Appendix 7-3

2019/20 Winter Bird Survey Report

Malachy Walsh and Partners
Engineering and Environmental Consultants

Winter 2019/2020 Bird Surveys
Shronowen Wind Farm

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NOTE: The following conventions have been followed with regard to species.

1. **First instance of any species name in the text: Common name followed by full form Scientific Name**

Daisy (*Bellis perennis*)

2. **2nd instance: Common name followed by abbreviated Scientific Name**

Daisy (*B. perennis*)

3. **Within tables: 1 or 2 above depending on circumstance.**
4. **In Headings and within body of text: Unless first instance – Common name only**

Daisy

1 SUMMARY OF FINDINGS

Only three of the 13 Primary Target Species[1] and one of the 15 Secondary Target Species were recorded during the survey period. The numbers of observations of individual Target Species, and the activity of bird species generally, was extremely low.

The species recorded are as follows:

- Primary Target Species:
  - Hen harrier (*Circus cyaneus*): 5 observations;
  - Kestrel (*Falco tinnunculus*): 5 observations; and
  - Whooper swan (*Cygnus cygnus*): 1 observation;

- Secondary Target Species
  - Snipe (*Gallinago gallinago*): 2 occurrences of a bird calling;

In addition, non target species namely, peregrine (*Falco peregrinus*) and mallard (*Anas platyrhynchos*) was also recorded.

While the full results of the survey are described in comprehensive detail in **Section 12**, a brief summary is presented here for information and for ease of review.

Hen harrier were recorded on five occasions. Male and females were observed mainly utilising the east of the site flying and hunting at heights between 0m-50m. These hen harriers activity was mostly occurring over the bog, scrub and forestry.

Kestrel was recorded on five occasions. Females were identified but a few of the birds sex and age was unknown due to the brevity of the sighting and the distance intervening between the observer and the bird, which made it difficult to see the plumage sufficiently clearly to ascertain the age or sex of the bird. All observations were made to the east and south-east within the site boundary, where the birds were seen flying at various heights up to 100m over bog habitat.

Whooper swan was only recorded on one occasion. This was an incidental observation of 12 whooper swans made in November. These were observed on the same patch of improved grassland outside the site boundary as they were identified in the previous winter survey. While the observation of whooper swan did not occur during VP watches they are included in this report as they are of material significance to any description of bird activity in the area. Potential foraging grounds that had been identified during the site reconnaissance surveys were resurveyed while the surveyors were en-route to and from the site before and after VP sessions. The observations are also noteworthy because it demonstrates that, notwithstanding the proximity of this foraging site to the proposed wind farm, no evidence of whooper swans foraging within the proposed site or of swans transecting through the site was recorded during the survey period. As it is known that swans typically follow traditional flight paths, to and from roosting sites and foraging grounds and between foraging grounds, it is reasonable to infer, from the absence evidence that this, over wintering migratory, species commuted through

[1] See **Section** 10

the site during the survey period, that this species does not routinely commute through the proposed wind farm site during any winter.

There were two recordings of snipe made during this winter survey. Snipe was heard calling after dark to the east of the site and two to three snipe were heard calling after dark to the south-east of the site. No further data was collected on these snipe

Peregrine was recorded on two occasions. On one observation it was clear this was of a captive bird as the falconer was observed with the bird. These peregrines were seen to the east and north-east of the site flying and perched over bog and forestry habitat at flights heights ranging within 0m-150m.

Mallard were recorded on three occasions. These were observed flying over bog habitat at heights within 0m-50m.

2 INTRODUCTION

Malachy Walsh and Partners, Engineering and Environmental Consultants, were commissioned by Emerging Markets Power (NI) Ltd., to conduct bird surveys, during the winter of 2019-2020[2], at the location of a proposed wind farm development at Shronowen Bog near Ballylongford, County Kerry, (Irish Grid Co-ordinates: R 00498 40715).The survey area, outlined in red, in **Figure 1**, below, includes the proposed development site and areas adjacent. This report presents the results of the winter 2019-2020 survey. Previous reports (report ref. 19746-6002-A) has been completed for the winter 2018-2019 survey and (report ref. 19746-6003-A) has been completed for the breeding 2019 survey.

This report comprises a description of those surveys and the results.

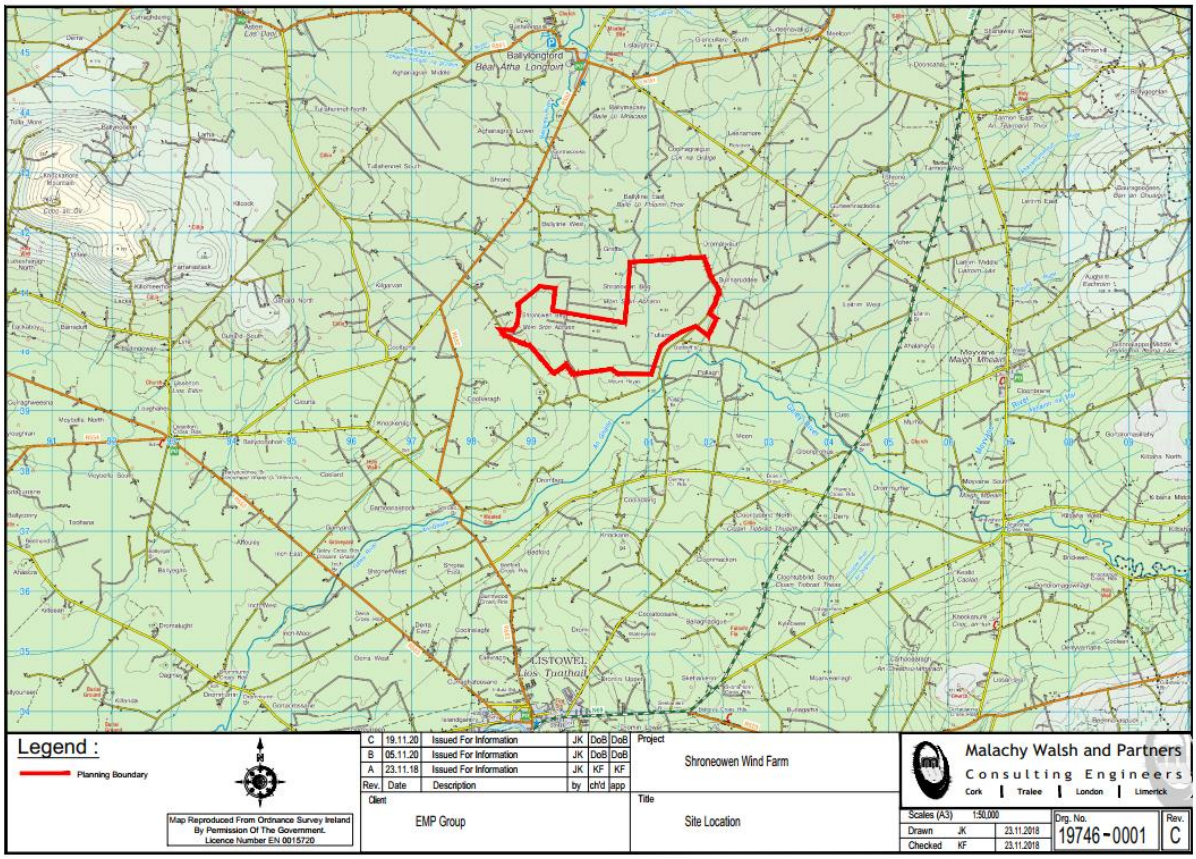


Figure 1: Site Location in red.

3 PURPOSE OF SURVEY

The survey was designed to determine the mix of species present and their behaviours and distribution within the survey area during the survey period. As reliable comparisons can then be made between these data and any subsequent survey data and, collectively, these will form a baseline upon which any future monitoring/multiyear surveys may be compared and, in the event of a consent application, will inform any impact assessments. The survey was conducted in compliance with the primary guidance used by the competent authorities in Ireland when assessing planning applications for a wind farm in circumstances where the impacts on avian ecology are germane, namely SNH (2017).

[2] Winter survey period: October to March.

In summary the survey design will identify the species assemblage and the spatial and temporal distribution of activity. The range of methods used and survey effort involved are site and species specific and are informed by a desk study, site reconnaissance, by extensive survey experience in the surrounding area and by knowledge of the bird assemblage present in the north Kerry area.

4 CONSTRAINTS

Surveyors did not have permission to access any lands outside the client's control. However, this did not impose a significant constraint on sampling as these lands comprise, almost exclusively, agricultural grassland habitats and it was expected, in light of the fact that several of the vantage points are located close to these agricultural habitats, that the typical species associated with these areas would be detected during the vantage point surveys.

5 SURVEY DESIGN

Compliance with SNH (2017) requires that two main broad survey types are included in the survey design.

- **Distribution and Abundance Surveys**. These are surveys to record numbers and distribution of breeding, wintering and migrant birds using the site. They will allow the evaluation of a site's importance and provide information to help quantify predicted impacts from disturbance and displacement.
- **Vantage Point (VP) Surveys**. These surveys, which, in the case of the Shronowen site, will be required, comprise a series of watches from a fixed location to quantify the flight activity of birds at a proposed development site, which provides data to estimate the collision risk.

The decision as to which of the survey methodologies are required is based on the outcome of a scoping exercise which determines which species are considered likely to use the habitats in the study area.

The survey includes a number of methodologies, described in **Sections 9.1** and **11**, below, that have been selected, from the list of survey types identified in SNH (2017), for their capacity to detect and record the activities of the species expected to be present in the survey area during the survey period. The methodologies selected ensured that a structured approach to survey work was implemented throughout. While all aspects of the activities of the observed Target Species were recorded, the primary aim of the surveys is to understand bird use of the survey area; a secondary purpose is to provide data for Collision Risk Modelling (CRM). A detailed description of how information on flight behaviours was recorded will be provided, under the appropriate headings, in **Section 11**.

The survey design and execution is informed by extensive in house experience across a broad range of comparable surveys conducted in similar areas with specific reference to those carried out in the north Kerry and west Limerick.

6 SCOPING TO IDENTIFY TARGET SPECIES

Compliance with SNH (2017) requires that prior to the commencement of surveys a scoping exercise is carried out to determine a broad overview of which species are likely to be at the site, their likely sensitivity to impacts from wind farms and the proximity of relevant designated sites. This allows the selection of Target species (see **Section** 9 below) and these species will form the basis of the survey programme.

6.1 CRITERIA FOR SELECTION OF TARGET SPECIES

6.1.1 Legislative Protection and Conservation Status

When compiling the list(s) of Target species, consideration of legislative protection and conservation status are of primary importance, In this regard, there are three important species lists from which Target Species may be drawn:

- Listed in Annex 1 of the EC Birds Directive;
- Protected under the Wildlife Acts, 1976 to 2012; and
- Red-listed species as per Colhoun & Cummins (2013)[3].

Within the scope of the criteria outlined above, SNH (2017) recommends that the Target Species should be limited to:

- Those species which are afforded a higher level of legislative protection; and
- Those species which, as a result of their behaviours, are more likely to be subject to impact from wind farms.

A precautionary approach was adopted and the selection followed the guidance set out for determining the sensitivity and importance of bird species as outlined in Percival (2003). Percival's methodology was considered alongside the other literature relating to the effects of wind farms on birds as reviewed in Whitfield and Madders (2006) and Drewitt and Langston (2006). These sensitivities were evaluated using the criteria set out in **Table 1**. When compiling the list cognisance was also taken of the constraints imposed on the distributions on the species due to their known habitat requirements and distributions.[4] Those species selected as Primary Target Species are listed in **Section 10.1** and those selected as Secondary Target Species are listed in **Section 10.2**.

Table 1: Determining the sensitivity and importance of bird species (adapted from Percival, 2003)

Sensitivity	Determining Factor
VERY HIGH	Where the site is an SPA
	Species present in nationally important numbers (>1% Irish population)
HIGH	Ecologically sensitive species (e.g. divers, common scoter, golden eagle, hen harrier, chough and roseate tern)
	EU Bird Directive Annex I species
	Red-listed Species of Conservation Concern
MEDIUM	Amber-listed Species of Conservation Concern

[3] Birds on the Red List birds are those of highest conservation concern, Amber List birds are of medium conservation concern and the Green List birds are not considered threatened.

[4] As outlined at https://www.birdwatchireland.ie

	Species present in locally important numbers (>1% of county population)
LOW	Amber-listed Species

6.1.2 Potential Effects of Wind Farms on Birds

Detailed knowledge of bird distribution and flight activity is necessary in order to predict the potential effects of a wind farm on birds. However, the scope and scale of the survey data taken and the suite of species on which data is collected should be informed by the analysis that wind farms present three main potential risks to birds (Drewitt & Langston 2006, 2008; Band *et al*. 2007, cited in SNH, 2017). These are:

- Direct habitat loss through construction of wind farm infrastructure;
- Displacement (sometimes called indirect habitat loss) if birds avoid the wind farm and its surrounding area due to turbine construction and operation. Displacement may also include barrier effects in which birds are deterred from using normal routes to feeding or roosting grounds; and
- Death through collision or interaction with turbine blades and other infrastructure.

Due to the unique ecology of each species each will have different sensitivities to each of these three impact sources.

6.1.3 Existing data, Records and Expert Knowledge

Cognisance must also be taken of existing data and records, expert knowledge of the species assemblage present in the wider north Kerry/west Limerick area, and the influence on bird distribution of the habitat mix within and adjacent to the survey area whose presence within the survey area is reasonably foreseeable in light of the habitats present, both within the survey area and in the surrounding landscape.

7 SITE RECONNAISANCE SURVEY

As per SNH (2017) requirements that, prior to the commencement of surveys, a scoping exercise is carried out reconnaissance of the site and its surrounds was carried out by MWP staff ecologists. These visits enabled an evaluation to be made of the habitat characteristics of the site and the identification of VP locations considered suitable to provide maximum site coverage. As stipulated by the client, all surveys were undertaken within lands within which landowner's permission had been arranged or on public roads. Access was not permitted to private lands outside the client's control.

8 DESK STUDY

8.1 DESCRIPTION OF THE SURVEY AREA

The site largely comprises cut-over bog (*sensu* Fossitt, 2000), which in its original form was a blanket bog, but which is now substantially cut-over and significantly altered by turf cutting. It is situated within a landscape dominated by agricultural grassland habitats and with some commercial conifer plantations against which the bog itself abuts (see **Figure 2** for Corine Landcover)[5]. The topography of the site is essentially flat, albeit, with the slight peat dome that is a characteristic of the lowland bog

[5] Areas of bog are shown in purple, forestry in green and pastureland is shown in yellow.

type. The site is intersected by a network of access tracks of robust construction that, while too rough for cars, are, for the most part, in good condition.

Turbary rights pertain to the entire site and much of the original peat mass has been removed. While a large central area remains relatively uncut, a crisscross network of drains intersects the site and significant proportion of the bog now comprises a mix of exhausted banks or banks that are currently being, or historically have been, worked. A significant effect of the peat extraction is the extent to which the water table across the site has been lowered permanently. Because the water table plays an important role in aerobic and anaerobic processes in a bog, the lowering of the water table within the peat boundary, between the upper aerobic acrotelm (living) layer and the underlying, water-logged and compacted, catotelm (dead) layer, has fundamentally altered the peat forming capacity of Shronowen Bog.

While the dominant current practice is removal of peat by excavator to a hopper from which the peat is then extruded (see **Drone Flown Image 1**) there is clear evidence of historic sausage cutting in the eastern part of the site (see **Drone Flown Image 2**). **Aerial Image 1** illustrates the extent to which, over time, the peat mass has been removed progressively and incrementally from the edge of the bog (represented in blue) to the interior area of the peat mass.

