.20	1	09.00 - 15.00	6 hrs	Dry; F1; Poor to Good Visibility; 8/8 Okta
15.10.20	2 (new)	08.50 - 14.30	6 hrs	Dry; F2; Poor to Good Visibility; 8/8 Okta
15.10.20	3	09.22 - 15.22	6 hrs	Dry; F3; Poor to Good Visibility; 8/8 Okta
15.10.20	4	09.00 - 15.00	6 hrs	Dry; F2-3; Poor to Good Visibility; 7/8 Okta
13.10.20	5	08.31 - 14.31	6 hrs	Dry; FX; Poor to Good Visibility; 4-8/8 Okta
13.10.20	6	08.25 - 14.25	6 hrs	Dry; F3; Poor to Good Visibility; 8/8 Okta
15.10.20	7	10.05 - 16.06	6 hrs	Dry; F3; Poor to Good Visibility; 6-8/8 Okta
13.10.20	8	09.10 - 15.10	6 hrs	Drizzle at first; F3; Poor to Good Visibility; 7-8/8 Okta
13.10.20	9	09.14 - 15.14	6 hrs	Drizzle at first; F3-4; Poor to Good Visibility; 8/8 Okta
13.10.20	10	09.03 - 15.03	6 hrs	Drizzle at first; F2-3; Poor to Good Visibility; 3-6/8 Okta
27.11.20	1	08.30 - 14.30	6 hrs	Dry; F0; Poor to Good Visibility; 4/8 Okta
25.11.20	2 (new)	09.20 - 15.20	6 hrs	Dry; F2-3; Poor to Good Visibility; 1/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
27.11.20	3	09.30 - 15.30	6 hrs	Dry; F2; Good Visibility; 8/8 Okta
27.11.20	4	09.11 - 15.11	6 hrs	Dry; F1; Poor to Good Visibility; 8/8 Okta
25.11.20	5	08.30 - 14.30	6 hrs	Dry; F3; Good Visibility; 2/8 Okta
25.11.20	6	08.30 - 14.30	6 hrs	Dry; F2; Good Visibility; 8/8 Okta
27.11.20	7	09.10 - 15.10	6 hrs	Dry; F3-4; Poor to Good Visibility; 4-8/8 Okta
25.11.20	8	08.57 - 14.57	6 hrs	Dry; F1; Poor to Good Visibility; 2-8/8 Okta
25.11.20	9	08.36 - 14.36	6 hrs	Dry; F2; Poor to Good Visibility; 2/8 Okta
25.11.20	10	09.00 - 15.00	6 hrs	Dry; F3; Poor to Good Visibility; 8/8 Okta
08.12.20	1	08.30 - 14.30	6 hrs	Dry; F2; Good Visibility; 2/8 Okta
08.12.20	2 (new)	09.00 - 15.00	6 hrs	Showers; F4; Poor to Good Visibility; 4-8/8 Okta
08.12.20	3	09.05 - 15.05	6 hrs	Dry; F3-4; Good Visibility; 3/8 Okta
08.12.20	4	08.45 - 14.45	6 hrs	Showers; F4; Good Visibility; 4/8 Okta
10.12.20	5	08.45 - 14.45	6 hrs	Showers; F2-4; Poor Visibility; 8/8 Okta
10.12.20	6	08.45 - 14.45	6 hrs	Showers; F1; Poor to Moderate Visibility; 8/8 Okta
08.12.20	7	08.30 - 14.30	6 hrs	Showers; F2; Poor Visibility; 8/8 Okta
08.12.20	8	08.46 - 14.46	6 hrs	Dry; F4; Good Visibility; 4/8 Okta
10.12.20	9	08.39 - 14.39	6 hrs	Showers; F3; Poor to Moderate Visibility; 8/8 Okta
10.12.20	10	08.28 - 14.28	6 hrs	Showers; F2-3; Poor to Moderate Visibility; 8/8 Okta
22.01.21	1	09.00 - 15.00	6 hrs	Snow showers; F3; Moderate to Good Visibility; 4-8/8 Okta
22.01.21	2 (new)	10.05 - 16.05	6 hrs	Snow showers; F2-3; Poor to Good Visibility; 8/8 Okta
22.01.21	3	09.30 - 15.30	6 hrs	Showers; F3-4; Good Visibility; 3-8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
22.01.21	4	09.08 - 15.08	6 hrs	Showers; F1-2; Good Visibility; 4/8 Okta
21.01.21	5	08.55 - 14.55	6 hrs	Showers; F3; Good Visibility; 1/8 Okta
22.01.21	6	08.50 - 14.50	6 hrs	Dry; F3; Poor to Good Visibility; 8/8 Okta
22.01.21	7	09.35 - 15.35	6 hrs	Snow showers; F5; Poor to Good Visibility; 8/8 Okta
21.01.21	8	09.13 - 15.13	6 hrs	Showers; F1-3; Moderate to Good Visibility; 4/8 Okta
21.01.21	9	09.25 - 15.25	6 hrs	Showers; F3-5; Poor to Moderate Visibility; 1-8/8 Okta
21.01.21	10	08.50 - 14.50	6 hrs	Showers; F2; Good Visibility; 1-8/8 Okta
22.02.21	1	09.00 - 15.00	6 hrs	Dry; F1; Good Visibility; 7/8 Okta
25.02.21	2 (new)	08.52 - 14.52	6 hrs	Dry; F3-4; Good Visibility; 1-3/8 Okta
22.02.21	3	09.10 - 15.10	6 hrs	Dry; F4; Good Visibility; 8/8 Okta
22.02.21	4	09.00 - 15.00	6 hrs	Showers; F2; Good Visibility; 4/8 Okta
25.02.21	5	09.03 - 15.03	6 hrs	Dry; F2-3; Good Visibility; 2/8 Okta
25.02.21	6	09.20 - 15.20	6 hrs	Dry; F1-3; Good Visibility; 1-5/8 Okta
22.02.21	7	09.16 - 15.16	6 hrs	Dry; F5-7; Moderate to Good Visibility; 8/8 Okta
25.02.21	8	09.10 - 15.10	6 hrs	Dry; F2; Good Visibility; 2/8 Okta
25.02.21	9	08.58 - 14.58	6 hrs	Dry; F2; Good Visibility; 2/8 Okta
25.02.21	10	09.14 - 15.14	6 hrs	Showers; F2; Good Visibility; 1-8/8 Okta
16.03.21	1	08.55 - 14.55	6 hrs	Dry; F3; Good Visibility; 1-8/8 Okta
16.03.21	2 (new)	09.09 - 15.09	6 hrs	Dry; F2-3; Moderate to Good Visibility; 4-8/8 Okta
16.03.21	3	08.52 - 14.52	6 hrs	Dry; F3; Good Visibility; 3/8 Okta
16.03.21	4	09.15 - 15.15	6 hrs	Dry; F3-5; Moderate to Good Visibility; 2-8/8 Okta
30.03.21	5	08.37 - 14.37	6 hrs	Dry; F1; Poor to Good Visibility; 0-8/8 Okta

