Year 1 Baseline Survey Report

Appendix A8.1

Kellystown Wind Farm, Co. Louth

Report prepared by Woodrow-APEM Group on behalf of EDF

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Statement of Authority

This report has been written by Julieta Pedrana. Julieta is an Ecologist – Ornithologist with Woodrow Sustainable Solutions Ltd part of the APEM Group (Woodrow-APEM Group). She has completed a B.Sc. in Biological Science at University of Mar del Plata, Argentina and a Ph.D. in Conservation Biology at the University of Southern Patagonia, Argentina. From 2017 to 2023, Julieta worked as a Senior Scientist researcher of the National Council of Scientific Research from Argentina at the Department of Environmental Science, National Technological University, Argentina. The main themes of her research have been the application of GIS-based modelling in nature conservation focusing on the predictive models for species occurrence and habitat suitability. She regularly carries out ornithological surveys and compiles ornithological reports, including carrying out collision risk modelling to inform wind farm planning.

This report was reviewed by Emmi Virkki. Emmi is a Senior Ecologist at Woodrow-APEM Group. She completed her BSc (Hons) in Environmental Biology and MSc in Environmental Science in University College Dublin. She has over six years of experience in consultancy in Ireland and her specialism lies in the fields of ornithology and botany. She regularly undertakes a wide variety of ornithological surveys (wintering and breeding bird surveys, and species-specific surveys, e.g. kingfisher, barn owl, red grouse), volunteers for Irish Wetland Bird Surveys (I-WeBS) with BirdWatch Ireland, and is one of the administrators of the Irish Rare and Scarce Bird News on the Band app. Emmi regularly undertakes impact assessments for small to large scale developments and is a full member of Chartered Institute of Ecology and Environmental Management (CIEEM).

This report has been approved by Mike Trewby. Mike is an Associate Director at Woodrow-APEM Group and is the Division's field work manager. Mike worked for Birdwatch Ireland from 2003 to 2010 conducting research on red-billed chough, red grouse and breeding seabirds. Prior to joining Woodrow in 2016, Mike worked as an independent ornithological consultant, and he has over 20 years fieldwork and research experience in the field of ecology. Mike regularly undertakes impact assessments for large scale developments and is a full member of CIEEM.

Ornithological surveys were carried out by appropriately experienced ornithological field surveyors, including Ciaran Smyth (CS), Enda Flynn (EF), and Mikee Hoit (MH).

QUALIFICATIONS

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- PhD - Conservation Biology at the University of Southern Patagonia, Argentina, 2010

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1 Overview

Woodrow Sustainable Solution Ltd part of the APEM Group (Woodrow-APEM Group) was commissioned by EDF Renewables to undertake ornithological survey work for the proposed Kellystown Wind Farm, Co. Louth. The proposed development is for a five-turbine wind farm located approximately 9 km inland from Clogher Head, 2.5 km west of the village of Kellystown.

Ornithological surveys, compliant with the 2017 SNH (NatureScot) guidelines for informing the impact assessment of onshore wind farms on avian populations were carried out for the proposed turbine layout at the time of surveying during the 2021-22 non-breeding season and the 2022 breeding season. As detailed in SNH (2017), the ornithological study areas applied appropriate buffering distances to land parcels that were identified as the viable area for wind turbines. SNH (2017) recommends that two years of bird data are collected, and the two-year study was completed at the end of the 2023 breeding season.

Survey requirements were informed by a desk study, investigating the occurrence of conservation sites designated for bird species (Special Protection Areas – SPAs), bird sensitivity mapping and records of birds historically occurring in the area.

Summer (breeding season) surveys undertaken included:

- Vantage point (VP) watches recording bird flight activity
- Breeding bird surveys covering the 500 m viable area buffer, including:
  - Breeding season site walkovers, sampling habitat types within the 500 m viable area buffer to provide a description of the bird assemblages occurring
  - Breeding waders, incorporating an adapted O'Brien & Smith (1992) methodology
  - Dusk surveys for crepuscular/nocturnal species (owls and woodcock)
- Wider area breeding raptor surveys covering suitable habitat within the 2 km viable area buffer

Winter (non-breeding season) surveys undertaken included:

- Vantage point (VP) watches recording bird flight activity
- Winter site walkover surveys
- Wider area wintering wetland bird surveys (IWeBS) covering suitable habitats within 5 km viable area buffer
- Hen harrier roost searches covering suitable habitat within 2 km viable area buffer

Target species included all waterbird species, birds of prey, any species listed on Annex I of the EU Birds Directive and any red or amber listed species on the Bird of Conservation Concern in Ireland (BoCCI) 2020-26 (Gilbert *et al*., 2021)

This report presents the results from a desk study examining potential ornithological constraints and the results for the first year of ornithological surveys, encompassing the 2021-22 non-breeding season and the 2022 breeding season. The report provides the Year 1 baseline ornithological information required to inform an ornithological impact assessment for the proposed wind farm. The full ornithological impact assessment requires a second year of data, to account for any annual variation in bird behaviour, distribution and abundance that may occur. This report should be viewed in conjunction with the Year 2 report.

Within this report the term viable area is used to refer to the area, which at the time of surveying, was identified as having the potential for wind turbine development, with consideration given to other constraints, such as appropriate standoffs from dwellings and involved landownership boundaries.

Associated parts of the proposed development beyond the viable area for turbine development, such as the grid connection route and turbine deliver route are not specifically included, although information collected, e.g. during wider area surveys, may be used as part of the impact assessment for these associated parts of the full proposal. In terms of capturing data for monitoring potential avian collision risk the ornithological study area was defined as the 500 m viable area buffer. Other ornithological study areas included:

- 2 km viable area employed as the search area for breeding raptors and hen harrier roosts
- 5 km viable area buffer employed as the search area for wintering water birds
- 15-20 km viable area buffer employed to investigate potential for connectivity between the wind farm site and SPAs

It should be noted that towards the end of Year 2 of the ornithological study, an additional area to the north of the original viable area was identified for the inclusion of a turbine. While there is an overlap in survey areas, any survey limitations as regards this extension to the original viable area should be examined as part ornithological impact assessment within the EIAR.

2 Desk study

An initial desk-based review of the 500 m viable area buffer and wider area was undertaken to determine the scope of surveys required and to inform any potential ornithological constraints at an early stage.

2.1 Scope and approach for desk study

A preliminary assessment of avian habitat suitability and availability was undertaken using ortho-imagery and 6-inch mapping, which was viewed using Bing Maps, Google EarthPro, Google Maps, and Ordnance Survey Ireland – GeoHive.

The National Parks and Wildlife Services (NPWS) Designations Viewer was used to identify the location of sites designated for nature conservation, specifically Special Protection Areas (SPAs) and the bird species (Special Conservation Interests) for which these sites have been designated. Shapefiles and metadata for designated sites have been downloaded and are updated annually for use by Woodrow-APEM Group ecologists on local Geographic Information Systems (GIS). The Environmental Protection Agency's (EPA) map viewer (EPA Maps) was used to investigate hydrological connectivity to sites designated for nature conservation.

SNH (2016) guidelines on assessing SPA connectivity with proposed developments recommends that core ranges of species listed as Special Conservation Interests (SCIs) for SPAs should be examined to assess connectivity between proposed developments and any surrounding SPAs. The largest core ranges presented in SNH (2016) are 15-20 km for certain geese species, including greylag geese and pink-footed geese.

SPAs within 15 km of (or with a hydrological connection to) the 500 m viable area buffer are listed in Table 1 and are shown in Figure 1. There are no additional SPAs designated for geese beyond 15 km. Please note, although it is displayed in Figure 1 and listed in Table 1, this desk-based assessment was conducted prior to the designation of the North-west Irish Sea SPA and potential for ecological connectivity between the proposed development and the Special Conservation Interests (SCIs) for this SPA will require further consideration as part of the AA process. With the exception of the cormorant and the gull species listed as SCIs, it is noted that the majority of SCIs occur as exclusively marine or predominately marine species in this region and thus there is no source-receptor linkages for these and no potential for significant effects.

Bird records were collated from the National Biodiversity Data Centre (NBDC) database, using the report function on Biodiversity Maps to generate a biological records data report. Most of these records are based on the Bird Atlas 2007-2011 (Balmer *et al*., 2013). The search area was designed to extend a minimum of 10 km from the 500 m viable area buffer, which falls within one national 10 km grid square [O08] and borders a second to the east [O18]. Bird records occurring within O08 and O18 were reviewed to investigate potential for target species to occur in the area, such as whooper swan, Greenland white-fronted geese and hen harrier. This information, along with consideration of SPAs and the associated SCIs help to identify any potential ornithological constraints and ensures surveys are designed appropriately to inform ornithological impact assessment.