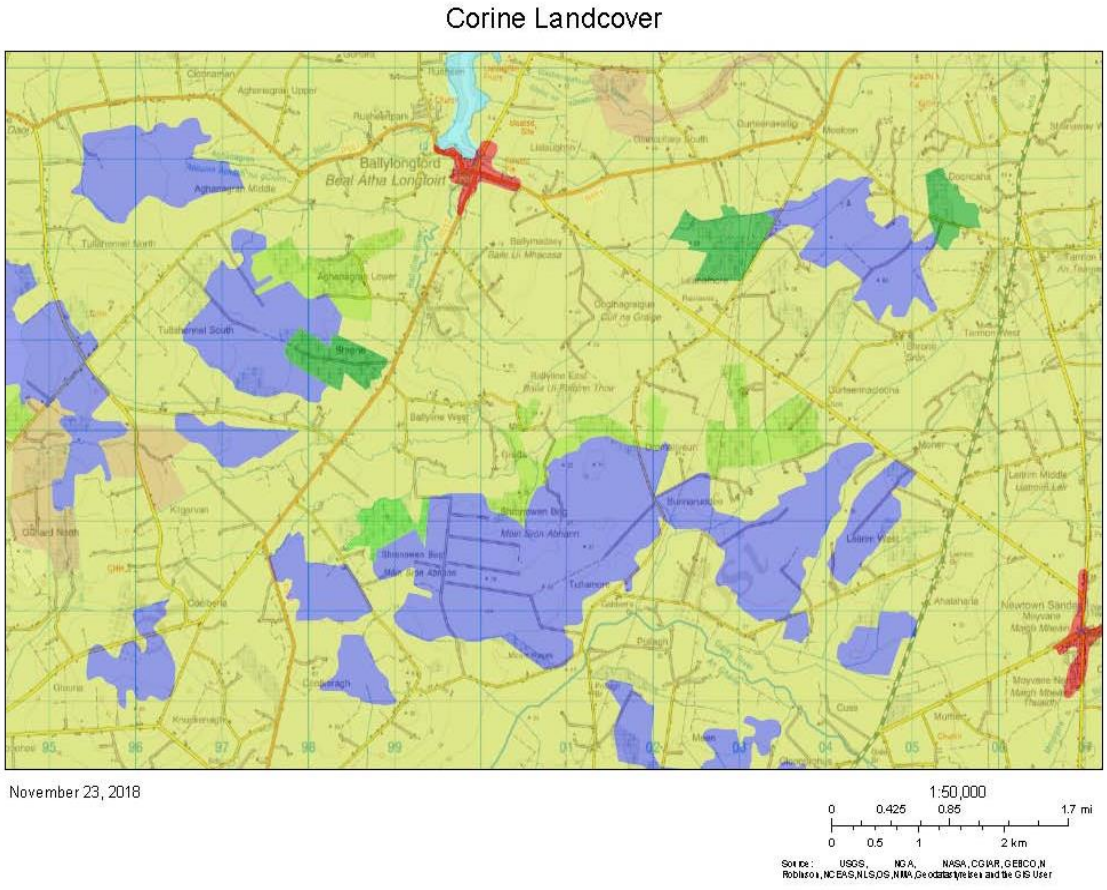
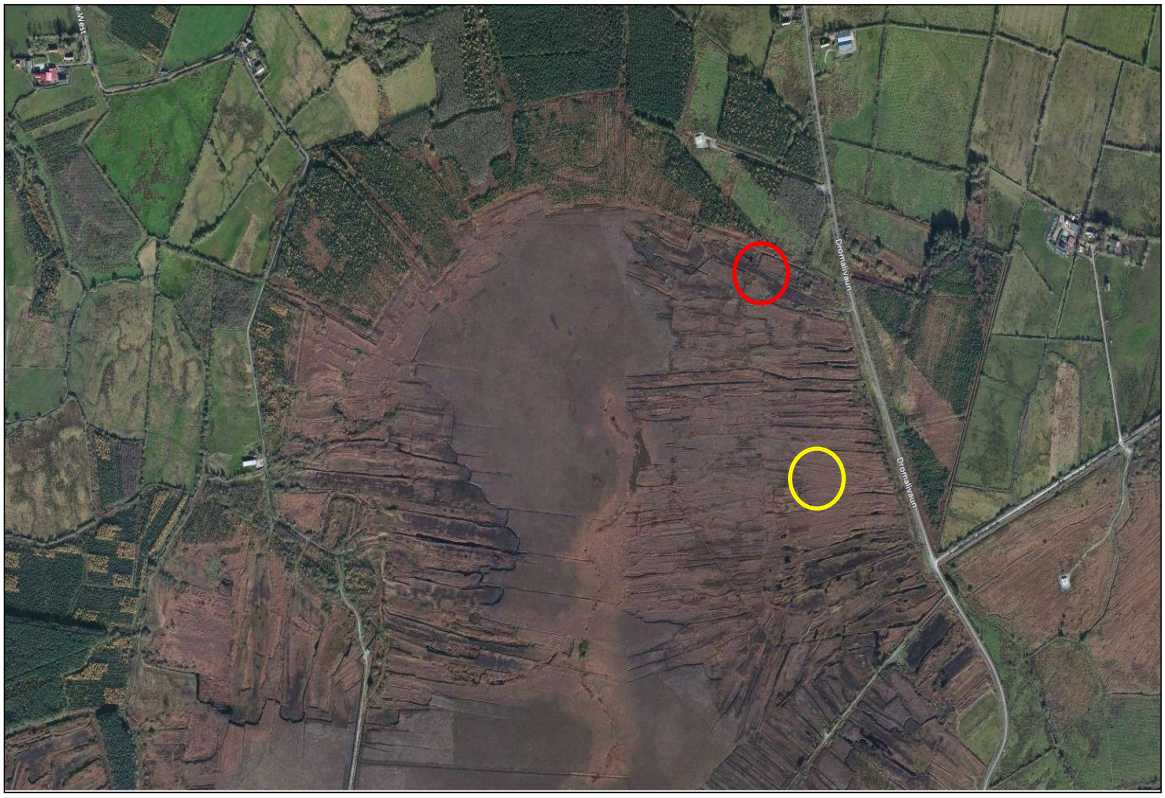


Figure 2: Corine Landcover (2006) [from EPA Maps]



Aerial Image 1: Typical view showing distinct signature of turf banks progressing from edge to centre at northern section of Shronowen Bog. (Red circle: approximate location of Drone Image 1; Yellow circle approximate location of Drone Image 2).

Drone Flown Image 1: Extruded turf with excavated bank adjacent (2019)

Drone Flown Image 2: Evidence of historic sausage cutting (*parallel 'scars' aligned left to right*)

The vegetation communities that the bog supports are constrained by the nutrient poor conditions that pertain and the cover currently comprises a relatively uniform and homogenous cover of Purple Moor-grass (*Molinia caerulea*). While heather is present, surveys indicate that it is not a significant component in the overall plant mix. A few isolated treelines are present; these consist primarily of birch (*Betula* spp.) and all are of a relatively low stature with an average canopy height in the region of 5 m. Areas of willow scrub (*Salix* spp.) are also present; however, these are primarily distributed within the transitional marginal habitats that fringe the bog, in the interface areas between the agricultural and commercial forestry habitats and the bog itself. Willow shrub lines also fringe the sides of the tracks in many places. A variety of grasses and ruderal species have colonised the margins along the sides of the tracks where disturbance has disrupted the dominance of the indigenous vegetation that dominates the reminder of the site. A significant proportion of the site comprises bare unvegetated ground which is present in areas where sustained peat extraction has been occurring recently.

While the site is intersected by a network of man-made drains, the only natural water body within the site is an unnamed tributary[6] of the Ballylongford River which drains from a point of origin in the north of the site. Apart from some localised ponding of water in some of the lower lying peat banks no established ponds or other bodies of standing water were noted during the site surveys and none are visible in the range of aerial imagery reviewed[7]. While stands of Bulrush (*Typha latifolia*) are present in some trackside drains in the western part of the site, the individual stands are generally small and localised and the distribution within the site is somewhat uneven and diffuse.

In summary the site is, both topographically and ecologically, relatively homogeneous, a characteristic that inhibits species diversity not only in terms of the floristic communities and insect species but also

[6] River Waterbody Code: IE_SH_24B030700 https://gis.epa.ie/EPAMaps/

[7] OSI aerial imagery (1995 to 2012); Google imagery (2017); Bing (undated)

in the variety of bird species, particularly passerines, likely to be present. It is unlikely to provide significant foraging, roosting or breeding habitats for many bird species.

8.2 BIRD SENSITIVITY TO WIND ENERGY DEVELOPMENT

The National Biodiversity Data Centre's (NBDC) online mapper[8] includes a layer which provides information on sensitivity to wind energy development. This layer is derived from a collation of existing distributional data, which indicates, by assessing the characteristics of a selected number of the most-sensitive bird species, whether protected birds are likely to be sensitive to wind energy developments in the areas mapped. The mapping layer is derived from McGuiness *et al.* (2015) and while it does not include all vulnerable species - due to data and other issues - and does not replace SEA, AA or EIA requirements nor the need to tailor survey and research to specific sites, it provides a useful metric to rank sites, at the initial scoping stage, in terms of their potential sensitivity to wind energy development. The layer has four sensitivity ratings namely, Low, Medium, High and Highest. These ratings are mapped at 2km grid square resolution for which 'All Birds Sensitivity Scores' (ABSS) are provided.

The survey area and the geographical area extending away from it is categorised as Low Sensitivity (see **Figure 3** and **Figure 4**, below) and the ABSS is 14.8.

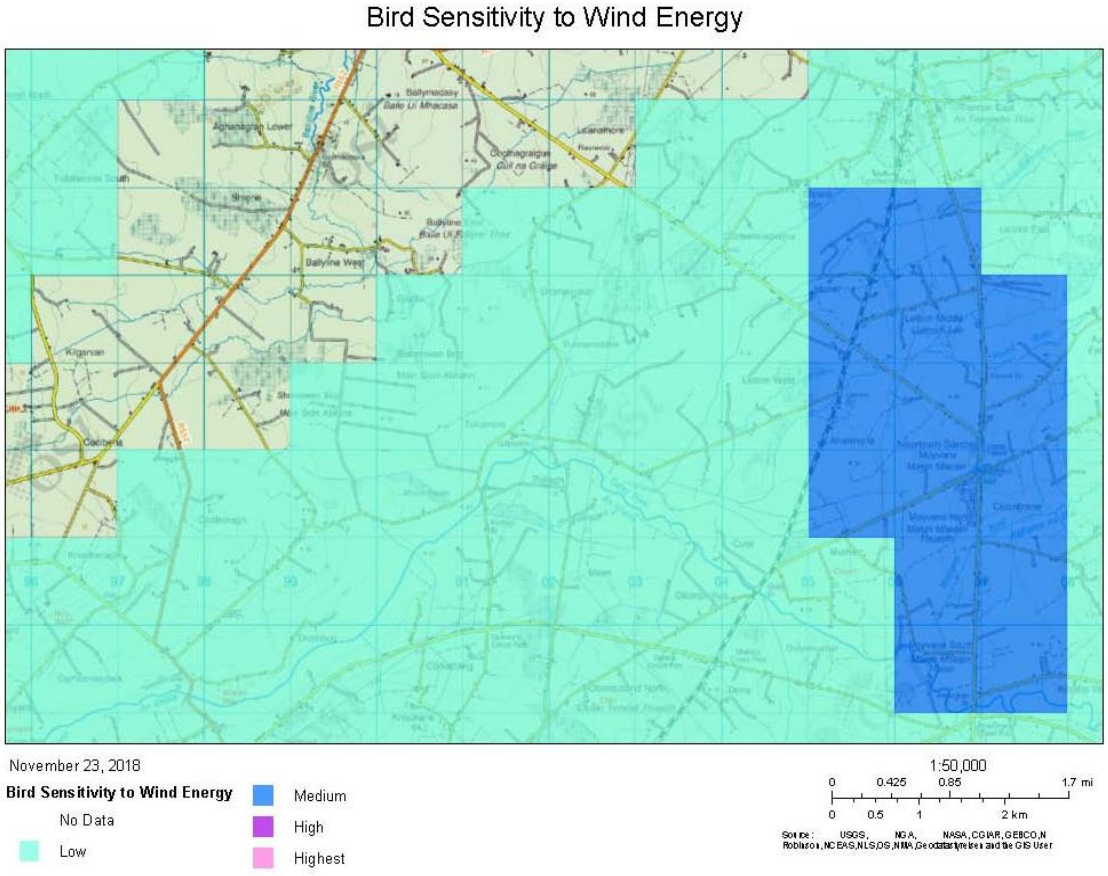


Figure 3: Bird Sensitivity to Wind Energy Development (from http://maps.biodiversityireland.ie/#/Map)

[8] https://maps.biodiversityireland.ie/Map

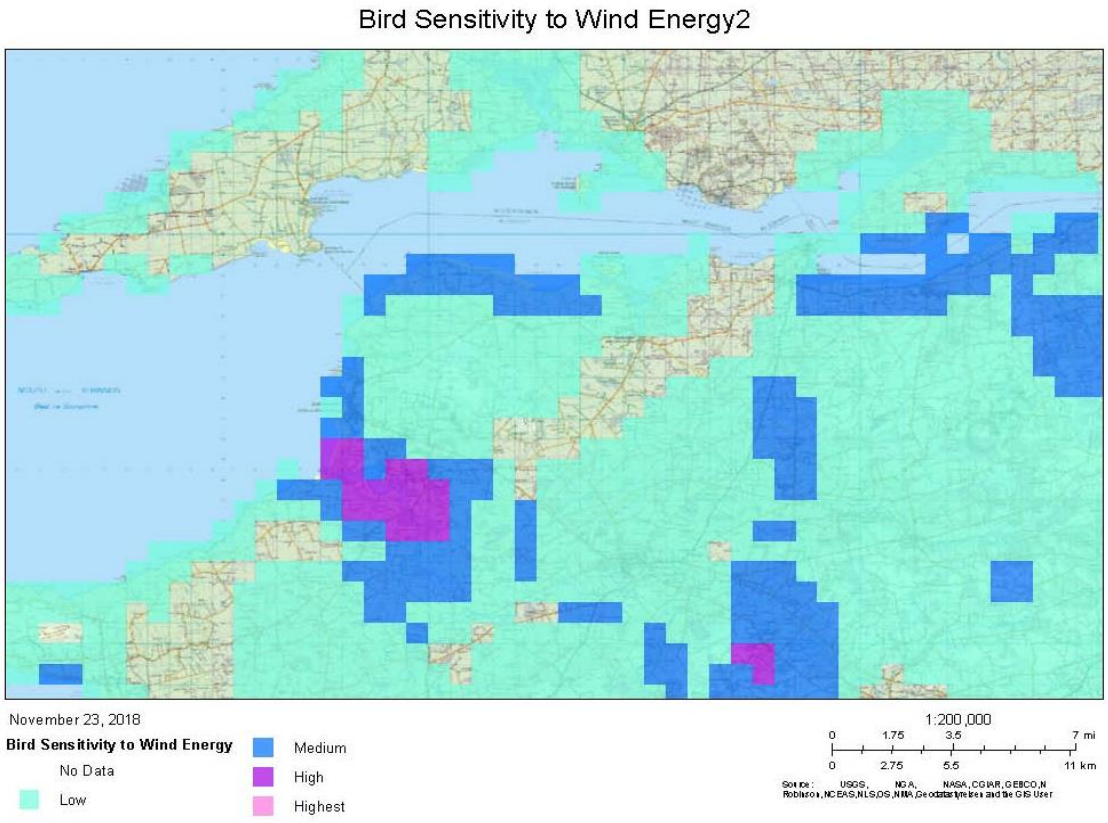


Figure 4: Bird Sensitivity to Wind Energy Development (from http://maps.biodiversityireland.ie/#/Map)

8.3 SITES OF INTERNATIONAL IMPORTANCE IN PROXIMITY TO THE SURVEY AREA

8.3.1 Special Protection Areas (SPAs) - Birds Directive Species

The survey area is situated approximately 3 km due south of the site boundary of the River Shannon and River Fergus Estuaries SPA (004077) which is selected for the conservation of the non- breeding, wintering populations[9] of 21 Special Conservation Interest (SCI) species and for the SCI Wetlands [A999] habitats that are a resource for the regularly- occurring migratory water birds that utilise the SPA. The proposal site is also approximately 10 km to the west of the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) which is selected for the conservation of a resident, breeding, population of one SCI species, namely hen harrier (*Circus cyaneus*) [A082] [10].

The SCI species for which the River Shannon and River Fergus Estuaries SPA (004077) is selected are:

- Cormorant (*Phalacrocorax carbo*) [A017]
- Whooper swan (*Cygnus cygnus*) [A038]
- Light-bellied brent goose (*Branta bernicla hrota*) [A046]
- Shelduck (*Tadorna tadorna*) [A048]
- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Pintail (*Anas acuta*) [A054]
- Shoveler (*Anas clypeata*) [A056]

[9] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004077.pdf

[10] https://www.npws.ie/protected-sites/spa/004161

- Scaup (*Aythya marila*) [A062]
- Ringed plover (*Charadrius hiaticula*) [A137]
- Golden plover (*Pluvialis apricaria*) [A140]
- Grey plover (*Pluvialis squatarola*) [A141]
- Lapwing (*Vanellus vanellus*) [A142]
- Knot (*Calidris canutus*) [A143]
- Dunlin (*Calidris alpina*) [A149]
- Black-tailed godwit (*Limosa limosa*) [A156]
- Bar-tailed godwit (*Limosa lapponica*) [A157]
- Curlew (*Numenius arquata*) [A160]
- Redshank (*Tringa totanus*) [A162]
- Greenshank (*Tringa nebularia*) [A164]
- Black-headed gull (*Chroicocephalus ridibundus*) [A179]

This list includes species from a number of groups including, *inter alia*, swans, geese, waders and gulls. While the foraging or breeding behaviours of most of these populations are not strongly associated with the habitats available in the survey area (NPWS, 2012) it is possible that some of the species do overfly the site when commuting between roosting and foraging grounds.

8.3.2 Important Bird and Biodiversity Areas (IBAs) and Ramsar Sites

8.3.2.1 Important Bird and Biodiversity Areas (IBAs)

The Important Bird and Biodiversity Areas (IBA) Programme is a BirdLife International initiative aimed at identifying and protecting a network of critical sites for the conservation of the world's birds. A total of 140 Important Bird Areas (IBAs) have been identified in Ireland, covering an area of about 4,309km², equivalent to 6% of the land area. These sites are important for breeding seabirds and for wintering wildfowl.

There are two IBA site within 15 km of the survey area, namely the Shannon and Fergus Estuaries (IE08) and The Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle (IBA Criteria C6 (2009)). Shannon and Fergus Estuaries (IE08) is encompassed within the significantly larger River Shannon and River Fergus Estuaries SPA (004077), is one of the most important sites in Ireland for wintering and migrating waterfowl and it supports 10 species in numbers of international importance all which are also protected under the SPA designation. These species are[11]:

- Whooper swan (*C. cygnus*)
- Brent goose (*Branta bernicla*)[12]
- Scaup (*A. marila*)
- Golden plover (*P. apricaria*)
- Knot (*C. canutus*)
- Dunlin (*C. alpina*)
- Black-tailed godwit (*L. limosa*)
- Bar-tailed godwit (*L. lapponica*)

[11] http://datazone.birdlife.org/site/factsheet/shannon-and-fergus-estuaries-iba-ireland/details

[12] Light-bellied brent goose, a species for which the SPA site (004077) is selected, is a sub species of brent goose

- Curlew (*N. arquata*)
- Redshank (*T. totanus*)

A further 13 species occur in numbers of national importance, including, *inter alia*,

- Greylag goose (*Anser anser*)
- Shelduck (*T. tadorna*)
- Wigeon (*A. penelope*)
- Teal (*A. crecca*)
- Pintail (*A. acuta*)
- Shoveler (*A. clypeata*)
- Lapwing (*V. vanellus*)
- Greenshank (*T. nebularia*)[13]

Of these species only greylag goose is not an SCI species for which the River Shannon and River Fergus Estuaries SPA (004077) is selected.

The Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle (IBA Criteria C6 (2009)) is encompassed within The Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161), both sites are important for breeding hen harrier (*Circus cyaneus*)[14].

8.3.2.2 Ramsar Sites

The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat is an international treaty for the conservation and sustainable use of wetlands. The Ramsar Convention was ratified by Ireland in 1984 and came into force for Ireland on 15 March 1985. Ireland presently has 45 sites designated as Wetlands of International Importance, with a surface area of 66,994 hectares.

No Ramsar site is located within 15km of the survey area.