Date	VP	Time (24hrs)	Survey Effort (hrs/mins)	Weather
30.03.21	6	09.10 - 15.10	6 hrs	Dry; F1; Poor to Good Visibility; 3-8/8 Okta
16.03.21	7	09.15 - 15.15	6 hrs	Dry; F3; Poor to Good Visibility; 3-8/8 Okta
30.03.21	8	09.00 - 15.00	6 hrs	Dry; F2; Poor to Good Visibility; 3-8/8 Okta
16.03.21	9	08.45 - 14.45	6 hrs	Showers; F2; Poor to Good Visibility; 8/8 Okta
16.03.21	10	08.40 - 14.40	6 hrs	Mist at first; F2-3; Poor to Good Visibility; 0-8/8 Okta

3.2 Hen Harrier Observations – Breeding Seasons

Table 29: Hen Harrier Observations, Breeding Season 2017 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	21.04.17	16.15 - 16.35	5 & 6	1,200	0	Foraging, Commuting	Conifer plantation, scrub, rough grassland, improved grassland	Adult male Hen Harrier flying low (mostly 0-5m above ground level) over trees/scrub. Partly foraging, partly commuting. Flew over conifer plantation, rough grassland & willow scrub, down a river valley with improved agricultural fields and back up the hill where it foraged again. Lost sight behind tall conifers.
2	16.06.17	10.15	6	0	40	Foraging	Heath	Male Hen Harrier hunting over heath-covered section of Dooneens mountain to the east of VP6 (off site). Flight height of 0-5m above ground level.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
3	16.06.17	13.08 - 13.09	6	0	90	Commuting, Carrying prey	Heath, Conifer Plantation	Male Hen Harrier (probably the same individual as flightline no. 2) heading south, carrying prey and flying directly. Flight height 5-25m. Flew up over conifer plantation to the south of VP6 and was lost from sight.
4a	16.06.17	16.33	6	0	30	Commuting	Heath	Male Hen Harrier flying south, quickly and directly (no prey). Flight height 5-25m.
4b	16.06.17	16.40	6	0	40	Flying	Conifer Plantation	Male Hen Harrier (presumed the same individual as flightline no. 4a) gliding slowly through conifer treetops to the south of VP6, c.15m flight height. Lost from sight to the south.
5a	12.07.17	14.14 - 14.20	6	0	360	Flying	Bog, rough grassland	Female Hen Harrier flying in from Laney River Valley 25-100m AGL initially. Mobbed by small passerines. Then gradually ascended higher, circling all the time (well above 100m) and lost from sight in clouds.
5b	12.07.17	14.44 - 14.45	6	0	40	Foraging	Bog, rough grassland	Adult female Hen Harrier (same individual as 5a) flying west across VP6 area. Foraging 0-5m AGL initially and then 5-25m AGL. Mobbed by small passerines. Lost sight as she flew towards the Laney River Valley.
6	23.08.17	13.49	5	70	20	Flying	Improved grassland	Juvenile Hen Harrier (this year's bird) flew southwest and then south at 2-4m height