The eastern 10 km grid square O18 extends over the coastline and sea around Clogher Head and includes records of bird species that are exclusively or almost exclusively marine in an Irish context, such as shags, gannets, kittiwakes and auks. The 500 m viable area buffer is over 5 km from the coast

and therefore these marine species were marked as not occurring within the potential zone of influence of any proposed turbines. The historical records are presented in Appendix 4.

The BirdWatch Ireland Bird Sensitivity Mapping for Wind Energy Development (Mc Guinness *et al.,* 2015), as presented on NBDC Biodiversity Maps[1] was examined – see Figure 2. For the 22 species assessed in Mc Guinness *et al*. (2015), the project area out to the 2 km viable area buffer was classified as lacking enough information to generate species sensitive scores, as indicated by the lack of shaded squares in Figure 2.

Based on SNH survey guidelines (2017), migratory populations of wintering geese and swans are considered as species notably sensitive to wind farm developments. To characterise the distribution of the local populations, data from recent population monitoring were reviewed, including:

- Boland & Crowe (2008), Lewis *et al*. (2019b) and Burke *et al.* (2022) for greylag goose and pink-footed goose distribution
- Burke *et al*. (2021) for whooper swan distribution
- Fox *et al*. (2021) for Greenland white-fronted goose distribution

3 Desk-study findings

3.1 Designated sites: Special Protection Areas (SPAs)

There are five SPAs within 15 km of, or hydrologically connected to, the 500 m viable area buffer. These SPAs are listed in Table 1 and locations shown in Figure 1. There are no SPAs within 5 km of the 500 m viable area buffer.

As detailed in Table 1, the closest SPA to the 500 m viable area buffer is the River Boyne and River Blackwater SPA, which lies 7.0 km to the south of the buffer. This SPA is designated for kingfisher (*Alcedo atthis*) and the River Boyne supports a nationally important population of this species, which is listed on Annex I of the EU Birds Directive. There is no hydrological connectivity between the 500 m viable area buffer and the upper (non-tidal) reaches of the River Boyne.

Based on NBDC data, kingfisher is known to occur within the 10 km grid square encompassing the site [O08]. Cummins *et al*. (2010b) found that kingfisher territories are linearly distributed along large watercourses like the River Boyne at approximately 1 pair per 10 km stretch of river. Kingfishers forage over a range of water features, which provide food items like small fish, invertebrates, and frogs, as well as nesting habitat in vertical banks of friable deposits. There are two small streams flowing west and east out of the 500 m viable area buffer and Drumshallon Lough, which have the potential to be utilised by foraging kingfisher. However, the relatively small sizes of these streams and the distance to more substantial river channels means, if utilised at all by kingfishers, these features are unlikely to be more than occasional traversed by birds commuting between optimal foraging and breeding areas. It can be objectively concluded that there is no source-receptor pathway between the 500 m viable area buffer and the SPA and therefore, potential for significant effects on the SPA can be ruled out, based on:

- limited suitable kingfisher habitat within the 500 m viable area buffer, and;
- the lack of direct hydrological connectivity between the SPA and the 500 m viable area buffer, in conjunction with the overall separation distances.

[1] NBDC Biodiversity Maps: https://maps.biodiversityireland.ie/Map

The 500 m viable area buffer has distant, hydrological connectivity with the Boyne Estuary SPA and the Dundalk Bay SPA.

The Boyne Estuary SPA is located 7.1 km south-east from the 500 m viable area buffer. This SPA is the second most important estuary for wintering birds on the Louth-Meath coastline and is of considerable ornithological importance for wintering waterbirds, with black-tailed godwit occurring in internationally important numbers and nine other species having populations of national importance. Part of the Boyne Estuary SPA also has national importance as a Wildfowl Sanctuary. Species or features listed as Special Conservations Interest (SCIs) for the Boyne Estuary SPA are provided in Table 1.

Dundalk Bay SPA is one of the most important wintering waterbird sites in the country and regularly supports more than 20,000 waterbirds. This site is located approximately 8.5 km north-east from the 500 m viable area buffer. Dundalk Bay is also a Ramsar site and parts of Dundalk Bay SPA are designated as Wildfowl Sanctuaries. SCIs are listed in Table 1 and includes greylag geese. Based on SNH (2016), the 500 m viable area buffer is considered to lie within the potential core wintering foraging distances for greylag geese (15-20 km). Dundalk Bay hosts significant numbers of Icelandic (migratory) greylag geese each winter (Burke *et al*., 2022). According to Burke *et al*. (2022) the greylag geese and other geese species, predominantly utilise the reclaimed grassland at Lurgangreen Fields (I-WeBS subsite: 0ZS03), although when disturbed or when sward height is unsuitable, these groups move to the saltmarsh at the nearby Lurgangreen North (I-WeBS subsite: 0Z497) or Lurgangreen South (I-WeBS subsite: 0Z472). Annual peak counts in recent years have numbered close to 350 individuals, with counts of ≥ 500 birds recorded in November and February 2018-2019. In addition, Burke *et al*. (2021) note two flocks of whooper swan (up to 208 birds) in County Louth near the Dundalk Bay SPA. Geese and swans are species which take regular commuting flights between roosts and foraging areas; and as such, VP watches are designed determine whether the 500 m viable area buffer occurs on a regular commuting route.

Table 1 lists a single SCI - greylag goose- for the Stabannan-Braganstown SPA, which is situated 11.4 km north-west from the viable area. The SPA has also supported other waterbirds, including smaller numbers of Greenland white-fronted goose and whooper swan. In winter, this site has historically been used by an internationally important wintering population of greylag goose. However, the population of greylag goose utilising the site has declined in recent years (NPWS, 2022). As shown in Figure 2, there is an area classed as being of high potential ornithological sensitivity, as per Mc Guinness *et al*. (2015), located *c.* 6.4 km to the north of the 500 m viable area buffer. This classification was driven by proximity to the Stabannan-Braganstown SPA that was designated for supporting part of the greylag geese population that winter along the east coast. I-WeBS data shows that the greylag goose population using this SPA has declined steadily since the baseline period and the species has not been recorded at the site since winter 2007/08, when a total of 16 geese were recorded (I-WeBS data, 2022, Burke *et al*., 2022).

During the baseline assessments to inform SPA designation, nearly 1,400 greylag geese (baseline period 1995/96 to 1999/2000) were estimated to be using both the Stabannan-Braganstown SPA and Dundalk Bay SPA and were considered as one population moving between the sites (NPWS, 2022). The national population of greylag goose overwintering in Ireland declined by 21% from 1999 to 2018 (Lewis *et al*., 2019).

The River Nanny Estuary and Shore SPA is located 14.2 km south-east from the 500 m viable area buffer. It is a site of ornithological importance, supporting six species of SCI including nationally important numbers of golden plover, oystercatcher, ringed plover, knot, sanderling and herring gull - see Table 1 for list of SCI species. The populations of knot and sanderling are of particular note, as they represent approximately 4% of respective national totals.

Table 1: Special Protection Areas (SPAs) within 15 km of the 500 m viable area buffer

Site code	SPA	Distance to 500 m viable area buffer	Special Conservation Interests (SCIs)
004232	River Boyne and River Blackwater SPA	*c.* 7.0 km SSW	Kingfisher (*Alcedo atthis*) [A229]
004080	Boyne Estuary SPA	*c.* 7.1 km SSE Distant hydrological connection via Termonfeckin Stream & coastal environment	Shelduck (*Tadorna tadorna*) [A048] Oystercatcher (*Haematopus ostralegus*) [A130] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Black-tailed Godwit (*Limosa limosa*) [A156] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Little Tern (*Sterna albifrons*) [A195] Wetland and Waterbirds [A999]
004026	Dundalk Bay SPA	*c.* 8.5 km north-east Distant hydrological connection via White River & River Dee	Great Crested Grebe (*Podiceps cristatus*) [A005] Greylag Goose (*Anser anser*) [A043] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Mallard (*Anas platyrhynchos*) [A053] Pintail (*Anas acuta*) [A054] Common Scoter (*Melanitta nigra*) [A065] Red-breasted Merganser (*Mergus serrator*) [A069] Oystercatcher (*Haematopus ostralegus*) [A130] 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] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Herring Gull (*Larus argentatus*) [A184] Wetland and Waterbirds [A999]
004091	Stabannan-Braganstown SPA	*c.* 9.6 km north-west	Greylag Goose (*Anser anser*) [A043]
004158	River Nanny Estuary and Shore SPA	*c.* 12.7 km south-east	Oystercatcher (*Haematopus ostralegus*) [A130] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140]

Site code	SPA	Distance to 500 m viable area buffer	Special Conservation Interests (SCIs)
			Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Herring Gull (*Larus argentatus*) [A184] Wetland and Waterbirds [A999]
004236	North-West Irish Sea SPA	*c.* 7 km east	Red-throated Diver (*Gavia stellata*) [A001] Great Northern Diver (*Gavia immer*) [A003] Fulmar (*Fulmarus glacialis*) [A009] Manx Shearwater (*Puffinus puffinus*) [A013] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Common Scoter (*Melanitta nigra*) [A065] Little Gull (*Larus minutus*) [A177] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Great Black-backed Gull (*Larus marinus*) [A187] Kittiwake (*Rissa tridactyla*) [A188] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Little Tern (*Sterna albifrons*) [A195] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]