8.4 SPECIES KNOWN FROM THE AREA

8.4.1 In-house Expert Knowledge

On the basis of extensive formal and informal in house expertise the following species are known to be present in the geographical area extending away from the survey area:

- Barn owl (*Tyto alba*)
- Kestrel (*Falco tinnunculus*)
- Merlin (*Falco columbarius*)
- Mute swan (*Cygnus olor*)
- Sparrowhawk (*Accipiter nisus*)
- Short-eared owl (*Asio flammeus*)

[13] No further information on the other species is provided on the website.

[14] http://datazone.birdlife.org/site/factsheet/stacks-to-mullaghareirk-mountains-west-limerick-and-mount-eagle-iba-ireland/details

While wintering swans and geese are present at coastal locations along the estuary there is little evidence that there are any established pathways, for the movements of swans or geese commuting to inland feeding sites that intersect with the survey area.

9 SELECTION OF TARGET SPECIES

As outlined, previously, in **Section 5** compliance with SNH (2017) requires that two main broad survey types are included in the survey design.

- Distribution and Abundance Surveys; and
- Vantage Point (VP) Surveys.

Within these broad types SNH (2017) lists a number of different methodologies and these are outlined hereunder. In each case a site specific assessment is carried out and recommendations are made as to which of the survey types should be carried out.

9.1 DISTRIBUTION AND ABUNDANCE SURVEYS

9.1.1 Moorland Breeding Birds

This survey type is restricted to the breeding period between April and early July SNH (2017) and was not, therefore, required.

9.1.2 Raptors and Owls

Of the four species of owl known in Ireland, namely barn owl (*Tyto alba*), snowy owl (*Nyctea scandiaca*), long-eared owl (*Asio otus*) and short-eared owl (*Asio flammeus*) only barn owl and long-eared owl are purely nocturnal. Surveys for nocturnal species are assessed in **Section 11**, below.

With regard to snowy owl (*Nyctea scandiaca*) it is noted that because this species is a rare winter visitor, mainly to western counties such as Mayo[15], it is not expected to be present. With regard to short-eared owl, should it be present in the survey area it is expected that this species and other raptors would be detected by the vantage point surveys described in **Section 11**, below.

9.1.3 Breeding Divers

This survey type was not required. Only one species from this group is known to breed in Ireland, namely red-throated diver (*Gavia stellata*). Very few pairs do breed in Ireland and those that have bred have been restricted to Co. Donegal[16].

With regard to the likelihood that the other species from this group will frequent the site outside of the breeding season, the populations of these species are associated with shallow sandy bays and feed on open water plunging to catch fish or other food. Due to the specialised nature of their feeding techniques they are not expected to present at the site due to its terrestrial location and habitat mix.

[15] https://www.birdwatchireland.ie/IrelandsBirds/Owls/SnowyOwl/tabid/1125/Default.aspx

[16] https://www.birdwatchireland.ie/Default.aspx?tabid=125

9.1.4 Red Grouse (*Lagopus lagopus hibernicus*) Survey

Having regard for the habitats available within the survey area and the low elevation of the site it is concluded, in light of extensive in house expertise[17], that a red grouse survey was not required.

9.1.5 Woodland Passerines

The site boundary does overlap with a number of commercial conifer plantations. In light of this and bearing in mind that surveys of woodland passerines, especially in commercial conifer forest, are generally not required (SNH, 2017) and because there is very little evidence that passerines are significantly affected by wind farms (DGE, 2014) it was concluded that this survey type was not required. In addition, because the vantage points (see **Section 11**, below) are located adjacent to locations that are good examples of the typical, albeit limited, variation in habitats present within the survey area, it was expected that the typical species associated with these habitats and the broader more typical habitats would be detected during the vantage point surveys.

9.1.6 Nocturnal Species

9.1.6.1 Owls

Of the species of owl resident in Ireland only barn owl and long-eared owl are purely nocturnal. As a result any flights would not be observable and systematic flight path mapping would not be possible, therefore, neither was selected as Target Species. However, extensive in-house experience of the species mix present in the wider geographical area indicates that the survey area could be within the foraging territory of barn owl and, although equivalent knowledge on the presence of long-eared owl is not available, it is considered, on the basis of the precautionary principle, that surveys for both species should be undertaken.

The surveys were conducted, as per SNH (2017) and BirdWatch Ireland[18], by listening for calling birds around dusk from February onwards during VP surveys. SNH (2017) further recommends that late evening surveys for calling juveniles in May-July can also be useful in detecting successful pairs; adults may also be active during this time. Should calling birds be detected, in the event that specific breeding sites are identified, surveys can be complemented by searches for signs of occupation, such as moulted feathers and pellets. If present, these evidences of occupancy in the environs of the site can be recorded. Given that this, latter, survey type should be conducted in the period May-July it will occur outside the survey period that is the subject matter of this report. This element of the surveys will, therefore, be discussed in the report on the summer 2019 surveys.

9.1.6.2 Other nocturnal species

Nightjar (*Caprimulgus europaeus*): as this species is a rare summer-visitor to uplands in southern Ireland[19] it was not expected to be present during the survey period. Surveys were not required.

9.1.7 Lowland and Farmland Birds

Surveys of farmland, moorland or woodland passerines are generally not required (SNH, 2017) and there is very little evidence that passerines are significantly affected by wind farms (DGE, 2014). However, in order to fully characterise the use of the survey area by birds, all species encountered

[17]) Staff ecologists have been issued 'Section 32: Licence for use of tape lure for red grouse survey' for each of the last 10 years. 2) Extensive local knowledge and previous surveys in the area.

[18] https://www.birdwatchireland.ie/IrelandsBirds/Owls/LongearedOwl/tabid/1123/Default.aspx

[19] https://www.birdwatchireland.ie/IrelandsBirds/Nightjar/tabid/1151/Default.aspx

were recorded; however, recording of these species was subsidiary to recording of Target Species and comprised recording of simple counts of species observed only. Because the VPs (see **Section 11**, below) are located adjacent to locations that are good examples of the typical, albeit limited, variation in habitats present within the survey area, it was expected that the typical species associated with these habitats and the broader more typical habitats would be detected during the vantage point surveys.

9.1.8 Wintering and Migratory Waterfowl, especially Geese and Swans

The survey area lies within the core foraging distance[20] of an SPA designated for species from these groups. Because disturbance or displacement to wintering swans can occur on feeding areas, feeding distribution surveys as per SNH (2017) were considered for inclusion in the survey design. However, while SNH (2017) does stipulate that feeding distribution surveys for whooper swan should be undertaken when the survey area lies within the core foraging distance of SPAs designated for this species, the guidance document also advises that these surveys are not required if it can be established, from existing data, that the area is not utilised for feeding.

As can be seen from **Table 2**, below, and on review of the site description in **Section 8.1**, above, the preferred inland foraging habitat types for the species of swans and geese identified in **Section 8**, above, are not available within the survey area. In addition, and as outlined previously, while swans and geese are known from coastal locations along the Shannon estuary there is little evidence that there are any established pathways, for the movements of swans or geese commuting to inland feeding sites that intersect with the survey area. In light of the evidence presented in the preceding sentences it was concluded that dedicated feeding and distribution surveys as per SNH (2017) were not warranted - particularly in light of the fact that most of the survey area comprises open bog with conifer plantations adjacent and is therefore not suitable foraging habitat.

Hinterland driving surveys were done by surveyors to determine any important sights for water birds in the general area.

Table 2: Feeding habits and preferred foraging habitat type

Species	Diet & Preferentially selected foraging habitat type
Whooper swan (*C. cygnus*)	Aquatic vegetation, but they are increasingly being recorded grazing on grass in pasture and spilt grain, as well as potatoes from cultivated land. Most on lowland open farmland around inland wetlands, regularly seen while feeding on grasslands and stubble.
Mute swan (*Cygnus olor*)	Water plants, which these large birds can reach with their long necks at depths of up to one metre. Also graze on land and occasionally feed on small amphibians, snails and insects.
Light-bellied brent goose (*B. bernicla hrota)*	During the winter, feeds mostly on eel-grass, which grows on muddy estuaries, and also on grasslands, usually when coastal supplies have been depleted at estuarine sites
Greylag goose (*A. anser*)	Currently feed mostly on cereal stubble and grassland in their wintering areas

In any event, feeding distribution surveys can be undertaken by observations from vantage points (SNH, 2017). Therefore, because there is some, albeit limited, potential that these species may overfly the site any movements by these species would be captured by the survey design. With regard to the efficacy of the VP surveys as a means to record data on activity by swans or geese, the flat topography

[20] In winter < 5km (SNH, 2016)

of the site and the uninterrupted fields of view ensure that full coverage of the site's habitats, which are of some, albeit very limited, potential value to these groups, was afforded by the VPs. This enabled an assessment as to whether or not, and to what extent, established commuting, passage and/or migratory routes intersect with the site. In addition, potential foraging grounds that had been identified during the site reconnaissance surveys were resurveyed while the surveyors were en-route to and from the site before and after VP sessions.

10 SELECTION OF TARGET SPECIES

Target Species, for which comprehensive data were recorded, were limited to those species likely to be affected by wind farms. The habitat mix within and adjacent to the proposed development site, described in **Section 8.1**, allowed a preliminary assessment to be made, in 2018, prior to commencement of surveys at the site, of the bird populations likely to be present in the study area. This assessment was cognisant of the known habitat preferences of the species evaluated and the restrictions on their distributions that result from these preferences. This assessment when viewed in combination with the information on the proximity of relevant designated sites, outlined in **Section 8.3**, and those species known to be present in the wider area, identified in **Section 8.4**, allowed the selection of primary and, potentially, Secondary Target Species as per SNH (2017). In selecting species for inclusion in the Target Species lists a precautionary approach was adopted and the selection also followed the guidance set out for determining the sensitivity and importance of bird species as outlined in Percival (2003), Whitfield & Madders (2006) and Drewitt & Langston (2006). This evaluation is summarised in **Table 3**.

Because there is very little evidence that passerines are significantly affected by wind farms (DGE, 2014; SNH, 2017) and unless rare/restricted passerines are present surveys are not required (SNH, 2017) transects or point counts such as those outlined in Anon (2012) or Bibby *et al*. (2000) were not carried out. However, in order to fully characterise the species mix present in the survey area all species encountered, including passerines, were recorded. However, recording of these species is subsidiary to recording of Target Species and will comprise recording of simple counts of species observed. This element of the survey design is to provide the additional data on bird usage of the site that will be required for subsequent assessments of the impacts on the broad avian biodiversity of the survey area in the event that an application for planning permission is submitted. An example of the survey sheet is included in **Appendix 2**.

Those species selected as Primary Target Species are listed in **Section 10.1** and those selected as Secondary Target Species are listed in **Section 10.2**. The evaluation is summarised in **Table 3**.

10.1 PRIMARY TARGET SPECIES

The Primary Target Species are:

- Hen harrier (*C. cyaneus*)
- Merlin (*F. columbarius*)
- Kestrel (*F. tinnunculus*)
- Sparrowhawk (*A. nisus*)
- Short-eared owl (*A. flammeus*)
- Whooper swan (*C. cygnus*)

- Mute swan (*C. olor*)
- Light-bellied brent goose (*B. bernicla hrota*)
- Greylag goose (*A. anser)*
- Golden plover (*P. apricaria*)
- Lapwing (*V. vanellus*)
- Curlew (*N. arquata*)
- Black-headed gull (*C. ridibundus*)

10.2 SECONDARY TARGET SPECIES

The Secondary Target Species are:

- Cormorant (*P. carbo*)
- Shelduck (*T. tadorna*)
- Wigeon (*A. penelope*)
- Teal (*A. crecca*)
- Pintail (*A. acuta*)
- Shoveler (*A. clypeata*)
- Scaup (*A. marila*)
- Ringed plover (*C. hiaticula*)
- Grey plover (*P. squatarola*)
- Knot (*C. canutus*)
- Dunlin (*C. alpina*)
- Black-tailed godwit (*L. limosa*)
- Bar-tailed godwit (*L. lapponica*)
- Redshank (*T. totanus*)
- Greenshank (*T. nebularia*)
- Snipe (*G. gallinago*)

While not included as Target Species, surveys for the nocturnal barn owl and long-eared owl were conducted as outlined in **Section 9.1.6.1**, above. In the event that either species was observed in daylight then any flight paths observed would be recorded as per **Section 11.1**, below.

Table 3: Target Species Ratings and Rationale for the Ratings Assigned

Raptors & Owls	Target Species Rating	Rationale
Hen harrier (*C. cyaneus*)	Primary	Amber listed. EU Bird Directive Annex I species. Potential foraging and breeding habitat in survey area. Populations are vulnerable to habitat modifications that result from land use change (Wilson *et al.*, 2015). Raptors are among the species known to be most vulnerable to collision mortality at wind farms (Thaxter *et al*., 2017). The construction and operation of wind turbines can impact on hen harriers (displacement during construction and/or operation; collision with turbines). Known presence in wider geographical area year round[21].
Merlin (*F. columbarius*)	Primary	Amber listed. EU Bird Directive Annex I species. Potential foraging habitat in survey area but unlikely to breed in survey area or in area extending away from survey area. Raptors are among the species known to be most vulnerable to collision mortality at wind farms (Thaxter *et al*., 2017). Known presence in wider geographical area during winter[21].
Kestrel (*F. tinnunculus*)	Primary	Amber listed. Potential foraging habitat in survey area. Potential breeding habitat in area extending away from survey area. Raptors are among the species known to be most vulnerable to collision mortality at wind farms (Thaxter *et al*., 2017). Known presence in wider geographical area year round [21].

[21] Known presence based on MWP in-house knowledge and experience.

Sparrowhawk (*A. nisus*)	Primary	Amber listed. EU Bird Directive Annex I species. Potential foraging habitat in survey area. Potential breeding habitat in area extending away from survey area. Raptors are among the species known to be most vulnerable to collision mortality at wind farms (Thaxter *et al.*, 2017). Known presence in wider geographical area year round[21].
Barn owl (*T. alba*)	Not selected	Nocturnal species therefore flight lines not visible. While raptors are among the species known to be most vulnerable to collision mortality at wind farms (Thaxter *et al.*, 2017), barn owls are rarely affected by wind turbines[22].
Long-eared owl (*A. otus*)	Not selected	Nocturnal species therefore flight lines not visible. Potential foraging habitat in survey area. Potential breeding habitat in area extending away from survey area.
Short-eared owl (*A. flammeus*)	Primary	Feeds mainly on small mammals in open habitats. Potential foraging habitat in survey area. Potential breeding habitat in area extending away from survey area. Known presence in wider geographical area[21].
Swans and Geese	**Target Species Rating**	**Rationale**
Whooper swan (*C. cygnus*)	Primary	EU Bird Directive Annex I species. Nationally important population. Proximity of SPA selected for protection of this species. Grassland areas adjacent to the estuary are used by grazing Whooper swans (Robinson *et al.*, 2004). The species is known to forage on grassland sites (Worden *et al.*, 2009) during the day. Possibility that the species overflies or transects through the survey area when commuting to foraging grounds further inland. Known poor flight manoeuvrability.

[22] https://www.barnowltrust.org.uk/hazards-solutions/barn-owls-wind-turbines/

Mute swan (*C. olor*)	Primary	Known presence in wider geographical area [21]. Possibility, albeit slight, that the species' flight lines intersect through the survey area when commuting between foraging grounds. Precautionary principle. Known poor flight manoeuvrability.
Light-bellied brent goose (*B. bernicla hrota*)	Primary	EU Bird Directive Annex I species. Internationally important population[23]. Proximity of SPA selected for protection of this species. Possibility, albeit slight, that the species' flight lines intersect through the survey area. Known poor flight manoeuvrability.
Greylag goose (*A. anser)*	Primary	Proximity of IBA selected for protection of this species. Possibility, albeit slight, that the species' flight lines intersect with the survey area. Known poor flight manoeuvrability. Precautionary principle.
Cormorants	Target Species Rating	Rationale
Cormorant (*P. carbo*)	Secondary	EU Bird Directive Annex I species. Nationally important migratory population. Nationally important resident breeding population. Proximity of SPA selected for protection of this species. Possibility that the species' flight lines intersect with the survey area.
Ducks	Target Species Rating	Rationale
Amber listed: Shelduck (*T. tadorna*) Scaup (*A. marila*) Teal (*A. crecca*)	Secondary	Notwithstanding the proximity of SPA selected for protection of these species and the national importance of the populations for which the SPA is selected, all are exclusively associated with open water habitats not present within the survey area or in the area extending away from it. Very limited likelihood that the species' flight lines intersect with the survey area.

[23] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004077.pdf

Red listed: Pintail (*A. acuta*) Shoveler (*A. clypeata*) Wigeon (*A. penelope*)		
Waders	Target Species Rating	Rationale
Golden plover (*P. apricaria*)	Primary	Red listed. EU Bird Directive Annex I species. Nationally important population. Proximity of SPA selected for protection of species. Possibility that the species overflies or transects through the survey area. Potential foraging habitat in survey area but unlikely to breed in survey area or in area extending away from survey area. Known presence in wider geographical area in winter[21].
Curlew (*N. arquata*)	Primary	Red listed; EU Bird Directive Annex I species. Nationally important population. Proximity of SPA selected for protection of species. Possibility that the species overflies or transects through the survey area. Potential foraging habitat in area extending away from survey area survey area but unlikely to breed in survey area or in area extending away from survey area. Known presence in wider geographical area[21]

Lapwing (*V. vanellus*)	Primary	Red listed. EU Bird Directive Annex I species. Nationally important population. Proximity of SPA selected for protection of species. Possibility that the species overflies or transects through the survey area to foraging grounds where the variety of soil and surface-living invertebrates this species predates are available. Potential foraging habitat in area extending away from survey area survey area but unlikely to breed in survey area or in area extending away from survey area.
Green listed: Ringed plover (*C. hiaticula*) Greenshank (*T. nebularia*) **Amber listed:** Grey plover (*P. squatarola*)] Knot (*C. canutus*) Black-tailed godwit (*L. limosa*) Bar-tailed godwit (*L. lapponica*) **Red listed:** Dunlin (*C. alpina*) Redshank (*T. totanus*)	Secondary	Notwithstanding the proximity of SPA selected for protection of these species and the international and national importance of the populations for which the SPA is selected, all are essentially obligate feeders on marine and estuarine benthic invertebrates. Very limited likelihood that the species' flight lines intersect with the survey area.
Gulls	Target Species Rating	Rationale

Black-headed gull (*C. ridibundus*	Primary	Red listed. EU Bird Directive Annex I species. Proximity of SPA selected for protection of species. Nationally important population. Possibility that the species overflies or transects through the survey area to alternative foraging grounds inland from the estuary.