Table 30: Hen Harrier Observations, Breeding Season 2018.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	16.03.18	10.11	4	15	0	Foraging	Bog	Brief sighting of ringtail Hen Harrier flying low <5m AGL. Probably foraging. Lost from view due to topography.
2	16.03.18	11.06	3	5	5	Flying	Conifer Plantation, Bog	Male Hen Harrier flew over forest and then over moor at 1-2m AGL. Veered south and flew over hill out of view.
3	22.03.18	12.55 - 12.57	6	0	180	Flying, carrying prey	Bog, Conifer Plantation	Male Hen Harrier carrying food in talons, being mobbed by a Raven (but out-maneuvred it). Continued south with prey flying c. 25-100m AGL.
4	11.04.18	12.47	3	15	17	Flying	Conifer Plantation, Bog	Male Hen Harrier flying over forestry south of VP3 downhill. Flew up over the brow of the hill to the west at 2-10m AGL.
5	10.05.18	10.24 - 10.35	4	660	0	Foraging, Flying	Heath, Conifer Plantation, Rough Grassland	Male Hen Harrier foraging low over heath, conifer plantation & rough grassland habitat c. 5m AGL (15m AGL over trees).
6	10.05.18	13.06 - 13.13	1	360	50	Foraging, Consuming Prey	Heath, Conifer Plantation, Rough Grassland	Male Hen Harrier hunting, dropped to ground (point A) for 20 seconds and caught prey (possibly frog) and flew low to point B to consume it. After three minutes he climbed up and soared eastwards, dropping a little and flew southwards along a similar path to observation no. 5 (may be same bird), c. 80m AGL.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
7	08.06.18	12.51	4	115	0	Foraging	Rough Grassland, Conifer Plantation	Male Hen Harrier hunting at 0-5m AGL over rough grassland before rising to 25m and flying east over post-thicket forestry.
8	06.07.18	12.07	3	15	5	Foraging	Heath/Bog	Male Hen Harrier hunting over heath bog at a height of 0-5m AGL.
9	06.07.18	12.33 - 12.37	4	210	30	Flying	Grassland, Conifer Plantation	Male Hen Harrier flying over grassland in valley below VP4. Flight height 1-3m AGL over grassland and just above trees in Conifer Plantation.
10a	06.07.18	14.07	3	15	0	Foraging	Heath/Bog	Male Hen Harrier hunting over heath bog at a height of 0-5m AGL.
10b	06.07.18	14.09	3	0	40	Flying	Rough Grassland	Male Hen Harrier (almost certainly same individual as observation no. 10a), flying over rough grassland at 5-25m AGL.
10c	06.07.18	14.10	3	0	240	Flying (two males together briefly)	Grassland, Conifer Plantation	Male Hen Harrier (from observation no. 10a/b) joined by a second male Hen Harrier and flew together for a few seconds. One bird lost from view. The remaining bird flew over grassland and Conifer Plantation at a height of 5-25m AGL.
11	06.07.18	14.53 - 15.03	2, 6	240	330	Flying with prey	Grassland, Conifer Plantation, Heath	Male Hen Harrier flying with prey, initially c. 10m AGL, circling higher up to 500m north of VP5. Reduced height again to 5-25m AGL to fly along ridge over heath near VP6.

Table 31: Hen Harrier Observations, Summer Season 2019 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	28.03.19	15.39	6	0	149	Foraging	Heath/Bog	Ringtail Hen Harrier hunting low (1-3m AGL) over heath/bog northeast of VP6.
2	13.05.19	09.20	8	30	0	Flying	Conifer Plantation	Male Hen Harrier flying over forest at a height of 5-25m AGL.
3	12.06.19	12.15	6	0	125	Foraging	Conifer Plantation, Rough Grassland	Male Hen Harrier initially flying at 20m AGL over spruce forestry. Dropped to 1-2m AGL, hunting over rough grassland.
4a	12.06.19	13.20	6	20	0	Commuting	Pasture	Male Hen Harrier flying at a height of 15m AGL over pasture/treelines.
4b	12.06.19	13.22	6	120	0	Foraging	Conifer Plantation, Scrub	Male Hen Harrier hunting at a height of 3-10m AGL. Same individual as 4a.
4c	12.06.19	13.27	6	70	0	Commuting	Conifer Plantation	Male Hen Harrier commuting flight across spruce forestry, then dropped behind it, c. 15m AGL.

Table 32: Casual Hen Harrier Observations, Summer Season 2019 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
A	27.03.19	11.58	RG TR1	10	0	Flying	Heath/Bog	Male Hen Harrier flying with Buzzard over heather at 10-20m AGL.