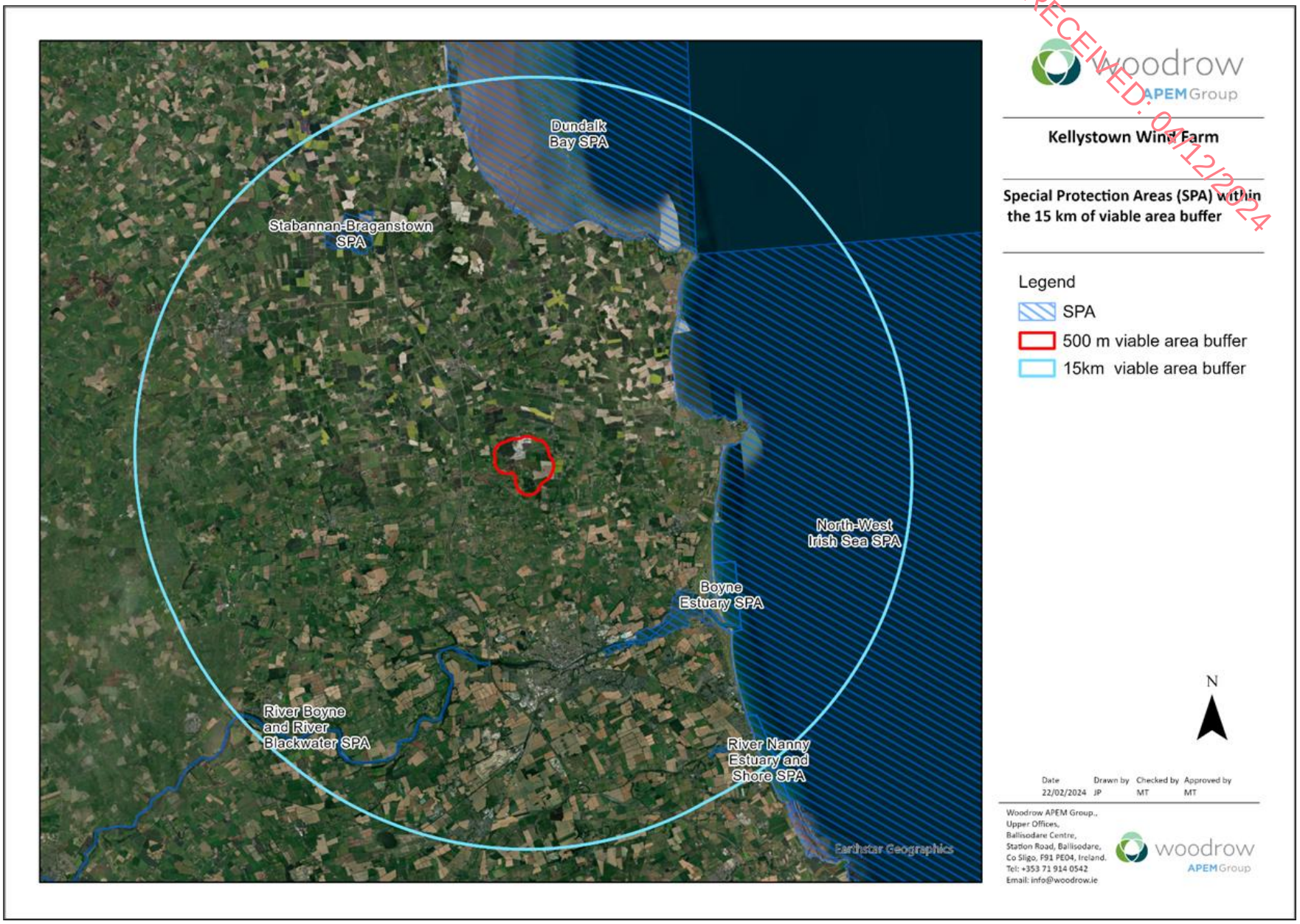


Figure 1: Special Protection Areas (SPAs) within 15 km radius of the 500 m viable area buffer

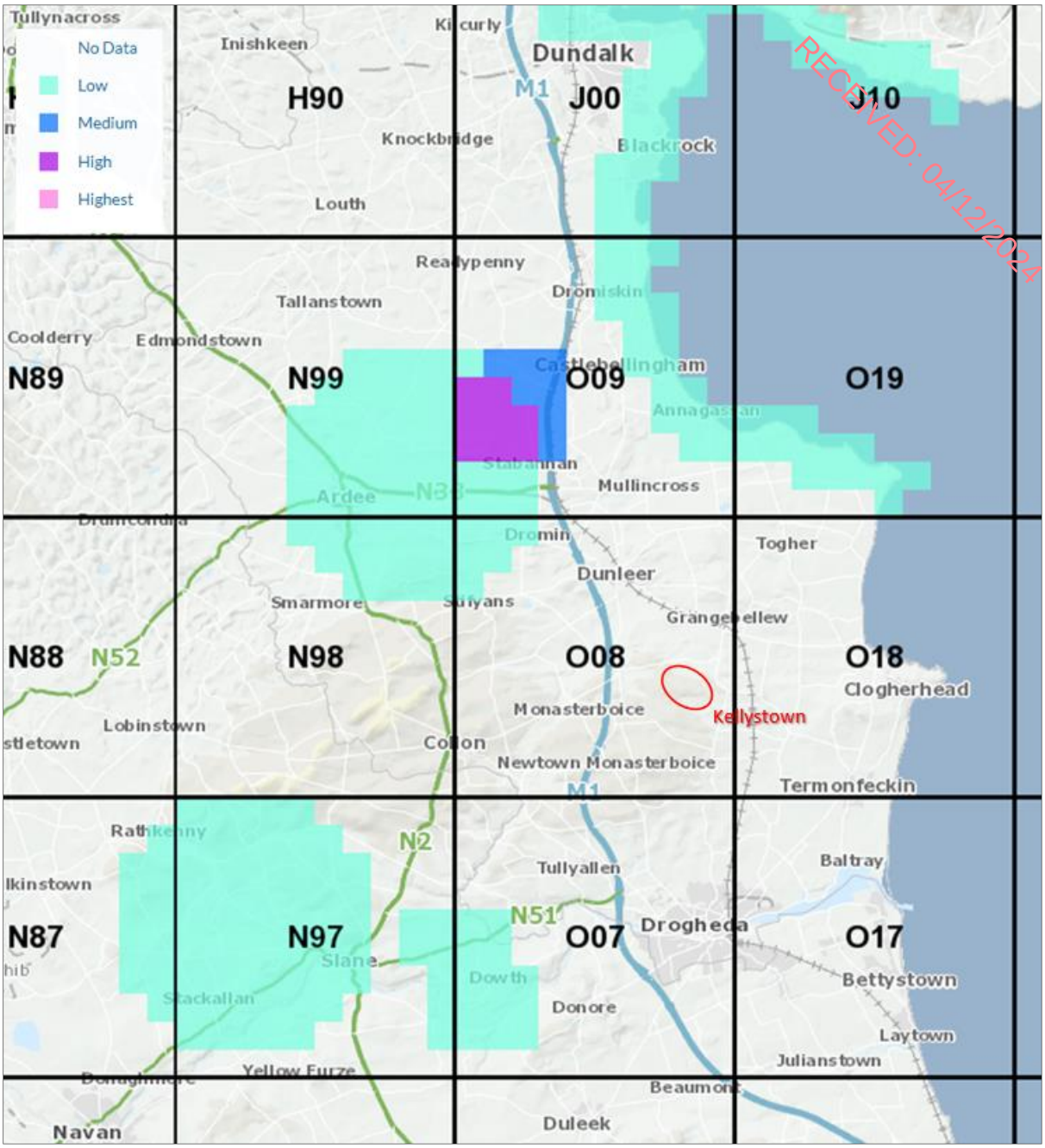


Figure 2: Bird Sensitivity to Wind Energy (Mc Guinness *et al.*, 2015)
Source: Taken from Biodiversity Maps: https://maps.biodiversityireland.ie/Map

3.2 Review for potential occurrence of target species

3.2.1 Wintering waterbirds

The only waterbody within the 500 m viable area buffer is Drumshallon Lough, which is 0.12 km in length and 0.04 km in width and is connected to a first order stream called the Drumshallon Lough Stream at the centre of the 500 m viable area buffer. This stream discharges into a second order stream known as Termonfeckin Stream, which is associated with hedgerows, treelines, and scrub. There is a small wetland to the south-west of the quarry, which is relatively overgrown and may have some suitability for species like snipe, jack snipe and woodcock over the winter.