11 VANTAGE POINT (VP) SURVEYS

VP surveys are designed to quantify the level of flight activity and its distribution over a survey area (SNH, 2017). The survey type comprises a series of watches from fixed locations that are repeated on a scheduled basis that are focused on recording flight behaviours that intersect with the turbine rotor envelope. The aim of the survey design is to set out a standard methodology for recording both the quantitative and qualitative aspects of these behaviours in order to produce sufficient information to assess the potential effects of the development on Target Species particularly with regard to collision risk. It also allows a determination to be made as to whether regular flight lines for any species intersect with the survey area.

VP surveys allow the collection of accurate data on Target Species that will enable estimates to be made of:

- The time spent flying over the survey area;
- The relative use of different parts of the survey area; and
- The proportion of flying time spent within the upper and lower height limits as determined by the rotor diameter and the hub height.

On the basis of extensive local knowledge and experience of the distribution of hen harrier in the north Kerry area and due to the proximity of an SPA designated for the protection of this species, VP surveys were required (SNH, 2017). To this end surveys from three VP locations were conducted during the survey period. The VPs, shown in **Figure 5** were selected to ensure that the fields of view covered all of the flight activity within the survey area (500m buffer) and are located such that no point within the survey area is greater than 2 km from a VP. When selecting the VP locations the visibility of the rotor swept area is critical; visibility at ground level is not. However, due to the almost uninterrupted fields of view afforded by the relatively flat topography of the site visibility to ground level is possible over much of the site. As per SNH (2017) 36 hours per VP were completed during the survey period.

Because bird species have varied seasonal, and within day, activity patterns the timing of survey sessions were adjusted to occur at times when birds are likely to be most active. Because bird flight behaviours change in response to wind conditions, particularly with regard to flight heights, weather will also be a factor in the scheduling of surveys.

The VP methodology outlined in **Section 11.1** also followed the NPWS Recommended Methodology for Assessment of Impacts of Proposed Windfarms included in **Appendix 1.** While the primary focus of the VP surveys were the Target Species listed in **Section 10** all species encountered were recorded on a presence/absence basis on separate field sheets (see **Appendix 2**).

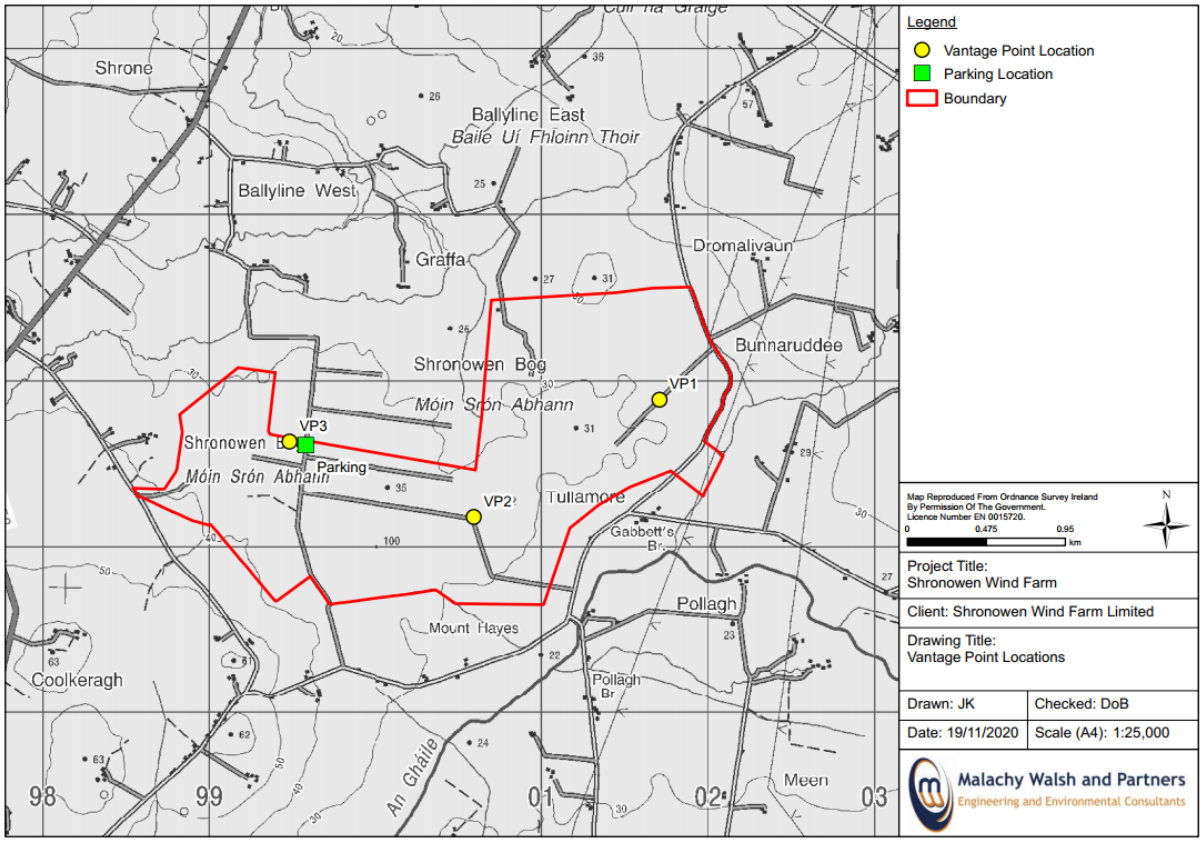


Figure 5: VP Locations

11.1 VANTAGE POINT (VP) METHODOLOGY

The methodology is of particular use in providing details of the number of species and the extent to which birds use the site. It also provides supplementary information on flight activity and behaviour. The longer the overall survey period of VP surveys, the more accurate and precise the sample of flight behaviour.

The VPs are located at positions that provided clear views of turbine hub heights and blade swept area over the survey area. The surveyors based themselves at each VP for a fixed period of 6 hours each month of the survey period. VP sessions were conducted as a series of watches each of not more than 3 hours continuous duration at a time. There were breaks of at least 30 minutes between watches to minimise observer fatigue and a short 'settling in' period of approximately 10 minutes at each VP, before watches started, to allow the surveyor to organise and annotate field sheets, mapping, etc. and to ensure any disturbance from moving around the site had passed. During winter months the variation in the length of daylight influenced the timing of the surveys.

VP watches were conducted under conditions of good ground visibility (>2km) on days when the cloud base was high enough to allow observation of the full survey area and observations were to be suspended during periods of poor visibility and/or heavy rain. In order to ensure that any activity by soaring birds was sampled, surveys were undertaken in a range of wind conditions and on showery days providing showers were not too heavy or prolonged. For each sighting of a Primary Target Species in flight the following was recorded:

- The time that the bird was located and the duration of the observation;
- Sex and age of the bird(s), if possible;

- Behaviour observed such as foraging, commuting or displaying;
- Estimation of flight height;
- Habitats used during flight observation period; and
- Weather conditions at time of sighting.

From the point when an individual was detected it was followed until it ceased flying or was lost from view. The time of initial detection and the flight duration was recorded and the flight path followed was plotted, in the field, onto OSI 1:50 000 mapping. The bird's flight height was estimated at the time of detection and then at evenly spaced intervals thereafter. In order to avoid observer error narrow height bands were not used and flight heights were classified into height bands that can be used in post survey analysis to characterise and describe the flights.

Observations of Target Species took priority over completion of activity summaries. The survey sheet (See **Appendix 2**) is designed to facilitate data entry and allows for the addition of brief notes summarising the flight behaviours. These can subsequently be used to provide qualitative descriptions of the behaviour. Entry of this information was facilitated by use of the codes outlined in **Sections 11.1.1** and **11.1.2**.

Static birds, such as those that are perched were to be recorded on the sheets and the location marked on a map. For clarity, and for ease of post survey analysis, individual flight paths were recorded on separate maps and observation sheets.

11.1.1 Behaviour Codes[24]

The following codes were used in the survey sheets to indicate the behaviours observed for each sighting:

- (H) Hunting
- (F) Flying
- (S) Soaring
- (C) Circling
- (P) Perched
- (G) On Ground
- (M) Mobbing
- (D) Display
- (FP) Male
- (O) Other

11.1.2 Habitat Codes[24]

The following codes were used in the survey sheets to indicate the habitats transected by each flight path:

- IG - Improved grazing
- S - Scrub
- B - Bog
- RG - Rough grazing

[24] Derived from Irish Hen Harrier Survey 2015 Survey & recording guidelines for contributors

- G - Grass moorland
- 1F - First rotation forest
- 2F - Second rotation forest
- T - Thicket (or pole) stage forest
- CF - Clear fell
- H - Heather moorland
- O - Other (please specify)

12 RESULTS: TARGET SPECIES ACTIVITY

Only three of the 13 Primary Target Species and one of the 15 Secondary Target Species were recorded during the survey period. These are, as follows:

- Primary Target Species:
  - Hen harrier (*C. cyaneus*)
  - Kestrel (*F. tinnunculus*)
  - Whooper swan (*C. cygnus*)

- Secondary Target Species
  - Snipe (*G. gallinago*)

In addition, one non target species namely, peregrine (*F. peregrines*) and mallard (*A. platyrhynchos*) was also recorded.

12.1 PRIMARY TARGET SPECIES

12.1.1 Hen harrier Observations

Four observations of this species were recorded and these occurred in October and December. Three of these were of adult males, one was of an adult female. All four flight paths were within the site boundary (see **Figure 1**, above). All of the flight paths were observed from VP1. All at flight heights were between 0m-50m, they were observed here flying and hunting over bog, scrub and 1st rotation forestry. One incidental sighting was made of a female adult in March near VP3 hunting over improved grassland and bog. These flight paths are illustrated in **Figure 6** Hen harrier flight paths Map**,** below. These drawings are, also, included in A4 format in **Appendix 5**. Individual flight paths are numbered and can be identified by cross reference to the Flight Path numbers found in Column 1, **Table 6** below.

The total time of observations is shown in **Table 4**, below and the characteristics of the flights recorded are summarised in **Table 6,** below. Descriptions of the behaviors recorded are included in **Section 12.1.1.1** to **Section 12.1.1.5** inclusive, below. A discussion of the survey results is included in **Section 13** below.

Table 4: Total Observation Time

VP	Time in seconds
1	242
Total	482

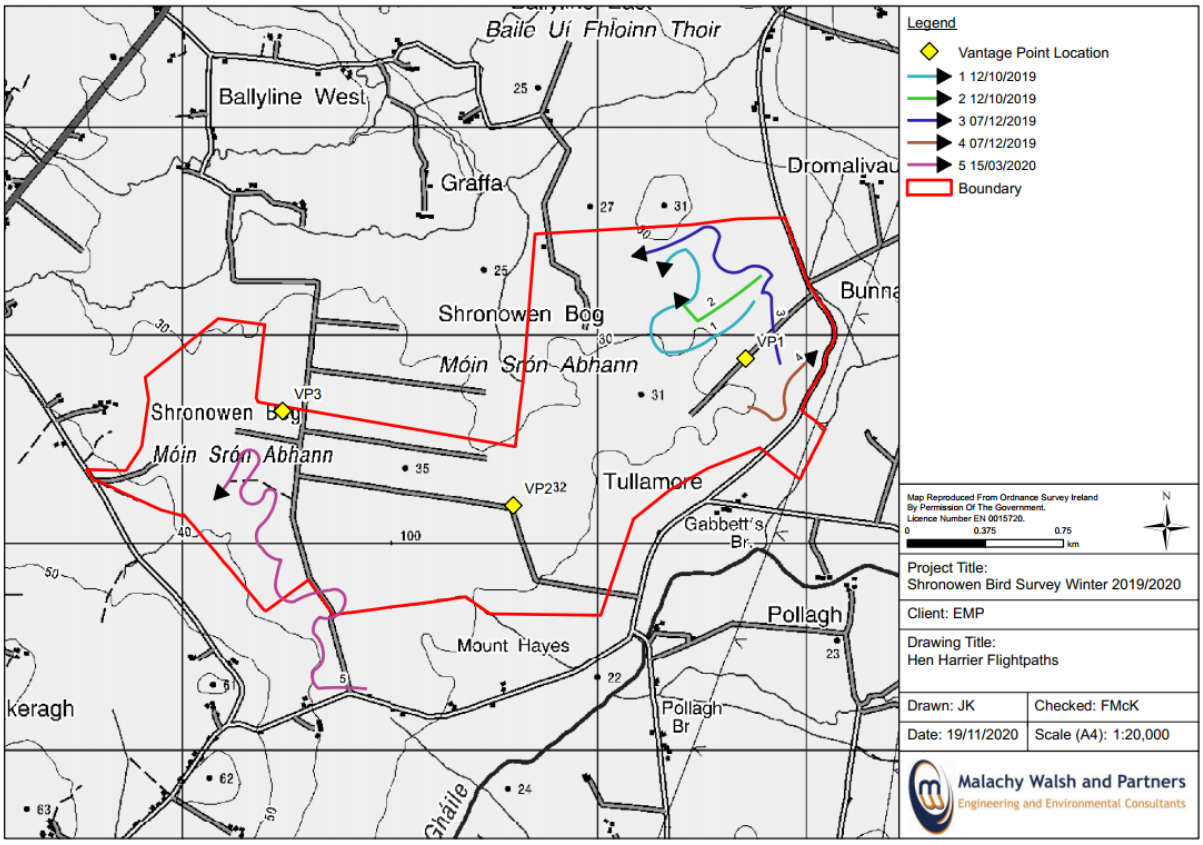


Figure 6 Hen harrier flight paths Map

12.1.1.1 VP1 (October 12th) Flight Path 1

At 09:15 an adult male hen harrier was observed to the north of VP1 within the site boundary. It was observed hunting and flying over bog and around a met mast. It appeared that the bird went to the ground when it dropped out of sight. It was first observed north of VP1 flying in a south westerly direction, it turned to fly north and then south at a height of 0m-20m.

12.1.1.2 VP1 (October 12th) Flight Path 2

At 12:06 an adult male hen harrier was observed to the north of VP1 within the site boundary. This hen harrier was first observed hunting low over the bog (<10m) for approximately 2.5minutes. It dropped behind a ridge and out of sight for 30seconds. This hen harrier then flew up over conifers and out of sight. This activity was observed north of VP1 at 0m-20m height, it flew in a south westerly direction and then off to the north-west.

12.1.1.3 VP1 (December 7th) Flight Path 3

At 11:33 an adult female was observed as it flew south-east of VP1 within the site boundary. It flew north and then eastwardly at various heights between 0m-40m over bog.

12.1.1.4 VP1 (December 7th) Flight Path 4

At 11:43 an adult male was observed to the south of VP1 within the site boundary. It was hunting low (0m-20m) over bog and was flying in a north easterly direction.

12.1.1.5 VP2 (March 15th) Incidental sighting Flight Path 5

At 11:22 an adult female was observed as it flew south of VP3. This female hen harrier was spotted as surveyor drove into site. The bird was hunting over improved grassland and bog, flying northward within the site boundary. It flew low (<15m) generally following the road until it turned back and dropped behind scrub out of view. This bird was in view from 11:22- 11:26 flying just ahead of the surveyor's car.

12.1.2 Kestrel Observations

Five observations of this species were recorded, and these occurred in October, November, December and March. All observations were made within the site boundary, two were made from VP1 and VP2 and one was made from VP3. These were seen within the bog habitat at various heights ranging from 0m-100m and the activities observed include flying mainly as well as hunting and perched. The flight paths are illustrated in **Figure 7** Kestrel flight paths Map**,** below. These drawings are also included in A4 format in **Appendix 5**. Individual flight paths are numbered and can be identified by cross reference to the Flight Path numbers found in Column 1, **Table 7,** below.

The total time of observations is shown in **Table 5,** below. The flight characteristics are summarised in **Table 7**, below and the observations are described in **Section 12.1.2.1** to **Section 12.1.2.5**, inclusive, below. A discussion of the survey results is included in **Section 13**.

Table 5 : Total Observation Time

VP	Time in seconds
1	386
2	8
3	20
Total	409

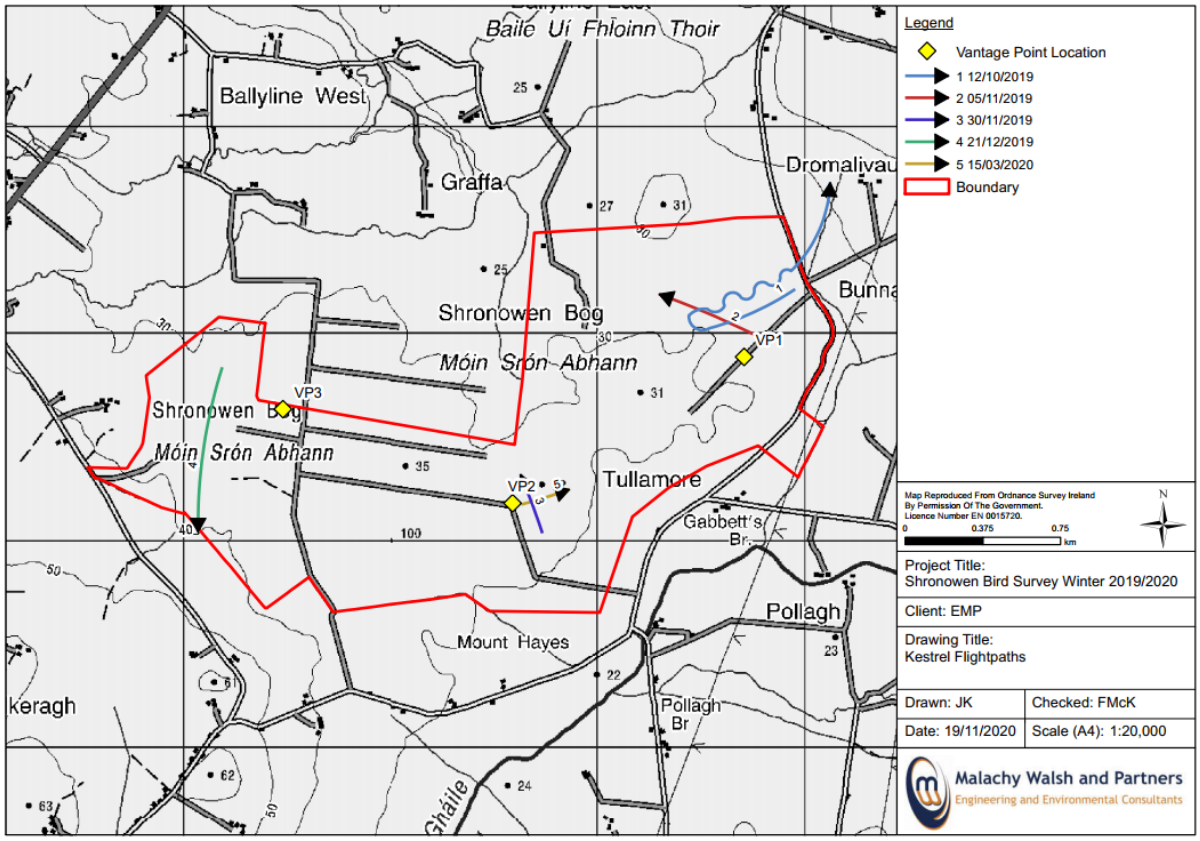


Figure 7 Kestrel flight paths Map

12.1.2.1 VP1 (October 12th) Flight Path 1

At 12:45 a female adult kestrel was observed to the north-east of VP1, within the site boundary.It was observed hunting over bog and also landed on a met mast for 5minutes in the middle of the observation. The kestrel flew south-west and then zigzagged off in a north easterly direction at heights up to 100m.