B	27.03.19	12.16	RG TR1	10	0	Resting/Flying	Heath/Bog	Male Hen Harrier flushed up from heather during transect. Flew over heather for 10 seconds.
C	27.05.19	08.28	PC1	5	0	Flying	Conifer Plantation	Male Hen Harrier flying over young conifer plantation at a height of 5m AGL.

Table 33: Hen Harrier Observations, Breeding Season 2020 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	18.03.20	10.28	7 & 3	103	15	Foraging	Conifer Plantation	Male Hen Harrier hunting over bog and pre-thicket forestry at a height of 1-25m.
2	18.03.20	11.26	1	50	0	Foraging	Young Forestry, Scrub, Rush, Grassland	Male Hen Harrier rose out of scrub/new forestry south of VP1, foraged over new forestry and rushy grassland, zig zagging over habitat as it hunted, then flew south towards VP3 over mature forestry, flying low at all times
3	20.03.20	11.36	8	240	0	Foraging	Conifer Plantation, Improved Grassland	Male flying low over spruce forest, then hunting over rushy pasture before circling upwards to 40m height.
4	27.04.20	09.23	6	0	60	Carrying prey	Grassland	Male Hen Harrier carrying prey and flying over grassland at a height of 50-120m above ground level.
5	10.06.20	10.05	4	20	0	Flying	Heath/Bog	Male Hen Harrier flying west at a height of 5-25m.
6	10.06.20	10.49	1	68	0	Flying	Forestry	Adult Male Hen Harrier circling over Forestry at a height of 10-30m.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
7a	12.06.20	08.40	5	8	0	Flying	Bog, Rough Grassland	Ringtail Hen Harrier flew east past ridge at VP5 at a height of 10-30m, then flew back west.
7b	12.06.20	08.42	5	10	0	Flying	Bog, Rough Grassland	Ringtail Hen Harrier flying east at a height of 10-30m.
8	16.07.20	12.02	8	5	0	Flying		Brief view of probable male Hen Harrier flying at a height of 5-25m.
9	26.08.20	13.25	8	45	0	Foraging	Heath/Bog	Ringtail Hen Harrier hunting over bog at a height of <20m.
10	26.08.20	13.44	3	5	0	Foraging	Forestry	Ringtail Hen Harrier flying along the edge of forestry at a height of <5m.
11	26.08.20	13.56	8	22	0	Foraging	Heath/Bog	Ringtail Hen Harrier hunting over bog at a height of <20m.
12	26.08.20	14.02	2	65	0	Circling	Heath/Bog	Ringtail Hen Harrier circling at a height of 15-50m, flew towards VP8 where it started hunting at a height of 1-2m.
13	26.08.20	14.08	2 & 5	99	0	Foraging	MF/HB	Ringtail Hen Harrier hunting between VP8 and VP2 flying low 1-2m height.

3.3 Hen Harrier Observations – Winter Seasons

Table 34: Hen Harrier Observations, Winter Season 2017/2018 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	09.11.17	11.24 - 11.26	5	150	0	Foraging	Conifer Plantation, rough grassland	Male Hen Harrier hunting over young conifers and rough grassland. Flew south at 2-5m above ground level (AGL) and then flew over the forest at 25m AGL, and west out of view.
2	09.11.17	12.45 - 12.47	1 & 5	0	210	Flying	Conifer Plantation	Ringtail Hen Harrier mobbed by three crows. Flying at 25-100m AGL initially, dropped to 20m AGL.
3	09.11.17	13.18	1	4	0	Flying	Conifer Plantation	Adult male Hen Harrier flying just above treetops, 5-25m AGL.
4	09.11.17	13.33	1 & 4	23	161	Foraging	Conifer Plantation, rough grassland	Adult male Hen Harrier foraging, 0-5m AGL, then rose to 20m to clear forestry.
5	26.01.17	12.06 - 12.08	3	120	30	Flying	Conifer Plantation, Bog	Ringtail Hen Harrier (probably a young female) flew in from the east over forest at 8-10m AGL. Mobbed by two Ravens. The Harrier then flew low over the moor (1-2m AGL) as it ascended the hill and flushed two Snipe. It disappeared over the hill but was seen again flying along the eastern side of the peak to the southeast of Musheramore at 1-2m AGL.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
6	21.02.18	13.16	3	4	0	Foraging	Conifer Plantation	Male Hen Harrier came briefly into view over immature conifer plantation to the north of VP3. Flying over conifers at 0-5m AGL. Lost from sight heading north.
7	26.02.18	11.17	5	15	0	Flying	Improved Agricultural Grassland	Adult male Hen Harrier briefly seen, flying quickly over improved agricultural grassland < 25m AGL.
8	26.02.18	11.33 - 11.37	5 & 6	120	120	Flying	Improved Agricultural Grassland, Scrub	Adult male Hen Harrier seen again (probably same bird as Observation 6). Flying quickly improved agricultural grassland, and scrub. Flew around disused house and farmyard at 10m AGL and dropped to 3-5m AGL as it left the site and continued down into valley and over another area of scrub before disappearing out of view.
9	16.03.18	10.11	4	15	0	Foraging	Bog	Brief sighting of ringtail Hen Harrier flying low <5m AGL. Probably foraging. Lost from view due to topography.
10	16.03.18	11.06	3	5	5	Flying	Conifer Plantation, Bog	Male Hen Harrier flew over forest and then over moor at 1-2m AGL. Veered south and flew over hill out of view.
11	22.03.18	12.55	6	0	180	Flying, carrying prey	Bog, Conifer Plantation	Male Hen Harrier carrying food in talons, being mobbed by a Raven (but outmanoeuvred it). Continued south with prey flying c. 25-100m AGL.