In the northern and the eastern sections of the 500 m viable area buffer, there are two downstream hydrological connections to the Termonfeckin River and Boyne Coastal and Estuary SAC that overlaps with Boyne Estuary SPA. As discussed in Section 3.1, other designated sites to the north of the 500 m

viable area buffer and along the coastline, to the east, are known to support nationally and/or internationally important numbers of wintering waterbirds or sensitive wintering wetland species, such as swans and geese (Lewis *et al*., 2019b, Burke *et al*., 2021, 2022),

Cultivated land, including cereal stubbles and improved grasslands, particularly when silage is cut or slurry spread provide foraging opportunities for some species, including gulls and some wader species such as golden plover, lapwing and curlew. Geese and swans, as well as some wader species are often attracted to these highly improved habitats in areas that are associated with flooding, e.g. along the flood plains of rivers. Historically, this was one of the features attracting birds to the Stabannan-Braganstown SPA.

3.2.2 Breeding waders

Based on the latest Bird Atlas 2007-11, there are no recent breeding records of curlew, redshank golden plover or dunlin within either of the 10 km grid squares covering the wider area surrounding the 500 m viable area buffer (Balmer *et al*., 2013). The last breeding evidence for curlew in the area was recorded by the Breeding Atlas 1968-72 (Sharrock, 1976). Aerial imagery indicates that habitat suitability for upland breeding waders is very limited in Co. Louth and therefore species like golden plover and dunlin (also a machair/coastal breeder in Ireland) are highly unlikely to breed in the area.

Based on the Bird Atlas 2007-11, there are contemporary breeding records of snipe and lapwing within 10 km of the 500 m viable area buffer and breeding snipe were recorded adjacent to this buffer. The closest breeding lapwing locations recorded for the Bird Atlas 2007-11 were approximately 5 km to the south-west of the 500 m viable area buffer (Balmer *et al*., 2013).

The 500 m viable area buffer holds areas of plantation and associated scrub that have the potential to support breeding woodcock. Historically, woodcock have been confirmed breeding within the 10 km grid square encompassing the 500 m viable area buffer (Sharrock, 1976). However, the Bird Atlas 2007-2011 did not register breeding at this location or in the wider area, and only wintering woodcock were recorded (Balmer *et al*., 2013). A recent reduction in Irish breeding range for woodcock means that the breeding population is red-listed (Gilbert *et al*., 2021), while the wintering population, which sees an influx of birds from eastern Europe, has not been assessed.

3.2.3 Birds of prey

Habitat availability within the 2 km buffer (Figure 4) was considered potentially suitable for breeding buzzard *Buteo buteo*, sparrowhawk *Accipiter nisus*, peregrine *Falco peregrinus*, and kestrel *Falco tinnunculus*. The area also has the potential to support long-eared owls *Asio otus* and barn owls *Tyto alba*. Habitat suitability for upland breeding species, including hen harrier *Circus cyaneus*, merlin *Falco columbarius* and short-eared owl *Asio flammeus*, a rare breeding species, was assessed as limited and these species are considered as unlikely to occur in the area. Further assessment for hen harrier and merlin is provided in the following sections.

Release sites for the red kite *Milvus milvus* re-introductions in Ireland have been in Co. Wicklow and Co. Down, and while the dispersal has been relatively protracted, it is possible that the breeding population has started to expand into Co. Louth, where there is potentially suitable habitat for this species. Habitat suitability for the two species of eagle re-introduced back into Ireland, golden eagle *Aquila chrysaetos* and white-tailed eagle *Haliaeetus albicilla* is limited in Co. Louth and these species are considered as unlikely to occur in the area. Red kite are a species that is notably susceptible to collisions with turbines and avoidance rates are low (SNH, 2018).

Other rarer species of raptor occurring in Ireland including goshawk *Accipiter gentilis*, osprey *Pandion haliaetus*, marsh harrier *Circus aeruginosus* and hobby *Falco subbuteo*, are highly unlikely to have any

meaningful association with the wind farm site, based on habitat availability in the general area, geographic location and reported occurrences of these rare species.

Hen harrier

The last National Breeding Hen Harrier Survey conducted in 2015 reported no breeding areas for hen harrier within the 10 km grid squares encompassing the 500 m viable area buffer (Ruddock *et al*., 2016). The Bird Atlas 2007-11 did record presence outside the breeding season within the wider area surrounding the 500 m viable area buffer; however, records were limited to one winter timed tetrad and one roving record (Balmer *et al*., 2013).

Traditionally hen harriers in Ireland nested within expansive areas of dense heather. Following the decline of this habitat, pairs are increasingly being recorded utilising young conifer plantations (Wilson *et al*., 2006). It is therefore important to assess forestry cover within and adjacent to the 500 m viable area buffer for potential to provide nesting cover once felled. The potential for commercial plantation to support nesting hen harrier must be considered in the context of the availability of foraging habitat. Aerial imagery and Corine Landcover 2018, examined as part of the desk-study, clearly showed that the open heathland, scrub and rough grassland habitats typically favoured by foraging hen harriers during the breeding season are not widely available on the east coast around the 500 m viable area buffer.

Likewise, although the 500 m viable area buffer the surrounding wider area, which is dominated by intensive agriculture, do have some areas of plantation, scrub and wetland that may superficially appear to be capable of supporting a hen harrier winter roost, as described in Clarke & Watson (1990) and O'Donoghue (2019); the combination of roosting habitat in close proximity to a range of foraging opportunities may be somewhat lacking. There is a historical record of hen harrier roosting in a large reedbed approximately 2 km from the 500 m viable area buffer and this location will be the focus of roost watches, as well as suitable habitat within the 500 m viable area buffer (scrub and wetland).

Merlin

Based on the Bird Atlas 2007-11 (Balmer *et al*., 2013), as well as historical sources (Sharrock, 1976) there are no records of breeding merlin in Co. Louth and records are of wintering birds. As for hen harrier, the occurrence of conifer plantation within the study area needs to be assessed for the potential to provide breeding habitat for merlin. In Ireland, merlin is traditionally a ground-nesting species of upland habitats that have taken to utilising abandoned tree nests of other species, in particular those of corvids, due to the decline of suitable habitat for ground nesting (Lusby *et al*., 2017). While the 500 m viable area buffer was assessed as having superficial potential suitability for tree nesting merlin, there was an obvious lack of suitable breeding season foraging habitat, which is typically open upland habitats. This overall lack of suitable breeding habitat was mirrored in the wider area surrounding the 500 m viable area buffer. Furthermore, the limited availability of wetland habitats attracting large concentrations of wintering waterbirds in the general area is also likely to limit merlin usage over the winter; although out of the breeding season merlin are known to be periodically attracted to the flocks of passerines foraging in tillage, in particular cereal stubbles that are seasonally available in the 500 m viable area buffer.

Other raptors

Buzzard, sparrowhawk and kestrel are widespread resident species in Ireland and, based on habitat availability, are likely to be breeding within the 2 km buffer. Buzzard and sparrowhawk are green-listed in Ireland (Gilbert *et al*., 2021), but both species are susceptible to collisions with turbines. The conservation status for kestrel was upgraded over the course of the baseline study from Amber to Red (Colhoun & Cummins, 2013; Gilbert *et al*., 2021). As reported in Lewis *et al*. (2019a), both breeding

numbers and distribution of kestrels have declined significantly, which is thought to have been driven by changes in prey availability due to agricultural intensification (Wilson-Parr & O'Brien, 2019), as well as secondary rodenticide poisoning. Based on flight behaviour which results in low avoidance rates (SNH, 2018), kestrel is a species that is notably susceptible to collisions with turbines. Within the 2 km buffer around the 500 m viable area buffer, there were several observations that indicate that kestrels are breeding in the wider area (Balmer *et al*., 2013; National Biodiversity Data Centre, 2022). The quarry cliffs adjacent to the 500 m viable area buffer have the potential to support breeding kestrel.

In Ireland, cliffs in quarries can provide suitable nesting ledges for breeding peregrines (Moore *et al*., 1997). There are reports of a breeding site for peregrines within the 10 km grid squares encompassing the 500 m viable area buffer (Balmer *et al*., 2013). Although it is an Annex I species, peregrine is green listed in Ireland due to the relatively recent recovery of the population (Gilbert *et al*., 2021).

Owls

The Bird Atlas 2007-2011 (Balmer *et al.*, 2013), showed a large decline in barn owl breeding distribution across Ireland and the species is Red listed (Gilbert *et al*., 2021). The 500 m viable area buffer and surrounding areas, with lower-lying, open agricultural areas, associated scrub and veteran trees in old growth woodland/treelines, provide suitable nesting and foraging habitat for barn owl. There are contemporary records for the species in the wider area surrounding the 500 m viable area buffer (Balmer *et al*., 2013). In Ireland, foraging distances from nest sites can extend up to 6 km and even as far as 9 km. However, the core breeding season home range is documented to be 4 to 5 km from the nest (Lusby & Cleary, 2014, TII 2021). This is further than the 1 km search area recommended by the SNH survey guideline (2017) for breeding barn owls (owls other than short-eared owls). Likewise, the documented extent for breeding season home range for Irish barn owls exceeds the *zone of sensitivity* given for barn owls in relation to wind farm developments in Mc Guinness *et al*. (2015), which is 2 km.