12.1.2.2 VP1 (November 5h) Flight Path 2

At 16:16 a kestrel was observed north of VP1, within the site boundary. This kestrel was observed flying c.25m over the bog in a north westerly direction.

12.1.2.3 VP2 (November 30th) Flight Path 3

At 17:01 a kestrel was observed south east of VP2 flying within the site boundary. This kestrel was fling low (c. 10m) over the bog as the light faded. It was first observed south-east of VP2 and flew in a north-westerly direction.

12.1.2.4 VP3 (December 21st) Flight Path 4

At 10:15 an adult female kestrel was observed north west of VP3 flying within the site boundary. This kestrel flew at heights of c. 30m and was first observed to the north west of VP3 and flew in a southerly direction.

12.1.2.5 VP2 (March 15th) Flight Path 5

At 12:15 a kestrel was observed flying over VP2 within the site boundary. This kestrel flew quickly at <20m height in a north easterly direction, it then dropped behind scrub and out of sight.

12.1.3 Whooper swan Observations

One observation of this species was recorded, and this occurred in November. This observation was made outside the site boundary. 12 whooper swans were observed on the ground on improved grassland to the north-west of VP3. The observation is illustrated in **Figure 8** Whooper swan observation Map**,** below. This drawing is also included in A4 format in **Appendix 5**.

The observation characteristics are summarised in **Table 8**, below and the observation is described in **Section 12.1.3.1,** below. A discussion of the survey results is included in **Section 13**, below.

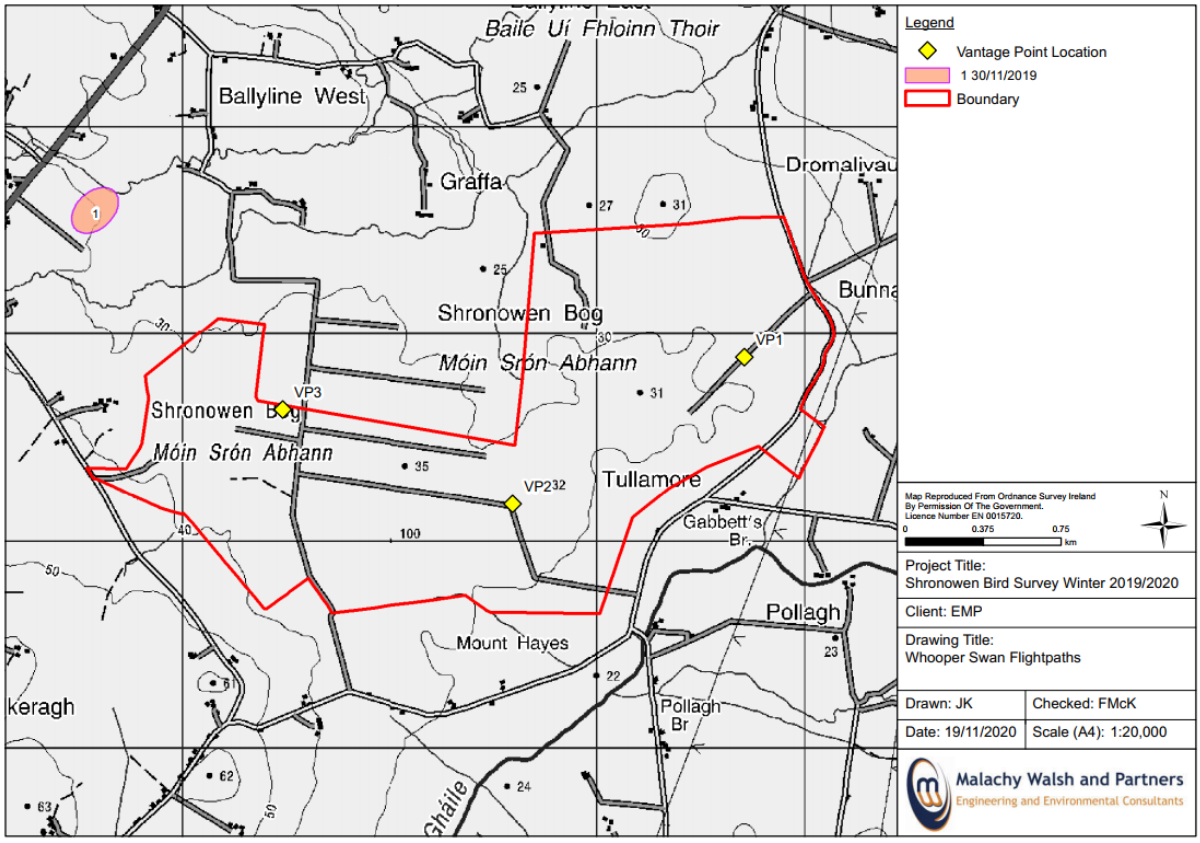


Figure 8 Whooper swan observation Map

12.1.3.1 VP2 (November 30th) Incidental sighting

At 14:05 whooper swans were observed to the north-west of VP3 outside the site boundary. This was a subflock of approximately 12 whooper swans which were observed grazing in an improved grassland field. These were observed before the VP watch on the surveyors drive to site.

Table 6: Summary characteristics of hen harrier flights observed

Flight Path No.	Figure No.	Date	VP	Time of Observation	Gender/ age	Duration of observation (seconds)	Behaviour	Height Flown (m)	Habitat(s) overflown
Winter 2019-2020									
1	6	12/10/19	1	09:15	Male/ Adult	35	Hunting Flying	0-20m	Bog, Scrub and 1st rotation forestry
2	6	12/10/19	1	12:06	Male/ Adult	157	Hunting Flying	0-20m	Bog, Scrub and 1st rotation forestry
3	6	07/12/19	1	11:33	Female/ Adult	15 12	Flying	0-20m 20-50m	Bog
4	6	07/12/19	1	11:43	Male/Adult	23	Hunting	0-20m	Bog
5	6	15/03/20	2	11:22	Female/ Adult	n/a	Hunting	0-20m	Improved grassland and bog

Table 7: Summary characteristics of kestrel flights observed

Flight Path No.	Figure No.	Date	VP	Time of Observation	Gender/age	Duration of observation (in seconds)	Behaviour	Height Flown (m)	Habitat(s) overflown
Winter 2019 – 2020									
1	7	12/10/19	1	12:45	Female / Adult	180 60 120	Hunting and perched	0-20m 20-50m 50-100m	Bog
2	7	05/11/19	1	16:16	Unknown	26	Flying	20-50m	Bog
3	7	30/11/19	2	17:01	Unknown	3	Flying	0-20m	Bog
4	7	21/12/19	3	10:15	Female/ Adult	20	Flying	20-50m	Bog
5	7	15/03/20	2	12:15	Unknown/ Adult	5	Flying	0-20m	Bog

Table 8: Summary characteristics of whooper swan flights observed

Flight Path No.	Figure No.	Date	VP	Time of Observation	Gender/age	Duration of observation (in seconds)	Behaviour	Height Flown (m)	Habitat(s) overflown
Winter 2019 - 2020									
1	8	30/11/19	2	14:05	12 Unknown	NA	On ground	0-20m	Improved grassland

12.2 SECONDARY TARGET SPECIES

12.2.1 Snipe Observations

Two recordings of this species were made and these occurred in November. Snipe was heard calling after dark at VP1 location on the 05/11/2019 and two to three snipe were heard calling after dark at VP2 location on the 30/11/2019. No further data was collected on these snipe.

12.3 OTHER SPECIES OBSERVED

12.3.1 Peregrine Observations

Two observation of this species were recorded, and these occurred in October and December. Observations were made within the site boundary from VP2 and VP1 locations. These birds were observed flying and perched over bog and 1st rotation forestry habitat, flight heights fell within 0m-150m. The flight paths are illustrated in **Figure 9** Peregrine flight paths Map**,** below. These drawings are also included in A4 format in **Appendix 5**. Individual flight paths are numbered and can be identified by cross reference to the Flight Path numbers found in Column 1, **Table 11,** below.

The total time of observation is shown in **Table 9,** below. The flight characteristics are summarised in **Table 11**, below and the observations are described in **Section 12.3.1.1** and **12.3.1.2**, below. A discussion of the survey results is included in **Section 13**, below.

Table 9: Total Observation

VP	Time in seconds
1	138
2	25
Total	163

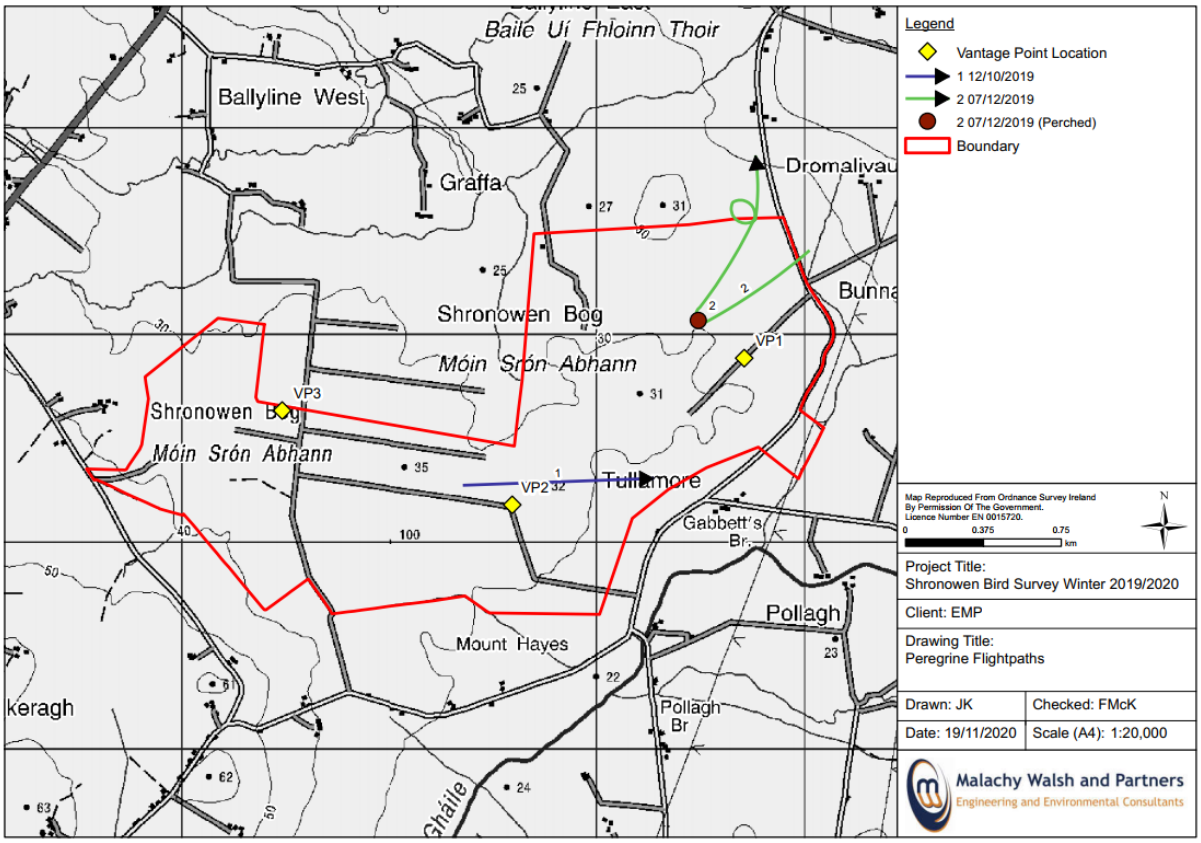


Figure 9 Peregrine flight paths Map

12.3.1.1 VP2 (October12th) Flight Path 1

At 14:25 a captive peregrine not a wild bird was observed within the site boundary. This peregrine was released by a falconer and flew past VP2. It was seen shortly afterwards when the falconer who then left the bog with the bird. This peregrine flew north of VP2 in an easterly direction, at a height between 100m-150m.

12.3.1.2 VP1 (October12th) Flight Path 2

At 12:20 a bird flew into the site boundary from the north east of VP1. It perched on the bog to the north west and flew quickly away due north. This peregrine was observed flying at various heights between 0m-100m.

12.3.2 Mallard Observations

Three observations of this species were recorded, and these occurred in October, February and March. These observations were made from VP1, VP2 and VP3 locations and all observations occurred inside the site boundary. These were observed flying over bog habitat heights within 0m-50m. The flight paths are illustrated in **Figure 10** Mallard flight paths Map**,** below. These drawings are also included in A4 format in **Appendix 5**. Individual flight paths are numbered and can be identified by cross reference to the Flight Path numbers found in Column 1, **Table 12** below.

The total time of observation is shown in **Table 10,** below. The flight characteristics are summarised in **Table 12,** below and the observations are described in **Section 12.3.2.1** to **Section 12.3.2.3**, below. A discussion of the survey results is included in **Section 13**, below.

Table 10: Total Observation

VP	Time in seconds
1	30
2	10
3	6
Total	46

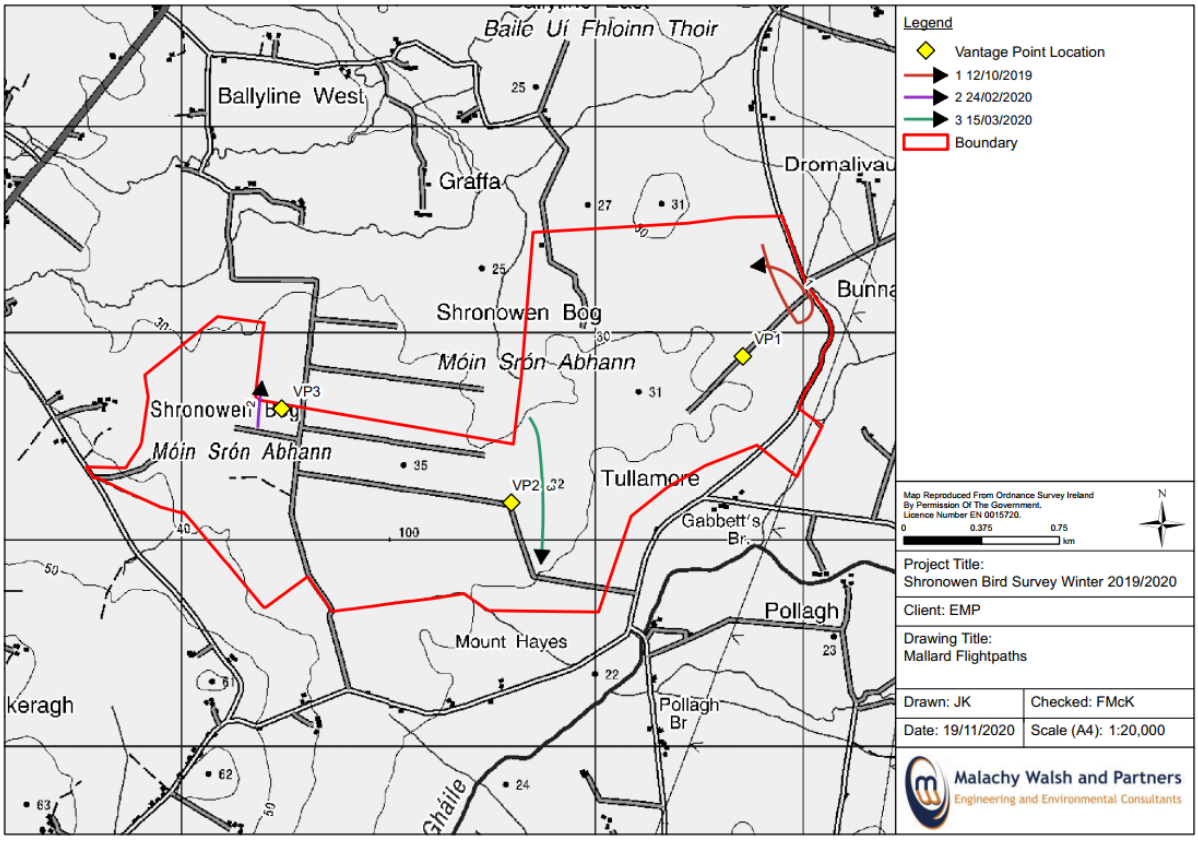


Figure 10 Mallard flight paths Map

12.3.2.1 VP1 (October 12th) Flight Path 1

At 11:55, two female and one male mallard were observed flying within the site boundary. These were observed to the north of VP1 flying over bog habitat in a south easterly direction and then it flew off in a north westerly direction. These birds were flushed by a tractor and flew around the bog between 0m-50m height before they landed again.