Table 35: Hen Harrier Observations, Winter Season 2018/2019 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	17.10.18	9.19 - 9.21	4	135	0	Flying	Rough grass and heath/bog	Male Hen Harrier flying east to west up valley over rough grass and heath/bog. Mobbed by Raven, driven off to southwest over hill.
2	17.10.18	9.38	1	40	0	Foraging	Conifer Plantation	Male Hen Harrier foraging, < 15m above ground level (AGL).
3a	17.10.18	11.24	6	0	49	Foraging	Heath/molinia	Ringtail (probable adult female) foraging low (0-5m AGL) off site over heath.
3b	17.10.18	12.08 - 12.11	6	0	180	Circling	Rough grassland	Ringtail (probable adult female) circling off site off site at a height of 5-25m AGL.
4	17.10.18	12.26	6	0	48	Foraging	Rough Grassland, Conifer Plantation	Ringtail (probable juvenile male) hunting off site over heath at a height of 0-5m AGL.
5	07.12.18	10.23	4	25	0	Foraging	Rough grassland/ Heath bog	Male Hen Harrier foraging low (<5m AGL) for 15 seconds and flying at 5-25m AGL for 10 secs.
6	07.12.18	11.33 - 11.34	6	0	60	Foraging, Flying	Rough Grassland, Conifer Plantation	Female Hen Harrier flying southwest c. 25-30m AGL, foraging and flew over conifer plantation to the south and lost from view.
7a	11.01.19	14.17	3	5	23	Flying	Conifer Plantation	Male Hen Harrier flying east at 20m AGL (over treetops).

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
7b	11.01.19	14.30	2	460	30	Foraging	Conifer Plantation, Rough Grassland, Improved Grassland	Male Hen Harrier hunting low (< 10m AGL)
8	28.03.19	15.39	6	0	149	Foraging	Heath/Bog	Ringtail Hen Harrier hunting low (1-3m AGL) over heath/bog northeast of VP6.

Table 36: Hen Harrier Observations, Winter Season 2019/2020 Survey.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	22.10.19	13.33	10	0	80	Foraging	Heath/Bog	Male Hen Harrier hunting over heath/bog at a height of <10m above ground level (AGL).
2	22.11.19	11.44	10	0	10	Foraging	Heath/Bog	Male Hen Harrier hunting over heath/bog at a height of <5m above ground level (AGL).
3	17.12.19	9.52	7	15	0	Foraging	Heath/Bog	Male Hen Harrier hunting and flying over bog to west of VP7 at 4-10m above ground level.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
4	20.01.20	14.53	5	420	0	Foraging & perching	Conifer Plantation, Improved Grassland	Male Hen Harrier circling at 35m directly above VP5, being mobbed by 3 Hooded Crows. It flew north and descended as it flew and landed on a tree stump for 2 minutes. Then flew over conifer plantation at 20m height and foraged over improved grassland at 2-3m height before flying out of sight.
5	18.03.20	10.28	7 & 3	103	15	Foraging	Conifer Plantation	Male Hen Harrier hunting over bog and pre-thicket forestry at a height of 1-25m.
6	18.03.20	11.26	1	50	0	Foraging	Young Forestry, Scrub, Rush, Grassland	Male Hen Harrier rose out of scrub/new forestry south of VP1, foraged over new forestry and rushy grassland, zig zagging over habitat as it hunted, then flew south towards VP3 over mature forestry, flying low at all times
7	20.03.20	11.36	8	240	0	Foraging	Conifer Plantation, Improved Grassland	Male flying low over spruce forest, then hunting over rushy pasture before circling upwards to 40m height.