The woodland habitats within the 500 m viable area buffer are suitable for long-eared owls and there is potential for this green-listed species to breed in the area. There is a record of long-eared owl breeding in the area in the Bird Atlas 2007 - 2011 (Balmer *et al*., 2013).

Based on limited habitat availability surrounding the 500 m viable area buffer, as well as relative scarcity of this species in Ireland, it is considered that short-eared owl are highly unlikely to occur in the area.

3.2.4 Other species of conservation concern

Kingfisher

Kingfishers are resident in Ireland and inhabit lowland rivers, loughs and estuaries (Balmer *et al*., 2013). It is an amber-listed species in Ireland and listed on Annex I of the Birds Directive. This species is known to occur along watercourses downstream of the 500 m viable area buffer (Cummins *et al*., 2010b and Balmer *et al*., 2013) including the River Boyne and River Blackwater SPA, which is designated for kingfisher. However, there is no direct hydrological link between the SPA and the 500 m viable area buffer.

Red grouse

Red grouse, which is considered a red-listed species in Ireland, occur almost exclusively in open bog and heathland. There are no records of red grouse in the vicinity of the 500 m viable area buffer in the Bird Atlas 2007-2011 (Balmer *et al*., 2013) and there are no historical records based on Sharrock (1976) and Cummins *et al*. (2010a). This species is considered as highly unlikely to occur within the 500 m viable area buffer as there is no suitable habitat for red grouse.

Swift

The conservation status of swift was upgraded from amber to red in Ireland due to recent severe declines in breeding populations (Colhoun & Cummins, 2013; Gilbert *et al*., 2021). Swifts show strong fidelity to their nest sites, and it is possible that the continuous decline in numbers is related to the loss of traditional nest cavities in buildings which have been renovated or demolished (Whelan *et al*. 2018).

There is potential for swifts to forage at the 500 m viable area buffer over the summer months while nesting in the buildings of nearby towns and villages. Depending on weather conditions, swifts often forage at heights of 50 to 100 m placing them within the collision risk of wind turbines. As swifts are habituated to manmade structures, it is considered unlikely that foraging birds will be displaced by operational turbines. Conversely this species (along with swallows and other hirundines) may be actively drawn towards turbines to catch insects that are attracted to, and/or are more active around turbine towers and hardstands. While the mechanism and potential effects are poorly understood at this stage, it is considered likely that this behaviour leads to heightened collision risk for this species (Rydell *et al*., 2012).

Nightjar

The nightjar is identified as a red-listed species of conservation concern in Ireland (Gilbert *et al*., 2021). Nightjars are primarily crepuscular and nocturnal, being most active around dusk and dawn, and they are long distance migrants and only visit Ireland to breed between May and August (Cramp & Simmons 1985). Areas of forestry plantation in upland habitats, specifically drier areas in young plantation and clear-fell, as well as associated scrub and bracken have the potential to support nightjar breeding territories. This red-listed species is a very rare breeder in Ireland and there are only historic records of the species in the vicinity of the 500 m viable area buffer (Sharrock, 1976). Given its rarity in Ireland, it is considered highly unlikely that nightjar will occur within the 500 m viable area buffer, despite the occurrence of some potentially suitable habitat.

Rare passerines

As detailed in SNH (2017) survey guideline, it is considered that most passerines are at low risk from collision with wind turbines; as flight behaviour makes them less susceptible to collisions and population dynamics (e.g., high fecundity and rapidly attaining sexual maturity). This means that any fatalities due to collisions are unlikely to impact on passerine communities at the population level. The exception may be rarer breeding passerines, which in an Irish context would include species like whinchat *Saxicola rubetra*, ring ouzel *Turdus torquatus*, yellowhammer *Emberiza citrinella* and tree sparrow *Passer montanus*. While there is no habitat availability to support breeding populations of the first two species listed, there are records for yellowhammer and tree sparrow occurring in the vicinity of the 500 m viable area buffer (Balmer *et al*., 2013).

The combination of pastural agriculture, with cultivated fields, which is typical of the region, provides suitable habitat for yellowhammer and tree sparrow, as well as some less regularly occurring non-passerine species like quail *Coturnix coturnix* and stock dove *Columba oenas*.

4 Field survey methodology and survey effort

SNH (2017) survey guidelines provide recommended survey methodologies for the assessment of avian populations within and adjacent to onshore wind farms. Survey methodologies utilised for ornithological surveys are outlined in the following sections and adhere to the relevant SNH guidance.

Two-years of ornithological surveys are recommended by the SNH (2017) survey guidelines, unless it can be clearly demonstrated that a single year of data is sufficiently robust, accurate and appropriate for assessing the potential impacts of the proposal. Given the ornithological sensitivity identified during the desk study, including SPAs potentially within the zone of influence of the 500 m viable area buffer the recommended two-years study will be conducted.

4.1 Vantage Point (VP) watches

VP watches record flight-line activity in relation to the 500 m viable area buffer to provide data on selected target species for assessing avian collision risk. Target species are those identified as being at risk from displacement effects caused by wind farm developments or from collision with turbines. Target species for which flight-line data was captured included the following species groups:

- All waterbird species
- All birds of prey
- Any species listed on Annex I of the EU Birds Directive
- Any species listed as SCIs for the SPAs shown in Table 1
- Any species listed as Red or Amber on the BoCCI 2020-26 (Gilbert *et al*., 2021), where collision risk presents potential for population level effects

Four VPs were used to cover the 500 m viable area buffer, the locations of which are shown in Figure 3. Based on viewshed analysis conducted for a 15 m elevation above ground level, the four VPs provided approximately 86% coverage of the 500 m viable area buffer. The output maps from viewshed analysis are presented in Appendix 3. Viewshed mapping shows that the shortfall in coverage occurs in the northern part of the 500 m viable area buffer. This is mainly as a result of the quarry void that causes the ground level to drop out of view, which limited the ability of surveyors to record the lower-level flights within the quarry. However, birds commuting through the northern area at higher altitudes were detectable; and if for example, the viewshed analysis is run at 25 m above ground level, as shown in Appendix 3: Figure A3.6, then the four VPs provide approximately 97% coverage of the 500 m viable area buffer. At the time of surveying no turbines were proposed in the northern part of the site and based on viewshed outputs, all rotor swept areas occurring within viable area were visible to at least 15 m above ground level. Furthermore, there is substantial overlap in the VP viewsheds employed to cover the 500 m viable area buffer, which results in duplication of survey effort and means that surveyor contact time within the buffer is notably high, ensuring that a realistic impression of species and flight behaviour is captured. Duplication in survey effort is controlled by running the data through a collision risk model.

The VPs selected to cover the 500 m viable area buffer are compliant with the SNH (2017) survey guidelines, which stipulate that viewsheds from VPs should not extend more than 2 km and that the angle of view should also not be extended beyond an arc of 180 degrees. To avoid any duplication of flight records surveyors did not conduct VP watches simultaneously. To limit observer fatigue, surveyors did not typically undertake VP watches of more than 3-hours in duration without a break, unless inclement periods of weather meant watches were paused for short durations until conditions improved.

VP watches involve the surveyor observing birds from a stationary position using binoculars and a telescope. In accordance with SNH (2017) survey guidelines, the viewshed of the VP is scanned continuously. When a target species is detected, the surveyor estimates the height of the bird and its usage of the area by drawing its flight path on a map and noting its behaviour. Flight heights are estimated visually, using known heights of features within the viewsheds, such as telegraph poles, plantations and contours as a reference. Other data collected includes the number of birds, time of detection and duration of flight, as well as sex and age class if relevant. A list of all non-target species encountered within the environs of the 500 m viable area buffer is also compiled during watches, with priority given to recording target species when bird activity is high.

As summarised in Table 2, a minimum of 36 hours of watches have been collected per VP per season, amounting to a total of 288 hours of watches for all four VPs during Year 1. Further details on survey timings, surveyor and weather conditions are provided in Appendix 3.