12.3.2.2 VP1 (February 24th) Flight Path 2

At 18:44, three mallards were observed flying over bog within the site boundary. It was not possible to identify the sex or determine where they went to due to the low light conditions on the day. These mallards were heard calling and observed flying northwards low 0m-15m height over bog to the west of VP3.

12.3.2.3 VP2 (March 15th) Flight Path 3

At 17:55 an adult male mallard was observed to the east of VP2 within the site boundary. It was observed flying over bog at c. 25m height. The bird was first observed to the north east of VP2 it flew in a southerly direction and was lost to view south east of VP2.

Table 11: Summary characteristics of peregrine flights observed

Flight Path No.	Figure No.	Date	VP	Time of Observation	Gender/age	Duration of observation (in seconds)	Behaviour	Height Flown (m)	Habitat(s) overflown
Winter 2019 - 2020									
1	9	12/10/19	2	14:25	Female /Adult	25	Flying	100-150m	Bog
2	9	07/12/19	1	12:20	Female /Adult	6	Flying	20-50m	Bog
						120	Perched	0-20m	Bog
						5	Flying	20-50m	Bog
						7	Flying	50-100m	Bog and 1st rotation Forestry

Table 12: Summary characteristics of mallard flights observed

Flight Path No.	Figure No.	Date	VP	Time of Observation	Gender/age	Duration of observation (in seconds)	Behaviour	Height Flown (m)	Habitat(s) overflown
Winter 2019 - 2020									
1	10	12/10/19	1	11:55	Male & 2 Female /Adult	20 10	Flying	0-20m 20-50m	Bog
2	10	24/02/2020	3	18:44	Unknown	6	Flying	0-20m	Bog
3	10	15/03/20	2	17:55	Male /Adult	10	Flying	20-50m	Bog

13 DISCUSSION

Only three of the 13 Primary Target Species[25] and one of the 15 Secondary Target Species were recorded during the survey period. The numbers of observations of individual Target Species, and the activity of bird species generally, was extremely low.

The species recorded are, as follows:

- Primary Target Species:
  - Hen harrier (*C. cyaneus*)
  - Kestrel (*F. tinnunculus*)
  - Whooper swan (*C. cygnus*)

- Secondary Target Species
  - Snipe

In addition, non target species namely, peregrine (*F. peregrines*) and mallard (*A. platyrhynchos*) was also recorded.

These species differ from those species recorded during the 2018-2019 winter survey period. Additional Primary Target Species sparrowhawk (*A. nisus*) and curlew (*N. arquata*) were recorded and additional Secondary Target Species recorded were cormorant (*P. carbo*) and snipe (*G. gallinago*).

13.1 PRIMARY TARGET SPECIES

During the second winter survey hen harrier were recorded on five occasions, this was one occasion more than last year's winter survey 2018-2019. Male and females were observed mainly utilising the east of the site flying and hunting at heights between 0m-50m. These hen harriers activity was mostly occurring over the bog, scrub and forestry. They were observed for a greater amount of time than during the previous year's winter survey.

Throughout the previous year 2018-2019 winter surveys hen harrier was recorded on four occasions each of which comprised a brief observation only and none of which extended beyond 30 seconds. While lengthier observations of this species can, and do, occur the characteristic speed and agility of this rapidly flying, powerful, stealth predator are such that brief glimpses of individuals, hugging the ground as they hunt, are typical and the hunting style used conceals individuals from prey and observer alike as the birds hide in the micro-topography and the low slung vegetation of their hunting grounds.

During the second winter survey kestrel was recorded on five occasions, this was three occasions less than last year's winter survey. Females were identified but a few of the birds sex and age was unknown due to the brevity of the sighting and the distance intervening between the observer and the bird, which made it difficult to see the plumage sufficiently clearly to ascertain the age or sex of the bird. All observations were made to the east and south-east within the site boundary, where the birds were

[25] See **Section** 10

seen flying at various heights up to 100m over bog habitat. They were observed for a lesser amount of time than during the previous year's winter survey.

Throughout the previous year 2018-2019 winter surveys kestrel was recorded on eight occasions and, as would be expected of this species, because of its habit of hovering in place, for prolonged periods, while hunting, these observations were generally quite lengthy.

No sparrowhawks were recorded during the 2019-2020 winter survey. This differs from the three observations of sparrowhawk made during the 2018-2019 winter survey period.

Throughout the previous year 2018-2019 winter surveys the three sightings of sparrowhawk also reflected the behaviours of this agile hunter which will often perch on objects or at locations that offer an open view of the hunting grounds when seeking opportunities to hunt and individuals will even pursue prey on foot, along branches in trees and shrubs or on the ground if the quarry seeks to use cover in attempting to elude it. The survey data indicates that, during the survey period, predators, either as a group or as individual species, were not active or present at the proposed wind farm site to any significant extent. These data would suggest that, during the survey period, the location, while within the foraging ranges of these species, was used sporadically rather than consistently.

During the second winter survey whooper swan was recorded on one occasion, which was five occasions less than last year's winter survey. This was an incidental observation of 12 whooper swans made in November. These were observed on the same patch of improved grassland outside the site boundary as they were identified in the previous winter survey. While the observation of whooper swan did not occur during VP watches they are included in this report as they are of material significance to any description of bird activity in the area. Potential foraging grounds that had been identified during the site reconnaissance surveys were resurveyed while the surveyors were en-route to and from the site before and after VP sessions. The observations are also noteworthy because it demonstrates that, notwithstanding the proximity of this foraging site to the proposed wind farm, no evidence of whooper swans foraging within the proposed site or of swans transecting through the site was recorded during the survey period. As it is known that swans typically follow traditional flight paths, to and from roosting sites and foraging grounds and between foraging grounds, it is reasonable to infer, from the absence evidence that this, over wintering migratory, species commuted through the site during the survey period, that this species does not routinely commute through the proposed wind farm site during any winter.

Throughout the previous year 2018-2019 winter surveys the observations of whooper swan did not occur during VP watches either. A feeding flock was first observed in February and this occurred on a further five occasions between that date and the end of the survey period on March 31st.

There were no sightings of curlew made during the 2019-2020 winter survey. During the 2018-2019 winter survey curlew was recorded on one occasion. This curlew was heard calling (from VP2 on the November 11th). This one recording of curlew does not comprise sufficient data from which to draw any inferences or conclusions beyond the observation that this species was not recorded to any significant extent, at the proposed wind farm site, during both survey periods.

13.2 SECONDARY TARGET SPECIES

There were no observations of cormorant made during 2019-2020 winter survey period. This differs from the two observations of cormorant made during the 2018-2019 winter survey period. These two observations of cormorant do not comprise sufficient data from which to draw any inferences or conclusions beyond the observation that this species was not recorded to any significant extent, at the proposed wind farm site, during both survey periods.

There were two recordings of snipe made during the 2019-2020 winter survey in November. Snipe was heard calling after dark at VP1 location on the 05/11/2019 and two to three snipe were heard calling after dark at VP2 location on the 30/11/2019. No further data was collected on these snipe. Two observations of snipe made during the 2018-2019 winter survey period. These four observations of snipe do not comprise sufficient data from which to draw any inferences or conclusions beyond the observation that this species was not recorded to any significant extent, at the proposed wind farm site, during the survey period.

13.3 OTHER SPECIES OBSERVED

During the second winter survey peregrine was recorded on two occasions and was not recorded during last year's winter survey. On one observation it was clear this was of a captive bird as the falconer was observed with the bird. These peregrines were seen to the east and north east of the site flying and perched over bog and forestry habitat at flights height ranging within 0m-150m.

During the second winter survey mallard was recorded on three occasions. These were observed flying over bog habitat at heights within 0m-50m. Throughout the previous year 2018-2019 winter surveys one observation of a pair of mallards was made.

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Appendix 1

NPWS Recommended Methodology for Assessment of Impacts Proposed by Wind farms

RECOMMENDED METHODOLOGY FOR ASSESSMENT OF IMPACTS OF PROPOSED WINDFARMS ON BREEDING HEN HARRIER WITHIN THE KNOWN RANGE OF THE SPECIES IN IRELAND

Of the two main threats to Hen Harriers from windfarms (collision and displacement), the possibility of indirect habitat loss, or displacement, if birds avoid a windfarm area is seen as the most immediate issue. Research to improve assessments of collision risk is ongoing in other countries; the proportion of the breeding population at risk from windfarms that have planning permission at present is small. Other proposed windfarms, within areas of importance for Hen Harrier, should be subject to Environmental Impact Assessment.

RELEVANT SPECIES

Although these recommendations focus on the Hen Harrier as the species of concern, breeding Short-eared Owl may possibly occur at some sites, in which case an assessment of site importance should be made using the same methodology, at times of day appropriate to the species.

ASSESSMENT OF SITE IMPORTANCE

Nine upland areas have been identified by Dúchas as being of national importance for Hen Harrier. All areas of heath/bog habitats within the indicative boundaries of these areas lie within 5km of known nest sites located during the 1998-2000 survey, *i.e.* within the normal foraging range of the male of each pair. Any proposed development, which may have impacts on such habitats, should be subject to a detailed survey, to determine Hen Harrier usage for hunting (foraging).

Important aspects to be considered in an assessment are:
The numbers and breeding success of Hen Harriers that may forage in the area, ideally within 5km of the proposed development site,
The time spent by Hen Harriers in all parts of the site,
The cumulative impact of other windfarms in the area that have been granted planning permission,

Spatial variation in an area's importance to foraging Hen Harriers when:
either occupancy or breeding success are below normal,
fire, overgrazing or turbary temporarily reduce the vegetation cover and hence its value to foraging birds,
nest locations change from year to year.

METHODS

Survey of breeding occupancy:
An appropriate survey in good weather conditions, with at least two visits in April of breeding pairs within 5km of the site from outer turbines and a second series of visits in July to determine breeding success, would be necessary to interpret results from foraging observations. In years with a run of poor weather during April and May, an intermediate series of observations may be required in June to confirm occupancy by breeding pairs or locate late arriving pairs. Useful information is given in Gilbert *et al.* (1998).

Methodology should be detailed giving dates of survey, map of area searched, and habitat types searched. Results should not include detailed nest locations in public documents (e.g. EIS), but should include minimum distance from the development site.

Data on the number and distance from the site of breeding pairs recorded in the 1998-2000 survey (Norriss *et al.* 2002), and in subsequent years where available, can be provided by Dúchas (contact dnorriss@duchas.ie).

Survey of proposed development site

Description of survey area:
The assessment area should include a strip at least 500m beyond the outermost turbines.
A habitat map of the study area should be produced based on the habitat categories listed in Appendix 1. A more detailed habitat map (for example using the classification in Fossitt (2000)) may be appropriate in some cases.

Use of the site:

Madders' (2002) methodology, using timed watches from fixed vantage points (VPs), suits well and can be adapted to local circumstances; those aspects of his procedures relevant to Hen Harriers are summarised below. The objective is to estimate the amount of time birds spend foraging per unit area of the site.

Two 3hour watches per VP per month are recommended for the duration of the breeding season (April – July). A gap of at least one hour between watches is advised.

Restrict observations to 0700-2000 hours and suspend observations during periods of poor

visibility and rain.

Select the minimum number of VPs consistent with complete coverage of the site. VPs should be outside the site where feasible, or located so as to avoid disturbance within the site, but within 1km of the ground being observed. Choose inconspicuous locations, well away from nests, to minimise impact on the birds.

Foraging Harriers usually fly within 10m of the ground and characteristically change direction and height abruptly when searching for prey. Record duration of observation and activity of any Harriers observed according to habitat category.

Map the area of each habitat visible from each VP, either in the field, from photographs or using a GIS. If there is area overlap from different VPs, observation areas should be summed when calculating overall observation rates/unit area. Because fields of view can change substantially with even minor changes in VP location, exact relocation using a GPS and perhaps an inconspicuous marker on the ground is recommended if more than one observer is involved.

The Report should include a summary of the sections of the site used by foraging Hen Harriers, broken down by broad habitat category.

If successful breeding is demonstrated in or close to a site, then VP observations should be continued into August to identify areas used by recently fledged juveniles prior to dispersal.

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APPENDIX 1

Recommended classification of habitat types for use in assessments of wind farm sites for Hen Harrier

Habitat code

Description

NF
NF 2
New forestry plantation, trees 20-30 cm high

NF 3
New forestry plantation, trees c 1m in height

NF 4
New forestry plantation, trees >2m in height, patchy thickets

2nd F
2nd F 1 & 2
2nd rotation forestry plantation, trees 20-30 cm high

2nd F 3
New forestry plantation, trees c 1m in height

2nd F 4
New forestry plantation, trees >2m in height, patchy thickets

F
Post thicket plantation

G
Grazing

RG
Rough Grazing & rushy pasture

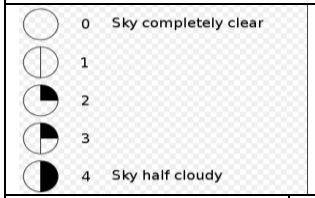
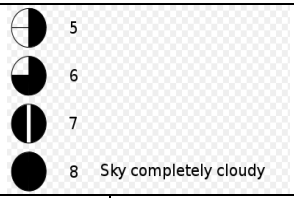
H/B
Heath / Bog
DE
Deciduous woodland & scrub

GO, Gorse

Appendix 2

Survey Field Sheets

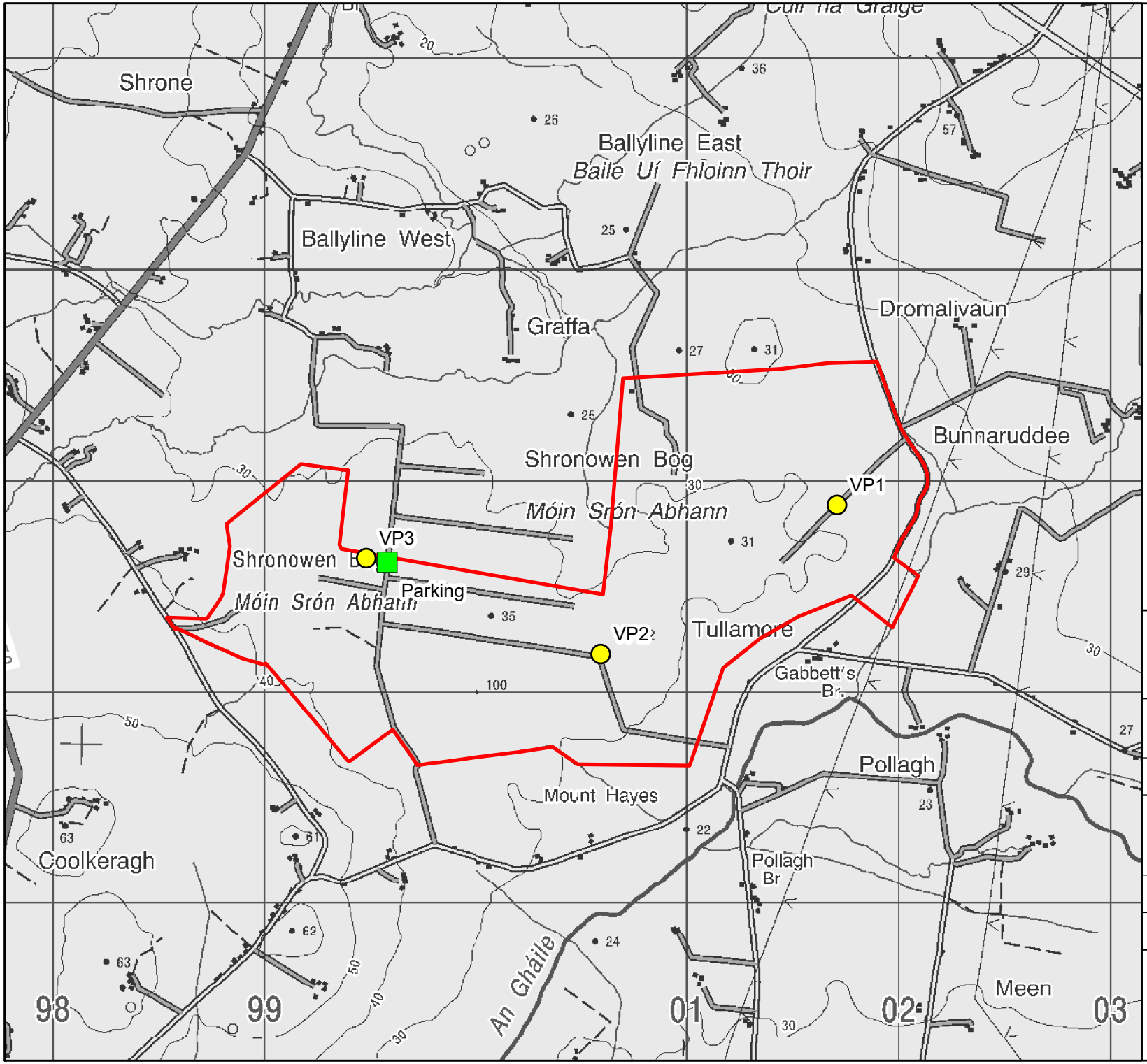
See over for additional notes

Location: Shroneowen WF	Project No: 19746	VP No:	Observer	Date:		Visibility:
				Time:	Start:	
					Finish:	
		Weather		Wind Speed & Direction:		Temp:

Barn Owl		Goldfinch		Long-eared Owl		Sand Martin		Whooper Swan	
Blackbird		Grasshopper Warbler		Long-tailed Tit		Sedge Warbler		Wigeon	
Blackcap		Grt Black-backed Gull		Magpie		Shelduck		Willow Warbler	
Black-headed Gull		Great Tit		Mallard		Siskin		Woodcock	
Blue Tit		Greenfinch		Meadow Pipit		Skylark		Woodpigeon	
Brambling		Grey Heron		Merlin		Snipe		Wren	
Bullfinch		Grey Partridge		Mistle Thrush		Song Thrush		Yellowhammer	
Buzzard		Grey Wagtail		Moorhen		Sparrowhawk		**Additional Species**	
Chaffinch		Greylag Goose		Mute Swan		Sptd Flycatcher			
Chiffchaff		Hen Harrier		Peregrine		Starling			
Coal Tit		Herring Gull		Pheasant		Stock Dove			
Collared Dove		Hooded Crow		Pied Wagtail		Stonechat			
Coot		House Martin		Raven		Swallow			
Crossbill		House Sparrow		Red Grouse		Swift			
Cuckoo		Jackdaw		Redpoll		Teal			
Curlew		Jay		Redshank		Tree Sparrow			
Dunlin		Kestrel		Redwing		Treecreeper			
Dunnock		Lapwing		Reed Bunting		Water Rail			
Fieldfare		Lsr-blk-bk Gull		Ringed Plover		Wheatear			
Goldcrest		Linnet		Robin		White-fronted Goose			
Golden Plover		Little Grebe		Rook		Whitethroat			