Table 37: Hen Harrier Observations, Winter Season 2020/2021 Survey

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
1	13.10.20	12.03	10	120	0	Foraging	Forestry/Clearfell	Ringtail Hen Harrier flew from mature forest along margin of young forestry and clearfelled area. Foraging at a height of 5-20m.
2	15.10.20	10.02	2	30	0	Flying	Heath/Bog	Male Hen Harrier interacting with Hooded Crow. Flying at a height of 5-25m.
3	25.11.20	11.00	8	10	0	Foraging	Bog/ Rough Grassland	Male Hen Harrier hunting over bog to the south of VP8 at a height of <10m.
4	25.11.20	11.05	9	0	30	Foraging	Heath/Bog	Male Hen Harrier foraging, disturbed flock of Golden Plover from the ground.
5	25.11.20	11.36	10	0	170	Foraging	Heath/Bog	Male Hen Harrier hunting over bog around VP10 at a height of 1-6m.
6a	25.11.20	13.05	10	0	161	Flying	Heath/Bog, Forestry	Two male Hen Harriers flying together. One bird flew off to the west.
6b	25.11.20	13.07	10	0	230	Flying, On Ground	Heath/Bog, Forestry	The second male Hen Harrier landed on the ground and remained there for 2 minutes and 5 seconds (x on map) before taking off again and flying north.
7	27.11.20	11.12	3	10	45	Foraging	Heath/Bog	Male Hen Harrier foraging at a height of less than 3m and also perched.

Observation	Date	Time	VP	On Site Observation Time (secs)	Off Site Observation Time (secs)	Activity	Habitat	Details
8	10.12.20	12.33	10	4	8	Flying	Heath/Bog, Young Forestry	Male Hen Harrier flying low over new forestry from south. Flew over clear fell and new forest, then along edge of mature forest in an easterly direction. Flying at a height of 10-20m.
9	25.02.21	11.02	2	10	0	Flying	Heath/Bog	Ringtail (female) Hen Harrier flew west over brow of hill at a height of 5-10m.
10	16.03.21	11.35	10	0	68	Foraging, Flying	Heath/Bog	Male Hen Harrier flew from west over bog at 15m height north of VP10, then veered southeast and hunting at a height of 5m above ground. Attempted strike twice on Meadow Pipit near stream to east of VP10.
11a&b	30.03.21	11.25	5 & 8	20	60	Flying	Forestry, Rough Grassland	Male Hen Harrier flying at a height of 5-25m.

3.4 General Bird Transect and Point Count Results

Table 38: Breeding Season Survey Results 2017

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Blackbird	<i>Turdus merula</i>	4	6
Blackcap	<i>Sylvia atricapilla</i>	3	2
Blue Tit	<i>Cyanistes caeruleus</i>	0	1
Bullfinch	<i>Pyrrhula pyrrhula</i>	1	1
Chaffinch	<i>Fringilla coelebs</i>	13	9
Chiffchaff	<i>Phylloscopus collybita</i>	1	2
Coal Tit	<i>Parus ater</i>	2	5
Dunnock	<i>Prunella modularis</i>	1	2
Goldcrest	<i>Regulus regulus</i>	5	3
Grasshopper Warbler	<i>Locustrella naevia</i>	1	0
Greenfinch	<i>Carduelis chloris</i>	1	2
Hen Harrier	<i>Circus cyaneus</i>	1	0
Hooded Crow	<i>Corvus cornix</i>	9	3
House Martin	<i>Delichon urbica</i>	2	0
Kestrel	<i>Falco tinnunculus</i>	1	0
Lesser Redpoll	<i>Carduelis cabaret</i>	2	0
Magpie	<i>Pica pica</i>	1	1
Meadow Pipit	<i>Anthus pratensis</i>	9	0
Pheasant	<i>Phasianus colchicus</i>	1	3
Pied Wagtail	<i>Motacilla alba</i>	2	0
Robin	<i>Erithacus rubecula</i>	9	10
Rook	<i>Corvus frugilegus</i>	0	1
Siskin	<i>Carduelis spinus</i>	2	0
Skylark	<i>Alauda arvensis</i>	5	0
Song Thrush	<i>Turdus philomelos</i>	3	1
Starling	<i>Sturnus vulgaris</i>	5	0
Stonechat	<i>Saxicola torquata</i>	1	0
Swallow	<i>Hirundo rustica</i>	2	0
Willow Warbler	<i>Phylloscopus trochilus</i>	8	12
Woodpigeon	<i>Columba palumbus</i>	6	5
Wren	<i>Troglodytes troglodytes</i>	11	11