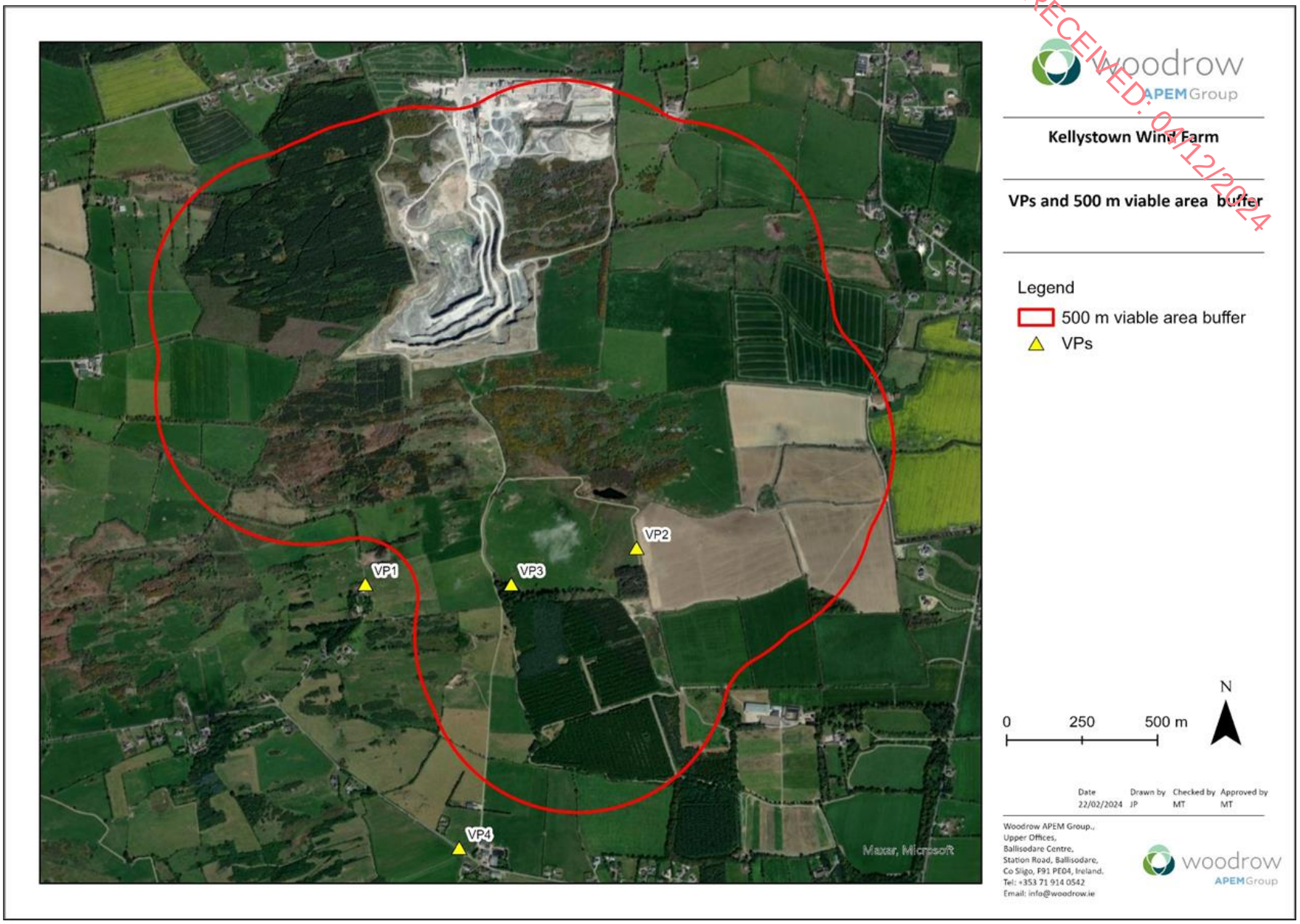


Figure 3: Vantage point locations in relation to 500 m viable area buffer

Table 2: Summary of survey effort for vantage point (VP) watches – Year 1

Non-Breeding Season 2021-22				
Survey date	**VP1**	**VP2**	**VP3**	**VP4**
13/09/2021	1	0	0	0
16/09/2021	0	3	3	3
17/09/2021	2	0	0	0
21/09/2021	3	0	0	3
23/09/2021	0	3	3	0
04/10/2021	3	3	3	0
07/10/2021	0	3	3	3
08/10/2021	3	0	0	3
02/11/2021	0	0	0	3
09/11/2021	3	0	0	3
10/11/2021	0	3	3	0
16/11/2021	0	3	3	0
17/11/2021	3	0	0	0
01/12/2021	3	0	0	3
03/12/2021	0	3	3	0
06/12/2021	0	3	3	0
07/01/2022	3	0	0	3
10/01/2022	3	0	0	3
12/01/2022	0	3	3	0
20/01/2022	0	3	3	0
02/02/2022	3	0	0	3
04/02/2022	0	3	3	0
07/02/2022	3	0	0	3
07/03/2022	0	0	3	3
13/03/2022	3	3	0	0
Total	**36**	**36**	**36**	**36**

Breeding Season 2022				
Survey date	**VP1**	**VP2**	**VP3**	**VP4**
23/03/2022	0	0	3	0
24/03/2022	0	3	0	0
28/03/2022	3	0	0	3
17/04/2022	3	0	0	0
19/04/2022	3	3	3	0
20/04/2022	3	0	3	0
21/04/2022	0	3	0	3
24/04/2022	0	0	0	3
18/05/2022	3	3	0	0
26/05/2022	3	0	0	0
28/06/2022	3	0	0	0
29/06/2022	3	0	0	0
11/07/2022	3	0	3	0
18/07/2022	3	0	0	0
03/08/2022	6	0	0	0
16/05/2022	0	3	3	0
17/05/2022	0	3	3	0
17/06/2022	0	3	3	0
27/06/2022	0	3	0	0
20/07/2022	0	3	0	0
21/07/2022	0	3	0	0
04/08/2022	0	3	3	0
15/08/2022	0	3	0	0
08/06/2022	0	0	3	0
20/06/2022	0	0	3	0
22/07/2022	0	0	3	0
16/08/2022	0	0	3	0
22/05/2022	0	0	0	3
29/05/2022	0	0	0	3
05/06/2022	0	0	0	3
19/06/2022	0	0	0	3
17/07/2022	0	0	0	3
24/07/2022	0	0	0	3
31/07/2022	0	0	0	3
14/08/2022	0	0	0	3
21/08/2022	0	0	0	3
Total	**36**	**36**	**36**	**36**

4.2 Site walkover surveys for breeding birds

The purpose of the walkovers and point counts, according to SNH (2017) guidelines, is to give a broad overview of bird activity in the proposed development using a route which is representative of the important ornithological features/habitats present. Breeding bird surveys aim to provide information on the distribution of breeding birds throughout the proposed wind farm site, highlighting the locations of potentially sensitive species to be flagged as ecological constraints, e.g., breeding waders or raptors. Various methods are employed depending on the habitat type and the expected species. Walkovers through the 500 m viable area buffer employed a range of surveys determined by desk study, such as proximity to designated sites, habitat availability and associated avian assemblages and where refined based on the findings of each visit.

Based on topography and habitat availability, the desk study determined that the wind farm site had the potential to support a range of target species, including lowland breeding waders (e.g., snipe), crepuscular/nocturnal woodland species (e.g., woodcock, barn owl, and long-eared owls) and raptors (e.g., peregrine, kestrel, buzzard and sparrowhawk).

During Year 1 the 500 m viable area buffer was sampled three times employing walkover surveys during the morning period, with each visit undertaken over a number of mornings (see Table 4). In addition, a series of evening/dusk visits were undertaken (see Table 3). Weather details for surveys are provided in Appendix 3.

4.2.1 Reduced effort common bird census (CBC) methodology

Breeding bird surveys were undertaken following common bird census (CBC) methodology, as described in Gilbert *et al*. (1998) - summarising Marchant (1983) and Marchant *et al*. (1990). This approach, which employs territory mapping, is typically used where there is a requirement to map the distribution of breeding birds across an entire site. Strict application of CBC methodology, which is undertaken for long-term population monitoring and high levels of accuracy in mapping breeding distribution, requires a minimum of 10 visits between March and July, conducted at intervals of at least 10 days apart. As outline in SNH (2017), this level of detail is not required for proposed wind farm developments, and the purpose of the walkovers is to identify and then survey habitats potentially supporting target species and to sample the habitat types present within the wind farm site to provide a general description of avian assemblages occurring, which can be employed to determine the scope of further survey requirements and inform the ornithological baseline.

CBC surveys can commence from sunrise and are undertaken over the early morning period for a duration of up to four hours. While it is advised that surveyors avoid the hour before sunrise (i.e. the dawn to sunrise period), this time period was incorporated into surveys for snipe, as detailed in O'Brien & Smith (1992). It is also suggested that incorporating evening visits can be useful for more accurately mapping the occurrence of certain species, e.g. woodcock that display around dusk or grasshopper warblers that tend to be more vocal at dusk. Surveys should not be undertaken in unfavourable weather conditions, specifically moderate to strong winds (greater than Beaufort F5), persistent rain and/or in poor visibility. The survey area is covered at a slow pace and the route adopted should aim to take surveyors within 50 m of all parts of the site, with this interval decreasing on a discretionary basis for areas where closer inspections may be required, e.g. dense scrub.