TARGET SPECIES FIELD SHEET									
Project No: **19746**	VP:	Date:	Survey Sheet No:	Surveyor:				Species:	
Location: **Shroneowen**									
VP Start:			Wind Speed (B 'fort)	Wind Direction:		Visibility:			
VP Finish:									
Weather Conditions:									
Disturbance:									
Time first observed:	**Activity Codes: (H)** Hunting, **(F)** Flying, **(S)** Soaring, **(C)** Circling, **(P)** Perched, **(G)** On Ground, **(M)** Mobbing, **(D)** Display. **Habitat Codes**: **(IG)** Improved Grassland, **(RG**) Rough Grassland, **(G)** Grassland Moorland, **(S)** Scrub, **(B)** Bog, **(1F)** 1st Rotation Forest, **(2F)** 2nd Rotation Forest, **(T)** Thicket/Pole Stage Forest, **(CF)** Clear Fell, **(H)** Heather Moorland, **(L)** Lake, **(P)** Pond, **(TSW)** Temporary Standing Water, **(O)** Other (specify):								
Sex:									
Age:									
0m – 20m (Seconds)	Activity/Habitat	20-50m	Activity/Habitat	50-100m	Activity/Habitat	100-150m	Activity/Habitat	>150m	Activity/Habitat

Notes:



Legend

- Vantage Point Location
- Parking Location
- Boundary

0 0.475 0.95 km

N

Project Title:
Shronowen Wind Farm

Client: Shronowen Wind Farm Limited

Drawing Title:
Vantage Point Locations

Drawn: JK	Checked: DoB
Date: 19/11/2020	Scale (A4): 1:25,000

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Appendix 3

Vantage Point Survey Summary

Location: Shronowen

October 2019 VP 1-3

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
1	12/10/2019	CMc	07.00	10.00	3	Cloud 4, wind speed f1, wind direction 3, 8°C, visibility 2.5km and heavy intermittent rain, one heavy shower (10minutes).
1	12/10/2019	CMc	10.30	13.30	3	Cloud 3, wind speed f1, wind direction 7.5, 9°C, visibility 2.5km and no rain.
2	12/10/2019	CMc	13.45	17.45	4	Cloud 5, wind speed f2, wind direction 7.5, 9°C, visibility 2.5km and no rain.
2	19/10/2019	CMc	07.10	10.10	3	Cloud 6, wind speed f1, wind direction 10.5, 10°C, visibility 2.5km
3	17/10/2019	CMc	16.40	19.40	3	Cloud 7, wind speed f1, wind direction 7.5, 7°C, visibility 2.5km and no rain.
3	25/10/2019	CMc	09.15	12.15	3	Cloud 8, wind speed f1, wind direction 3, 5°C, visibility 1.5km and slight rain continuous.

November 2019 VP 1-3

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
1	05/11/2019	CMc	15.00	18.00	3	Cloud 6, wind speed f2, wind direction 10.5, 10°C, visibility 2.5km and no rain.
1	24/11/2019	CMc	10.00	13.00	3	Cloud 7, wind speed f2, wind direction 4.5, 9°C, visibility 2.5km and slight continuous rain for the last hour only.
2	23/11/2019	CMc	12.00	15.00	3	Cloud 7, wind speed f2, wind direction 10.5, 9°C, visibility 2.5km and no rain.
2	30/11/2019	CMc	14.30	17.30	3	Cloud 8, wind speed f2, wind direction 3, 9°C, visibility 2.5km and no rain.
3	09/11/2019	CMc	06.50	09.50	3	Cloud 6, wind speed f2, wind direction 10.5, 6°C, visibility 2.5km and heavy intermittent rain.
3	09/11/2019	CMc	09.50	12.50	3	Cloud 6, wind speed f3, wind direction 10.5, 8°C, visibility 2.5km and no rain.

December 2019 VP 1-3

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
1	07/12/2019	CMc	10.15	13.15	3	Cloud 4, wind speed f2, wind direction 7.5, 12°C, visibility 2.5km and no rain.
1	14/12/2019	CMc	14.25	17.25	3	Cloud 6, wind speed f2, wind direction 7.5, 5°C, visibility 2.5km and slight intermittent rain only in the last 30minutes.
2	22/12/2019	CMc	07:45	10:45	3	Cloud 4, wind speed f2, wind direction 9, 3°C, visibility 2.5km and slight intermittent rain.
2	22/12/2019	CMc	12:00	15:00	3	Cloud 4, wind speed f2, wind direction 9, 9°C, visibility 2.5km and slight intermittent rain.
3	21/12/2019	CMc	07:45	10:45	3	Cloud 4, wind speed f1, wind direction 6, 0°C, visibility 2.5km and no rain.
3	21/12/2019	CMc	10.45	13.45	3	Cloud 3, wind speed f1, wind direction 6, 3°C, visibility 2.5km and no rain.

January 2019 VP 1-3

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
1	18/01/2020	CMc	07.40	10.40	3	Cloud 1, wind speed f1, wind direction 3, --1°C, visibility 2.5km and no rain.
1	18/01/2020	CMc	13.00	16.00	3	Cloud 1, wind speed f1, wind direction 9, 5°C, visibility 2.5km and no rain
2	04/01/2020	CMc	10.00	13.00	3	Cloud 8, wind speed f1, wind direction 7.5, 9°C, visibility 2.5km and no rain.
2	25/01/2020	CMc	09.00	12.00	3	Cloud 7, wind speed f2, wind direction 6, 8°C, visibility 2.5km and no rain.
3	12/01/2020	CMc	07.45	10.45	3	Cloud 6, wind speed f1, wind direction 9, 4°C, visibility 2.5km and no rain.
3	25/01/2020	CMc	13.30	16.30	3	Cloud 8, wind speed f3, wind direction 6, 9°C, visibility 2.5km and

Vantage Point Survey Summary

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
						slight intermittent rain.

February 2019 VP 1-3

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
1	08/02/2020	CMc	13.30	16.30	3	Cloud 8, wind speed f4, wind direction SW, 7°C, visibility 2.5km and moderate continuous rain.
1	12/02/2020	CMc	15.44	18.44	3	Cloud 5, wind speed f4, wind direction W, 3°C, visibility 2.5km and heavy intermittent rain.
2	17/02/2020	CMc	12.00	15.00	3	Cloud 4, wind speed f4, wind direction W, 6°C, visibility 2.5km and no rain.
2	22/02/2020	CMc	14.30	17.30	3	Cloud 7, wind speed f3, wind direction 7.5, 7°C, visibility 2.5km and no rain.
3	12/02/2020	CMc	10.30	13.30	3	Cloud 3, wind speed f2, wind direction 7.5, 6°C, visibility 2.5km and no rain.
3	24/02/2020	CMc	16.10	19.10	3	Cloud 5, wind speed f2, wind direction 10.5, 6°C, visibility 2.5km and no rain.

March 2019 VP 1-3

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
1	06/03/2020	CMc	16.30	19.30	3	Cloud 8, wind speed f1, wind direction 9, visibility 2.5km.
1	07/03/2020	CMc	08.30	11.30	3	Cloud 8, wind speed f2, wind direction 7.5, visibility 2km and drizzle rain
2	15/03/2020	CMc	11.40	14.40	3	Cloud 4, wind speed f2, wind direction 10.5, 9°C, visibility 2.5km and no rain.
2	15/03/2020	CMc	16.40	1940	3	Cloud 4, wind speed f2, wind direction 10.5, 7°C, visibility 2.5km and no rain.
3	12/03/2020	CMc	11.00	14.00	3	Cloud 6, wind speed f23 wind direction 9, 6°C, visibility 2.5km and

Vantage Point Survey Summary

VP	Date	Observer	Start Time	Finish Time	Length of VP watch (hours)	Weather
						slight intermittent rain.
3	13/03/2020	CMc	15.00	18.00	3	Cloud 7, wind speed f1, wind direction 4.5, 8°C, visibility 2.5km and slight intermittent rain.

Appendix 4

Target/Secondary Species Observations

Hen harrier														
Date	VP	Sex	Age	Map Flight Path No.	Habitat	No. Of Birds	Time of Flight/ Obs.	Activity	Flight Height (m)	Time (sec) in Height Category				
										Non-flight	0-50m	50 – 100m	>100m	>200m
12/10/19	1	Male	Adult	1	Bog scrub and 1st rotation forestry	1	09.15	Flying and hunting	0-20m		35			
12/10/19	1	Male	Adult	2	Bog scrub and 1st rotation forestry	1	12.06	Flying and hunting	0-20m		157			
07/12/19	1	Female	Adult	3	Bog	1	11.33	Flying	0-20m 20-50m		15 12			
07/12/19	1	Male	Adult	4	Bog	1	11.43	Hunting	0-20m		23			
15/03/20	2	Female	Adult	5	Improved grassland and bog	1	11.22	Hunting	0-20m		240			

Kestrel														
Date	VP	Sex	Age	Map Flight Path No.	Habitat	No. Of Birds	Time of Flight/ Obs.	Activity	Flight Height (m)	Time (sec) in Height Category				
										Non-flight	0-50m	50 – 100m	>100m	>200m
12/10/19	1	Female	Adult	1	Bog	1	12.45	Hunting and perched	0-20m 20-50m 50-100m		180 60	 120		
05/11/19	1	Unknown	Unknown	2	Bog	1	16.16	Flying	20-50m		26			
30/11/19	2	Unknown	Unknown	3	Bog	1	17.01	Flying	0-20m		3			
21/12/19	3	Female	Adult	4	Bog	1	10.15	Flying	20-50m		20			
15/03/20	2	Unknown	Adult	5	Bog	1	12.15	Flying	0-20m		5			

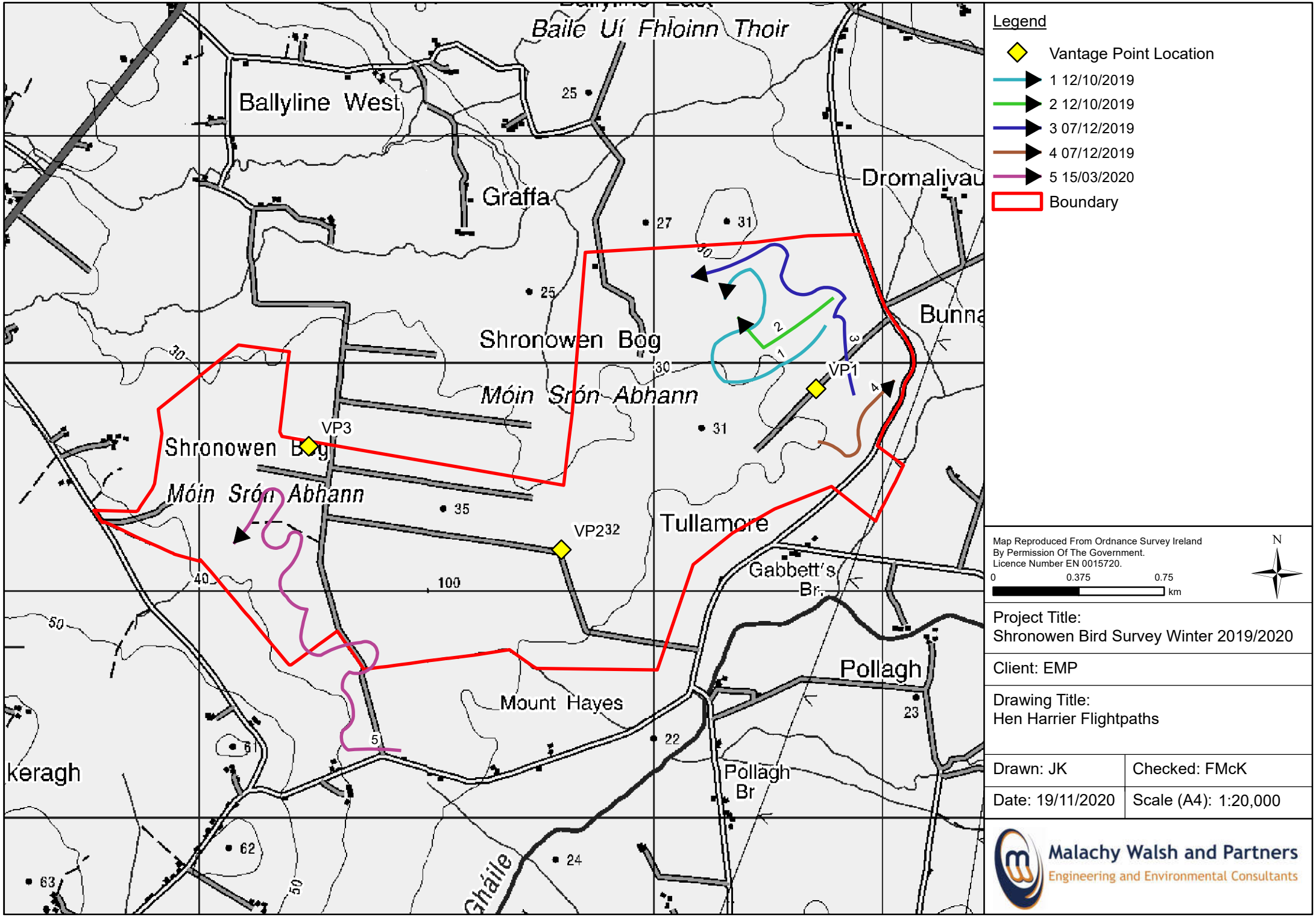
Whooper swan														
Date	VP	Sex	Age	Map Flight Path No.	Habitat	No. Of Birds	Time of Flight/ Obs.	Activity	Flight Height (m)	Time (sec) in Height Category				
										Non-flight	0-50m	50 – 100m	>100m	>200m
30/11/19	2	Unknown	Unknown	1	Improved grassland	12	14.05	On the ground	0-20m	NA				

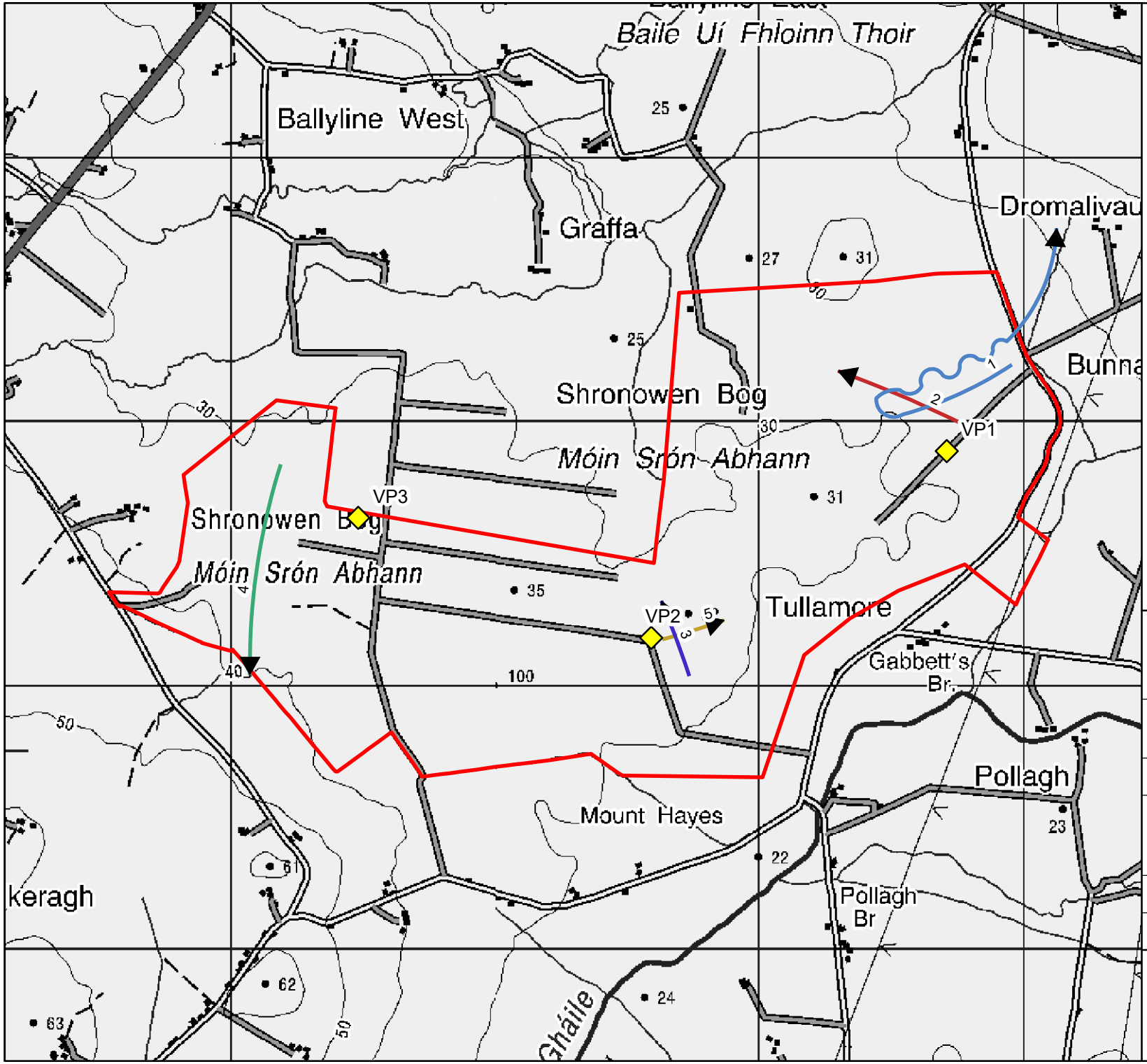
Peregrine falcon														
Date	VP	Sex	Age	Map Flight Path No.	Habitat	No. Of Birds	Time of Flight/ Obs.	Activity	Flight Height (m)	Time (sec) in Height Category				
										Non-flight	0-50m	50 – 100m	>100m	>200m
12/11/19	2	Female	Adult	1	Bog	1	14.25	Flying	100-150m		25			
07/12/19	1	Female	Adult	2	Bog Bog Bog Bog and 1st rotation forestry	1	12.20	Flying Perched Flying Flying	20-50m 0-20m 20-50m 50-100m	120	6 5			