Table 39: Breeding Season Survey Results 2018

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Blackbird	<i>Turdus merula</i>	2	2
Blackcap	<i>Sylvia atricapilla</i>	0	4
Blue Tit	<i>Cyanistes caeruleus</i>	1	2
Chaffinch	<i>Fringilla coelebs</i>	4	7
Chiffchaff	<i>Phylloscopus collybita</i>	1	2
Coal Tit	<i>Parus ater</i>	2	5
Crossbill	<i>Loxia curvirostra</i>	1	0
Dunnock	<i>Prunella modularis</i>	2	0
Goldcrest	<i>Regulus regulus</i>	0	2
Grasshopper Warbler	<i>Locustrella naevia</i>	0	1
Great Tit	<i>Parus major</i>	1	0
Greenfinch	<i>Carduelis chloris</i>	1	1
Hooded Crow	<i>Corvus cornix</i>	2	2
Jackdaw	<i>Corvus monedula</i>	2	50
Lesser Redpoll	<i>Carduelis cabaret</i>	4	2
Magpie	<i>Pica pica</i>	1	3
Meadow Pipit	<i>Anthus pratensis</i>	6	0
Pheasant	<i>Phasianus colchicus</i>	3	1
Pied Wagtail	<i>Motacilla alba</i>	1	0
Raven	<i>Corvus corax</i>	2	0
Reed Bunting	<i>Emberiza schoeniclus</i>	0	1
Robin	<i>Erithacus rubecula</i>	6	8
Rook	<i>Corvus frugilegus</i>	2	0
Siskin	<i>Carduelis spinus</i>	0	2
Skylark	<i>Alauda arvensis</i>	5	0
Song Thrush	<i>Turdus philomelos</i>	3	0
Stonechat	<i>Saxicola torquata</i>	1	0
Swallow	<i>Hirundo rustica</i>	1	0
Whitethroat	<i>Phylloscopus trochilus</i>	1	1
Willow Warbler	<i>Phylloscopus trochilus</i>	7	8
Woodpigeon	<i>Columba palumbus</i>	4	6
Wren	<i>Troglodytes troglodytes</i>	14	9

Table 40: Breeding Season Survey Results 2019

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Blackbird	<i>Turdus merula</i>	6	5
Blackcap	<i>Sylvia atricapilla</i>	2	5
Blue Tit	<i>Cyanistes caeruleus</i>	2	0
Chaffinch	<i>Fringilla coelebs</i>	17	19
Chiffchaff	<i>Phylloscopus collybita</i>	1	3

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Coal Tit	<i>Periparus ater</i>	2	4
Dunnock	<i>Prunella modularis</i>	1	1
Goldcrest	<i>Regulus regulus</i>	4	7
Grasshopper Warbler	<i>Locustrella naevia</i>	0	1
Great Tit	<i>Parus major</i>	1	1
Hooded Crow	<i>Corvus cornix</i>	14	3
Jackdaw	<i>Corvus monedula</i>	6	0
Jay	<i>Garrulus glandarius</i>	0	1
Lesser Redpoll	<i>Carduelis cabaret</i>	0	2
Magpie	<i>Pica pica</i>	4	1
Meadow Pipit	<i>Anthus pratensis</i>	22	0
Mistle Thrush	<i>Turdus viscivorus</i>	1	0
Pheasant	<i>Phasianus colchicus</i>	1	1
Pied Wagtail	<i>Motacilla alba</i>	2	0
Raven	<i>Corvus corax</i>	8	2
Reed Bunting	<i>Emberiza schoeniclus</i>	1	0
Robin	<i>Erithacus rubecula</i>	5	9
Rook	<i>Corvus frugilegus</i>	26	0
Siskin	<i>Carduelis spinus</i>	1	0
Skylark	<i>Alauda arvensis</i>	11	0
Song Thrush	<i>Turdus philomelos</i>	1	1
Swallow	<i>Hirundo rustica</i>	5	0
Whitethroat	<i>Phylloscopus trochilus</i>	0	1
Willow Warbler	<i>Phylloscopus trochilus</i>	4	12
Woodpigeon	<i>Columba palumbus</i>	38	1
Wren	<i>Troglodytes troglodytes</i>	9	14

Table 41: Breeding Season Survey Results 2021

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Blackbird	<i>Turdus merula</i>	6	4
Blackcap	<i>Sylvia atricapilla</i>	2	2
Blue Tit	<i>Cyanistes caeruleus</i>	8	4
Bullfinch	<i>Pyrrhula pyrrhula</i>	2	1
Chaffinch	<i>Fringilla coelebs</i>	28	22
Chiffchaff	<i>Phylloscopus collybita</i>	3	6
Coal Tit	<i>Periparus ater</i>	2	3
Crossbill	<i>Loxia curvirostra</i>	0	1
Dunnock	<i>Prunella modularis</i>	2	2
Goldcrest	<i>Regulus regulus</i>	14	6
Goldfinch	<i>Carduelis carduelis</i>	3	0
Grasshopper Warbler	<i>Locustrella naevia</i>	0	1