While walkover surveys covered habitats within the 500 m viable area buffer that were suitable for breeding raptors, including: buzzard, sparrowhawk, kestrel, and peregrine, the time required to detect breeding sites for these species, as outlined in Hardey *et al*. (2013), is not facilitated during walkovers.

As such, any raptor observations recorded during walkovers were examined together with observations from VP watches and wider area breeding raptor surveys to identify breeding territories.

4.2.2 Breeding snipe surveys

Suitably wet areas within the 500 m viable area buffer were covered for breeding snipe, including Drumshallon Lough and associated wetland. Surveys running from dawn to three hours after, or late afternoon to dusk, as detailed in O'Brien & Smith (1992) were employed to increase the chances of detecting breeding behaviour, including chipping, or drumming snipe.

4.2.3 Dusk surveys

Dusk surveys were carried out on calm, dry nights and covered woodland areas in the 500 m viable area buffer to identify roding woodcock (territorial males) and long-eared owls, as detailed in Gilbert *et al*. (1998). For woodcock surveys started roughly 15 minutes before sunset and continued up until 60 minutes after sunset with visits conducted between May and June, as recommended by the UCC Irish Woodcock Project (UCC Ornithology Group, 2021). Surveyors targeted relatively short sections of woodland edge with associated scrub/forestry rides during each survey.

Dusk surveys for long eared owl targeted periods when this species is most vocal, specifically early in the season (late-March to May) when males and females tend to be most actively calling and later in the season (late-June and into August), when young can be detected begging loudly. During dusk surveys, surveyors also scanned and listened for other crepuscular/nocturnal species, such as barn owls and possibly nightjars, as well as species that are often more active over this period, like snipe, water rail and grasshopper warblers. Although dusk surveys could detect barn owl activity, surveying for this species involves assessing any building or veteran trees within 1 km of the proposed wind farm site for potential to support barn owls. Any incidental records of crepuscular/nocturnal bird species were noted during bat surveys that were undertaken by Woodrow-APEM Group; this included internal inspection of buildings and veteran trees within the 300 m of the viable area.

4.2.4 Data capture for walkover surveys

During site walkovers georeferenced data was collected using Survey123 and routes/coverage were tracked using the Outdoor Active application (previously ViewRanger). In addition to target species, point data on the occurrence of non-target species was recorded to provide an indication of the bird assemblages occurring within the 500 m viable area buffer. Surveyors identify and record the activity of birds and at the end of the season the maps for the series of visits are analysed together. This highlights concentrations or clusters in breeding activity for species and a picture emerges showing the location of breeding territories across the site. If required, the number of territories for each species can be reported.

Table 3: Survey effort for dusk surveys – breeding season 2022

Date	Visit	Survey Type	Start time	Duration (hrs)	Surveyor
23/03/2022	1	Dusk - Owl	19:45	1.0	CS
24/03/2022	1	Dusk - Owl	06:00	1.0	CS
28/03/2022	1	Dusk - Owl	20:30	1.5	CS
18/05/2022	2	Dusk - WK/Owl	20:25	2.0	EF
25/05/2022	3	Dusk - WK/Owl	20:35	2.0	EF
26/05/2022	3	Dusk - WK/Owl	20:40	2.0	EF
20/06/2022	4	Dusk - WK/Owl	21:00	2.0	EF
22/06/2022	4	Dusk - WK/Owl	21:00	2.0	EF
30/06/2022	5	Dusk - WK/Owl	21:00	2.0	EF
15/08/2022	6	Dusk - Owl	20:00	2.0	EF
16/08/2022	6	Dusk - Owl	20:00	2.0	EF
31/08/2022	7	Dusk - Owl	19:25	2.0	EF

Table 4: Survey effort for site walkover surveys – breeding season 2022

Date	Visit	Survey Type	Start time	Duration (hrs)	Surveyor
26/04/2022	1	Walkover	06:15	2.0	EF
26/04/2022	1	Walkover	09:20	2.0	EF
28/04/2022	1	Walkover	07:20	2.0	EF
28/04/2022	1	Walkover	10:20	2.0	EF
29/04/2022	1	Walkover	06:00	2.0	EF
29/04/2022	1	Walkover	08:45	2.0	EF
27/06/2022	2	Walkover	08:30	3.0	EF
28/06/2022	2	Walkover	07:50	3.0	EF
29/06/2022	2	Walkover	08:20	3.0	EF
30/06/2022	2	Walkover	07:30	3.0	EF
18/07/2022	3	Walkover	07:10	3.0	EF
20/07/2022	3	Walkover	07:15	3.0	EF
21/07/2022	3	Walkover	07:15	3.0	EF
22/07/2022	3	Walkover	07:10	3.0	EF

4.3 Wider area breeding raptor surveys

SNH (2017) survey guidelines recommend surveying the wider area (hinterland) for up to 2 km from the proposal site for most breeding raptor species, including peregrine, merlin and hen harrier. Surveys for breeding eagle require a larger search area (6 km buffer), however this region is beyond the current Irish breeding range for white-tailed eagle and golden eagle. The search area can also be extended, if the site lies within the potential zone of influence to any SPAs (SNH, 2016). The viable area was considered to be too distant to be associated with any SPAs designated for raptors and therefore, using a 2 km buffer on the viable area as a the breeding season search area was deemed appropriate and is shown in Figure 4.

A combination of 'mini-VPs' and driven/walked transects were used to search potential nesting habitat within the 2 km viable area buffer, including the viable area, with a significant proportion of the time spent observing the quarry for breeding activity. Survey methods for breeding raptors follow those outlined in Hardey *et al*. (2013). A total of ten visits were carried out during the 2022 breeding season, as listed in Table 5, with Appendix 3 providing details of weather conditions.

Raptor observations recorded during VP watches and site walkovers were examined together with observations from wider area breeding raptor surveys to identify breeding territories.

Table 5: Survey effort for wider area breeding raptor surveys – breeding season 2022

Date	Visit	Survey Type	Start time	Duration (hrs)	Surveyor
23/03/2022	1	Raptor	11:10	3	CS
24/03/2022	1	Raptor	10:25	3	CS
20/04/2022	2	Raptor	10:15	3	EF
21/04/2022	2	Raptor	13:15	3	EF
15/05/2022	3	Raptor	12:00	3	EF
22/05/2022	4	Raptor	10:00	3.5	EF
05/06/2022	5	Raptor	09:45	3	EF
19/06/2022	6	Raptor	10:45	3	EF
17/07/2022	7	Raptor	10:45	3	EF
24/07/2022	8	Raptor	10:45	3	EF
14/08/2022	9	Raptor	11:00	3	EF
21/08/2022	10	Raptor	13:30	3	EF

4.4 Winter site walkovers

Winter walkovers of the 500 m viable area buffer were undertaken during the 2022-21 winter. Surveyors covered the 500 m viable area buffer noting down all species encountered and ensured coverage sampled all important habitat types present. As such, winter walkovers provide useful contextual information on the distribution of winter bird species occurring within the site, how habitats are being utilised and can provide additional information on numbers of birds, especially for flocking species like golden plover and lapwing. Walkover surveys are also a more suitable survey method to record usage by species that are difficult to detect during VP watches, such as wintering woodcock and snipe.

During winter site walkovers georeferenced data was collected using Survey123 and routes/coverage were tracked using the Outdoor Active application (previously ViewRanger). Point data on the occurrence and behaviour of target and non-target species was recorded.

The dates of the winter site walkovers carried out during the 2021-22 winter season are listed in Table 6, with weather condition during surveys provide in Appendix 3.

Table 6: Survey effort for site walkover surveys – non-breeding season 2021-22

Date	Visit	Survey Type	Start time	Duration (hrs)	Surveyor
18/11/2021	1	Walkover	09:30	6	CS
13/01/2022	2	Walkover	09:30	2.5	CS
13/01/2022	2	Walkover	12:15	2	CS
13/01/2022	2	Walkover	14:30	1.5	CS
03/02/2022	3	Walkover	08:07	2.5	CS
03/02/2022	3	Walkover	10:52	2	CS
03/02/2022	3	Walkover	13:07	1.5	CS

4.5 Wider area wintering waterbird surveys

In assessing the impact of the proposed wind farm developments, it can be important to provide contextual data on the numbers of waterbirds in the wider area relative to the usage of the site by these species. SNH (2017) survey guidelines require monitoring of swans and geese foraging and roosting locations when occurring in the environs of the proposed wind farm site, and specifically where SPAs are designated for these species. Study areas of up to 500 m from the proposed development site for foraging locations and up to 1 km from proposed wind farm site for roosting locations are recommended, although this may be extended where high levels of activity are

anticipated and if investigating connectivity with designated sites, such as for greylag geese which are a SCI of the Stabannan-Braganstown SPA and Dundalk Bay SPA.