Mallard														
Date	VP	Sex	Age	Map Flight Path No.	Habitat	No. Of Birds	Time of Flight/ Obs.	Activity	Flight Height (m)	Time (sec) in Height Category				
										Non-flight	0-50m	50 – 100m	>100m	>200m
12/10/19	1	Male & Female	Adult	1	Bog	2	11.55	Flying	0-20m 20-50m		20 10			
24/02/20	3	Unknown	Unknown	2	Bog	3	18.44	Flying	0-20m		6			
15/03/20	2	Male	Adult	3	Bog	1	17.55	Flying	20-50m		10			

Appendix 5

Flight Paths and Activity Areas


Baile Uí Fhloinn Thoir
Ballyline West
Graffa
Dromalivau
Bunna
Shronowen Bog
Móin Srón Abhann
VP1
VP2
VP3
Shronowen Bog
Móin Srón Abhann
Tullamore
Gabbett's Br.
Pollagh
Mount Hayes
Pollagh Br
keragh
Ghaile
Legend
Vantage Point Location
1 12/10/2019
2 12/10/2019
3 07/12/2019
4 07/12/2019
5 15/03/2020
Boundary
Map Reproduced From Ordnance Survey Ireland
By Permission Of The Government.
Licence Number EN 0015720.
0 0.375 0.75
km
N
Project Title:
Shronowen Bird Survey Winter 2019/2020
Client: EMP
Drawing Title:
Hen Harrier Flightpaths
Drawn: JK
Checked: FMcK
Date: 19/11/2020
Scale (A4): 1:20,000
Malachy Walsh and Partners
Engineering and Environmental Consultants



Legend

- Vantage Point Location
- 1 12/10/2019
- 2 05/11/2019
- 3 30/11/2019
- 4 21/12/2019
- 5 15/03/2020
- Boundary

0 0.375 0.75 km

N

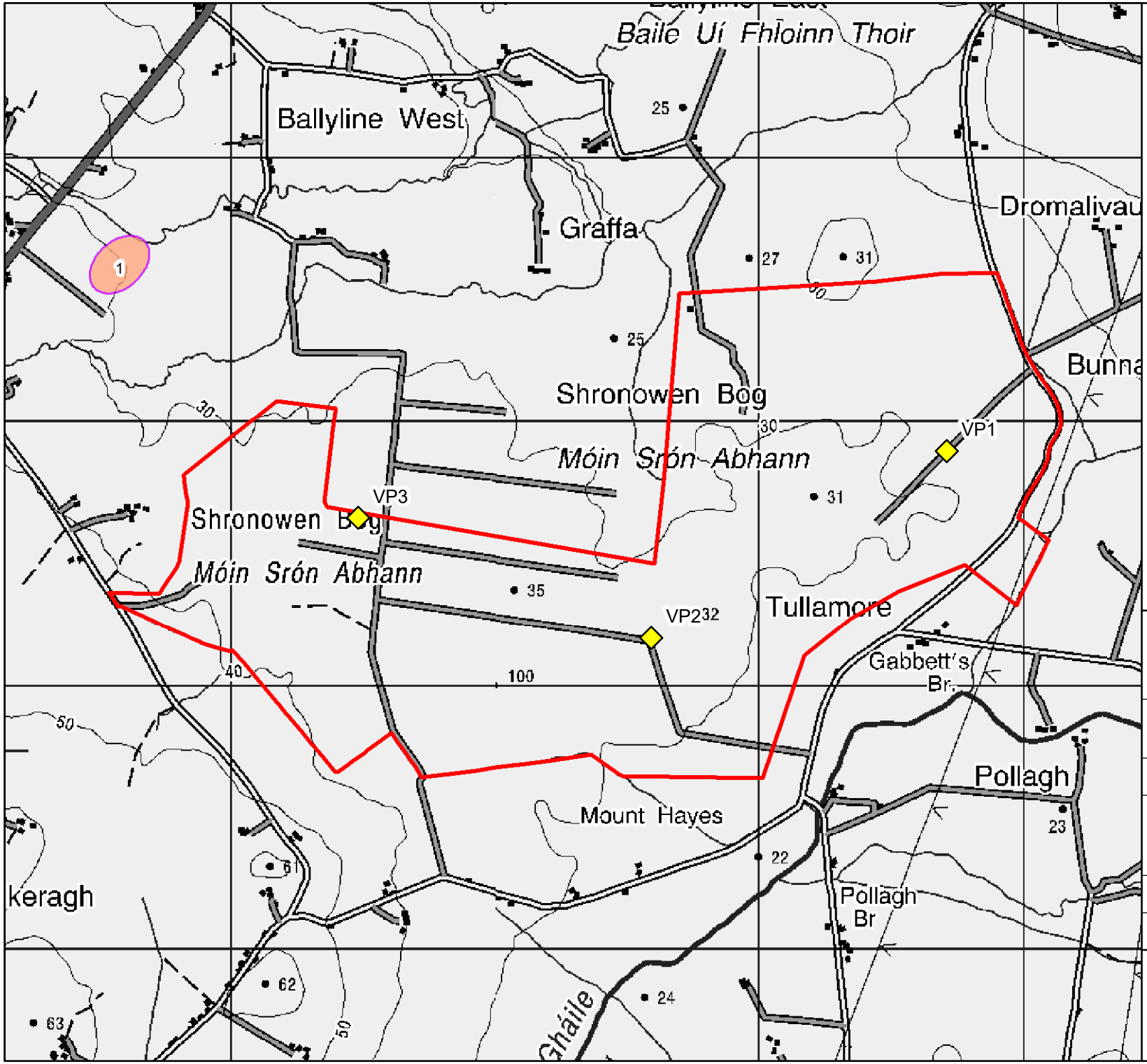
Project Title:
Shronowen Bird Survey Winter 2019/2020

Client: EMP

Drawing Title:
Kestrel Flightpaths

Drawn: JK	Checked: FMcK
Date: 19/11/2020	Scale (A4): 1:20,000

Malachy Walsh and Partners
Engineering and Environmental Consultants



Legend

- Vantage Point Location
- 1 30/11/2019
- Boundary

0 0.375 0.75 km

N

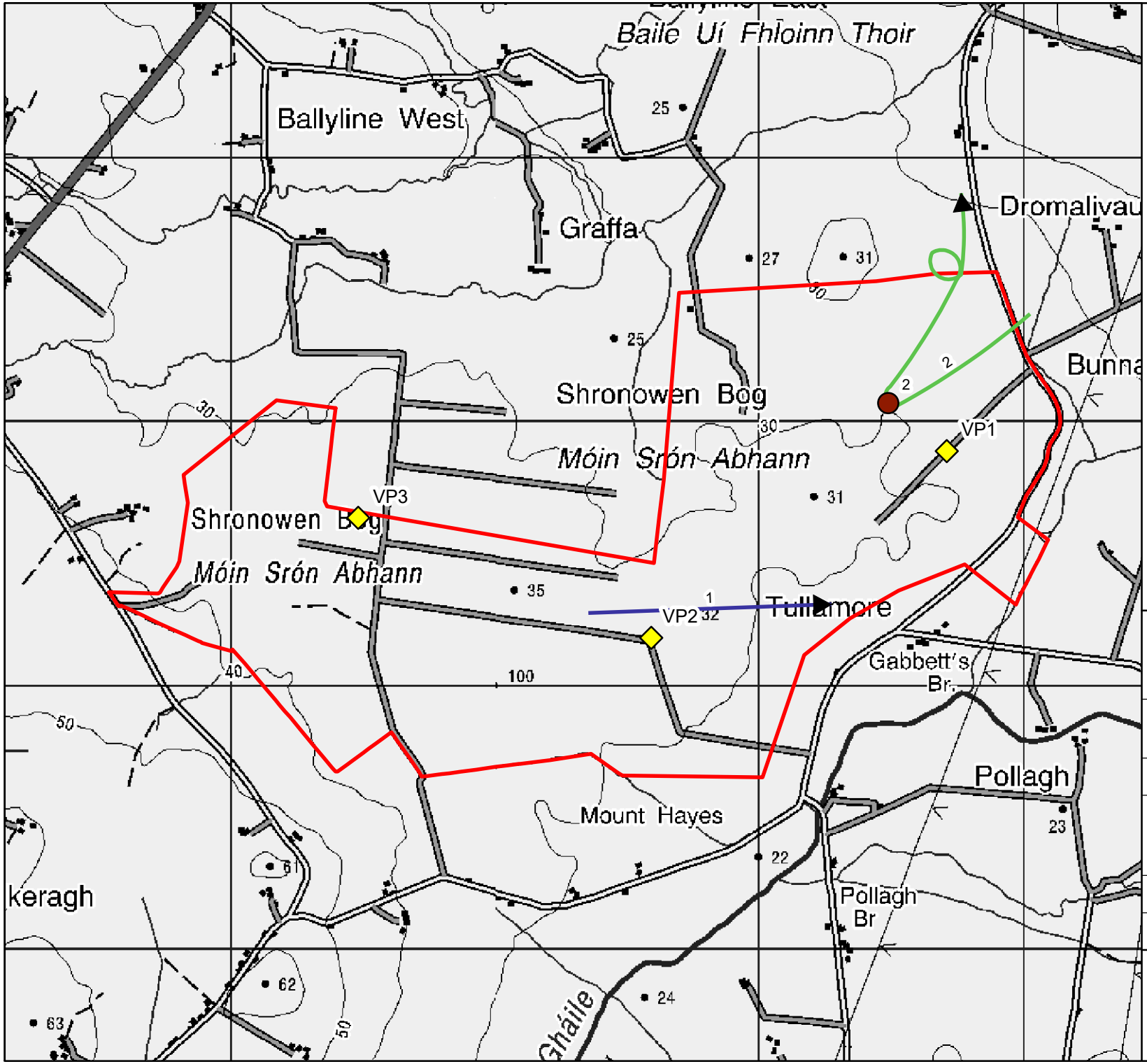
Project Title:
Shronowen Bird Survey Winter 2019/2020

Client: EMP

Drawing Title:
Whooper Swan Flightpaths

Drawn: JK	Checked: FMcK
Date: 19/11/2020	Scale (A4): 1:20,000

Malachy Walsh and Partners
Engineering and Environmental Consultants



Legend

- Vantage Point Location
- 1 12/10/2019
- 2 07/12/2019
- 2 07/12/2019 (Perched)
- Boundary

0 0.375 0.75 km

N

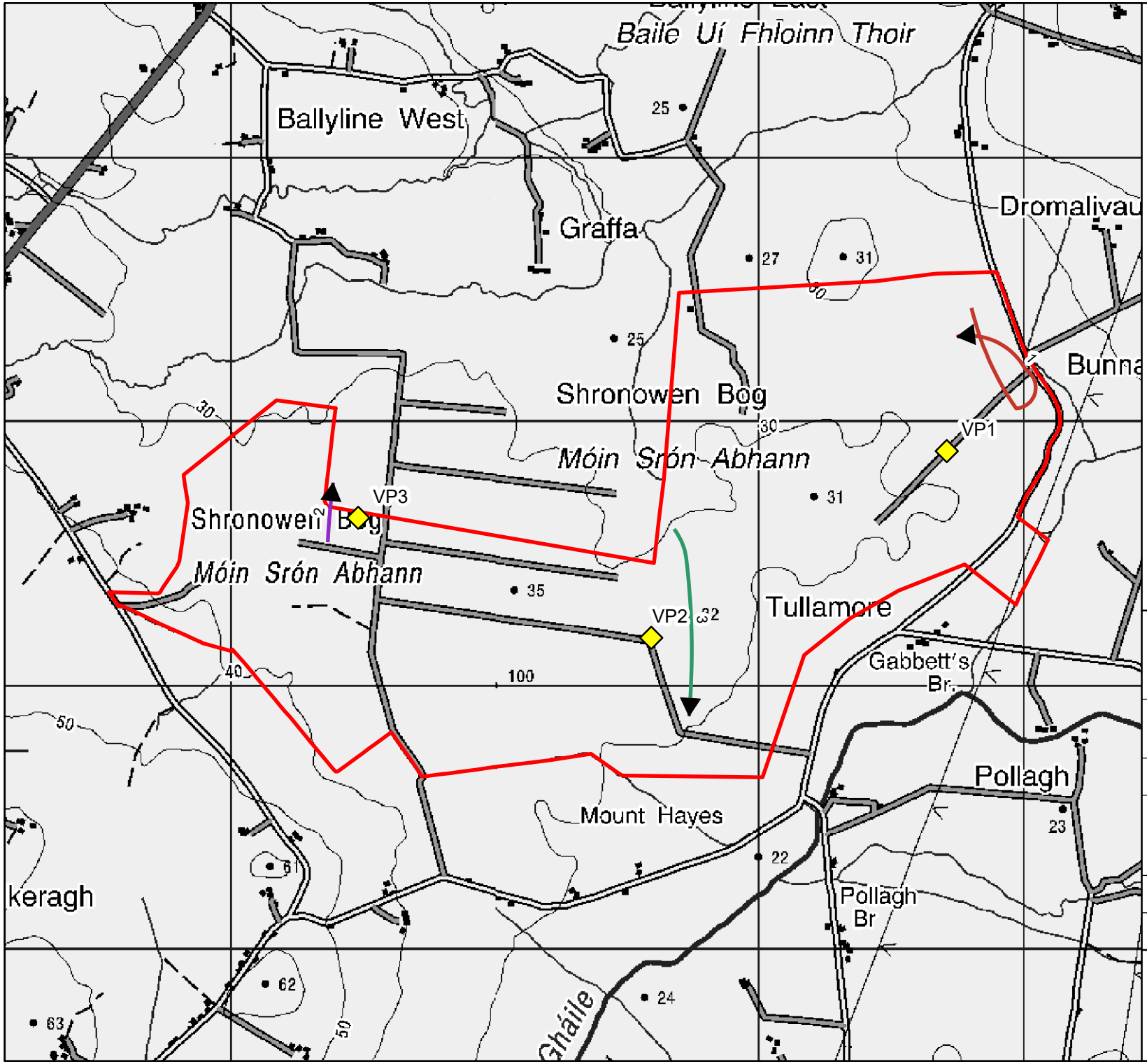
Project Title:
Shronowen Bird Survey Winter 2019/2020

Client: EMP

Drawing Title:
Peregrine Flightpaths

Drawn: JK	Checked: FMcK
Date: 19/11/2020	Scale (A4): 1:20,000

Malachy Walsh and Partners
Engineering and Environmental Consultants



Legend

- Vantage Point Location
- 1 12/10/2019
- 2 24/02/2020
- 3 15/03/2020
- Boundary

0 0.375 0.75 km

N

Project Title:
Shronowen Bird Survey Winter 2019/2020

Client: EMP

Drawing Title:
Mallard Flightpaths

Drawn: JK	Checked: FMcK
Date: 19/11/2020	Scale (A4): 1:20,000

Malachy Walsh and Partners
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Appendix 6

Non-Target Species of Conservation Concern recorded during VP Surveys

The following summary outlines all non-target species of conservation concern recorded during the winter 2019/2020 VP surveys.

Stonechat *(Saxicola torquatus)* was the most frequently recorded amber listed species. It was recorded in all months of the winter survey, during Oct – March.

Meadow pipit *(Anthus pratensis)* was the only non-target red-listed species which were recorded. Meadow pipits were recorded in January and March. Amber-listed species which were frequently recorded include robin (*Erithacus rubecula*) recorded on four occasions during December-March. The other amber-listed species recorded was goldcrest (*Regulus regulus*) recorded only in December.

18 green-listed species were recorded during the summer vantage point surveys. The majority of these species are common and widespread and occur in a wide variety of habitat-types, many of which are found within the survey area. Most of these species are present throughout the year while some are summer visitors to Ireland.

The following table outlines monthly peak counts for all non-target species of conservation concern recorded during vantage point surveys at Shronowen winter 2019-2020.

Common Name	Latin Name	Oct	Nov	Dec	Jan	Feb	Mar
Goldcrest	*Regulus regulus*			1			
Meadow pipit	*Anthus pratensis*	6					4
Robin	*Erithacus rubecula*			2	1	3	10
Stonechat	*Saxicola rubicola*	4	3	2	4	2	2

Appendix 7

List of All Species Recorded

The following table outlines peak counts for all species recorded during the winter 2019/2020 surveys at Shronowen. A total of 25 species were recorded (Annex I species* are highlighted in bold).

Common Name	Latin Name	Oct	Nov	Dec	Jan	Feb	Mar
Blackbird	*Turdus merula*	2	1	1	2	3	2
Blue tit	*Cyanistes caeruleus*		1				
Dunnock	*Prunella modularis*			1			
Fieldfare	*Turdus pilaris*				32	4	
Goldcrest	*Regulus regulus*			1			
Goldfinch	*Carduelis carduelis*		27				
Great tit	*Parus major*			1			
Hen harrier*	*Circus cyaneus*	1		2			
Hooded crow	*Corvus cornix*	2	1	4	2	2	2
Jackdaw	*Corvus monedula*	2	2	1			
Kestrel	*Falco tinnunculus*	1	1	1			1
Longtailed tit	*Aegithalos caudatus*			3			
Magpie	*Pica pica*	1	2		2	1	
Mallard	*Anas platyrhynchos*	3				3	1
Meadow pipit	*Anthus pratensis*	6					4
Peregrine	*Falco peregrinus*	1		1			
Pheasant	*Phasianus colchicus*	1		1			2
Pied wagtail	*Motacilla alba*			1			1
Raven	*Corvus corax*	1	1	1	1	4	1
Reed bunting	*Emberzia shoenichus*	2	1		1	1	
Robin	*Erithacus rubecula*			2	1	3	1
Rook	*Corvus frugilegus*	5	2	2	3	4	2
Stonechat	*Saxicola rubicola*	4	3	2	4	2	2
Whooper swan*	*Cygnus cygnus*		12				
Wren	*Troglodytes troglodytes*	2	1	1	2	2	2