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Great Tit	<i>Parus major</i>	0	2
Grey Heron	<i>Ardea cinerea</i>	1	0
Hooded Crow	<i>Corvus cornix</i>	14	2
House Martin	<i>Delichon urbica</i>	5	0
Jackdaw	<i>Corvus monedula</i>	6	1
Kestrel	<i>Falco tinnunculus</i>	1	0
Lesser Redpoll	<i>Carduelis cabaret</i>	5	2
Long-tailed Tit	<i>Aegithalos caudatus</i>	0	4
Magpie	<i>Pica pica</i>	6	4
Meadow Pipit	<i>Anthus pratensis</i>	42	7
Mistle Thrush	<i>Turdus viscivorus</i>	1	2
Pied Wagtail	<i>Motacilla alba</i>	2	1
Raven	<i>Corvus corax</i>	2	0
Robin	<i>Erithacus rubecula</i>	9	7
Rook	<i>Corvus frugilegus</i>	28	0
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	0	1
Siskin	<i>Carduelis spinus</i>	0	10
Skylark	<i>Alauda arvensis</i>	36	0
Song Thrush	<i>Turdus philomelos</i>	2	3
Spotted Flycatcher	<i>Muscicapa striata</i>	1	0
Starling	<i>Sturnus vulgaris</i>	5	0
Swallow	<i>Hirundo rustica</i>	11	1
Whitethroat	<i>Phylloscopus trochilus</i>	0	1
Willow Warbler	<i>Phylloscopus trochilus</i>	8	11
Woodpigeon	<i>Columba palumbus</i>	18	5
Wren	<i>Troglodytes troglodytes</i>	21	16

Table 42: Winter Season Survey Results 2017/2018

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Blackbird	<i>Turdus merula</i>	3	2
Blue Tit	<i>Cyanistes caeruleus</i>	1	1
Bullfinch	<i>Pyrrhula pyrrhula</i>	0	3
Chaffinch	<i>Fringilla coelebs</i>	12	12
Coal Tit	<i>Parus ater</i>	5	4
Dunnock	<i>Prunella modularis</i>	1	2
Fieldfare	<i>Turdus pilaris</i>	70	0
Goldcrest	<i>Regulus regulus</i>	2	1
Great Tit	<i>Parus major</i>	0	1
Hooded Crow	<i>Corvus cornix</i>	8	1
Jackdaw	<i>Corvus monedula</i>	11	0
Lesser Redpoll	<i>Carduelis cabaret</i>	4	0

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Magpie	<i>Pica pica</i>	4	2
Meadow Pipit	<i>Anthus pratensis</i>	8	0
Pheasant	<i>Phasianus colchicus</i>	1	1
Pied Wagtail	<i>Motacilla alba</i>	1	0
Raven	<i>Corvus corax</i>	19	2
Reed Bunting	<i>Emberiza schoeniclus</i>	0	1
Robin	<i>Erithacus rubecula</i>	8	10
Skylark	<i>Alauda arvensis</i>	2	0
Snipe	<i>Gallinago gallinago</i>	1	0
Song Thrush	<i>Turdus philomelos</i>	4	1
Sparrowhawk	<i>Accipiter nisus</i>	2	0
Starling	<i>Sturnus vulgaris</i>	120	0
Woodpigeon	<i>Columba palumbus</i>	3	1
Wren	<i>Troglodytes troglodytes</i>	5	4

Table 43: Winter Season Survey Results 2019/2020

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Blackbird	<i>Turdus merula</i>	12	2
Blue Tit	<i>Cyanistes caeruleus</i>	12	4
Chaffinch	<i>Fringilla coelebs</i>	25	12
Coal Tit	<i>Parus ater</i>	10	5
Crossbill	<i>Loxia curvirostra</i>	1	2
Dunnock	<i>Prunella modularis</i>	4	3
Fieldfare	<i>Turdus pilaris</i>	80	0
Goldcrest	<i>Regulus regulus</i>	12	8
Goldfinch	<i>Carduelis carduelis</i>	18	0
Great Tit	<i>Parus major</i>	2	1
Hooded Crow	<i>Corvus cornix</i>	55	7
Jackdaw	<i>Corvus monedula</i>	17	3
Jay	<i>Garrulus glandarius</i>	1	0
Kestrel	<i>Falco tinnunculus</i>	0	1
Lesser Redpoll	<i>Carduelis cabaret</i>	3	1
Magpie	<i>Pica pica</i>	5	3
Mallard	<i>Anas platyrhynchos</i>	2	0
Meadow Pipit	<i>Anthus pratensis</i>	97	4
Pied Wagtail	<i>Motacilla alba</i>	2	1
Raven	<i>Corvus corax</i>	13	0
Redwing	<i>Turdus iliacus</i>	41	0
Reed Bunting	<i>Emberiza schoeniclus</i>	1	0
Robin	<i>Erithacus rubecula</i>	18	18
Rook	<i>Corvus frugilegus</i>	30	1

Species Name	Scientific Name	Max Abundance Transects	Max Abundance Point Counts
Siskin	<i>Carduelis spinus</i>	4	13
Snipe	<i>Gallinago gallinago</i>	4	0
Song Thrush	<i>Turdus philomelos</i>	1	0
Starling	<i>Sturnus vulgaris</i>	61	0
Woodpigeon	<i>Columba palumbus</i>	48	0
Wren	<i>Troglodytes troglodytes</i>	7	10