In Ireland, swan and goose distribution is not well documented beyond designated sites and many wintering waterbirds occur outside of SPAs, with distribution often changing over time in response to changes in land use and other pressures such as hunting. Seasonal availability of resources also affects distribution, such as availability of stubbles in the autumn, as do more stochastic events such as flooding.

Survey methodology was based on the approach employed by IWeBS, involving monthly survey visits to cover the survey area, which was extended up to 5 km beyond the viable area. The aim was to cover any suitable wetland or other habitats in the wider area that were considered suitable for foraging and/or roosting wintering waterbirds. Surveyors recorded the location of waterbirds and associated behaviour using Survey123, with survey routes/coverage tracked using the Outdoor Active application (previously ViewRanger). While waterbirds are the focus of this survey, other species are recorded, such as birds of prey which often start displaying over the late winter/early spring.

The 5 km viable area buffer employed as the survey area is shown in Figure 5. As listed in Table 7, the wider area was surveyed ten times over the 2021-22 non-breeding season, with a given monthly visit undertaken over one to three days. Appendix 3 provides weather conditions for visits.

Table 7: Survey effort for wider area waterbird surveys – non-breeding season 2021-22

Date	Visit	Survey Type	Start time	Duration	Surveyor
13/09/2021	1	Waterbird	11:20	3.0	CS
08/10/2021	2	Waterbird	14:30	3.0	CS
21/10/2021	3	Waterbird	07:50	3.0	CS
21/10/2021	3	Waterbird	11:20	3.0	CS
01/11/2021	4	Waterbird	07:40	3.0	CS
01/11/2021	4	Waterbird	11:20	3.0	CS
02/11/2021	4	Waterbird	11:20	3.0	CS
02/12/2021	5	Waterbird	09:30	3.0	CS
02/12/2021	5	Waterbird	13:20	2.5	CS
17/12/2021	6	Waterbird	12:30	3.0	CS
21/01/2022	7	Waterbird	09:07	3.0	CS
21/01/2022	7	Waterbird	12:40	3.0	CS
25/01/2022	7	Waterbird	12:50	3.0	CS
02/02/2022	8	Waterbird	08:25	2.0	CS
03/02/2022	8	Waterbird	14:50	2.0	CS
04/02/2022	8	Waterbird	07:40	2.0	CS
22/02/2022	9	Waterbird	07:40	3.0	CS
08/03/2022	10	Waterbird	08:00	3.0	CS
08/03/2022	10	Waterbird	11:30	3.0	CS
08/03/2022	10	Waterbird	15:00	3.0	CS

4.6 Hen harrier roost searches

During the initial desk review, it was noted that the viable area and the surrounding wider area do have some areas that may superficially appear to be capable of supporting a hen harrier winter roost and there is a historical hen harrier roost recorded approximately 2 km from the viable area. Therefore, in Year 1, the historical roots and suitable habitat within or directly adjacent to the viable area, particularly areas of cover associated with Drumshallon Lough and the wetland to the west were the focus of roost searches.

SNH (2017) survey guidelines stipulates in relation to surveying for communal raptor roosts, including those of hen harriers, that roost sites within 2 km of a proposed wind farm site should be identified. The 2 km search area employed for the proposed Kellystown Wind Farm was based on the 2 km viable area buffer, which is shown in Figure 4.

The approach to surveying for hen harrier roosts was determined by two factors:

- Availability of potentially suitable roosting habitat in the vicinity of the proposed wind farm site, as described by Clarke and Watson (1990) and in the Irish Hen Harrier Winter Roost Survey guidelines (O'Donoghue, 2019); and
- Hen harrier activity observed during VP watches, site walkovers and wider area surveys.

SNH (2017) guidelines defer to Hardey *et al*. (2013) for specific roost survey methodology requiring surveyors to employ professional judgement in identifying and targeting potential roosts based on observed flight activity within or adjacent to the viable area. Hardey *et al*. (2013) recommend locating birds in the late afternoon and then attempting to track them back to roosts. O'Donoghue (2019) notes that the best time to conduct a roost watch is at least 40 minutes before sunset until dark, or 30 minutes before sunrise until at least 30 minutes after sunrise.

If a roost is identified, then further monitoring is required to describe roost attendance and to track flight lines to and from the roost in relation to the proposed wind farm site. Further monitoring is typically undertaken on a monthly basis or twice a month, depending on the frequency of occupancy and how affiliated roosting birds are to the proposed wind farm site.

The dates of the hen harrier roost watches are detailed in Table 8, with information on weather conditions recorded during surveys provided in Appendix 3.

Table 8: Survey effort for hen harrier roost searches – non-breeding season 2021-22

Date	Visit	Survey Type	Start time	Duration	Surveyor
18/10/2022	1	HH roost search	17:00	2	EF
19/10/2022	2	HH roost search	07:15	2	EF
31/10/2022	3	HH roost search	06:45	2	EF
28/11/2022	4	HH roost search	15:30	1.5	EF
25/11/2022	5	HH roost search	15:30	1.5	EF
20/12/2022	6	HH roost search	15:30	1.5	EF
21/12/2022	7	HH roost search	15:30	1.5	EF

4.7 Survey limitations

The main potential for limitations relates to survey coverage and emanates from the re-positioning of a turbine towards the end of Year 2 to a location north of the original viable area that was identified at the start of the ornithological study. At the time of surveying during Year 1, the proposed turbine locations were indicative, and the area identified as being viable for turbines was used to derive the ornithological study areas employed, including the 500 m, 2 km and 5 km viable area buffers. As the final turbine layout extends approximately 100 m north of the original viable area, further investigation is required to determine how this extension might affect the validity of the data collected for conducting the ornithological impact assessment.

For the larger ornithological study areas, including the 2 km and 5 km viable area buffers, the relatively small northern extension is considered inconsequential to the data collected for breeding raptors, hen harrier roost searches and wider area wintering waterbird surveys. Adding an additional 100-200 m to the 2 km and 5 km viable area buffers does not result in the inclusion of suitable habitats for the aforementioned raptors and waterbirds; and therefore, there is no significant limitations to the data

collected. The northwards extension of the 500 m viable area buffer by approximately 100 m does have the potential to affect coverage for walkovers and VP watches.

In relation to walkover surveys, it is considered that the most important habitats occurring within the 500 m viable area buffer, namely wetlands for breeding waders were adequately covered and there is no suitable wetland habitat occurring within the northern extension. Habitat availability for the breeding raptors occurring in the environs, specifically sparrowhawk, buzzard and kestrel was limited in the northern extension due to the lack of woodland. The habitat types occurring within the northern extension were like those sampled within the 500 m viable area buffer, including improved grasslands, scrub, quarry, hedgerow and drains. At this location, these habitats are highly unlikely to support any potentially sensitive species beyond those recorded for the 500 m viable area buffer, such as yellowhammer. Therefore, while the northern extension area was not fully covered during walkovers, it is considered that walkover surveys sampling the habitats within the 500 m viable area are sufficient to provide an indication of the avian assemblages occurring in the northern extension and based on a lack of habitat availability, there is a high degree of certainty that the area does not support breeding waders or raptors. This assertion is supported by additional observations during other surveys which also provided coverage over the northern extension during the breeding season and did not detect any breeding target species. Based on the reasoning provided, limited coverage of the northern extension area does not result in any significant limitations to the walkover data collected.

In relation to VP watches, the shortfall in low level (0-15 m) coverage of the northern part of the 500 m viable area buffer has been explained in the section covering VP watch methodology -see Section 4.1. Fortunately, the rotor swept area of the re-positioned turbine is fully covered from VP3, even at 15 m above ground level. While the re-positioning of the north-eastern turbine does push the northern extent of the buffer up to *c*. 100 m beyond the original viable area buffer, this only occurs as a relatively thin sliver of airspace. The extension to the viable area buffer lies *c*. 1.6 km from VP2 and *c*. 1.8 km from VP3, so is within the 2 km viewshed and higher-level flights are captured for target species passing through the area. Viewshed analysis indicates that flights below 25 m may not be detected, which would require the application of a correction factor to account for lower-level flights, if assessing turbines where the rotor swept areas extend below 25 m. A correction factor to estimate for lower-level flights can be generated for the site, as there is substantial overlap in the VP viewsheds employed to cover the 500 m viable area buffer, which results in duplication of survey effort and means that surveyor contact time within the buffer is notably high, ensuring that a realistic impression of species and flight behaviour has been captured. Therefore, given the relatively small area affected and recourse to the application of correction factors to account for low level flights, limited coverage of the northern extension area does not result in any significant limitations to the VP watch data collected.

Inclement weather conditions, especially during the winter can result in limitations for the ornithological data collected by limiting detectability of birds or supressing bird activity. This is avoided in the first instance, by attempting to undertake surveys within the permitted weather parameters as specified by survey guidelines and as such surveys are scheduled around poor weather conditions. Secondly, weather conditions are monitored throughout surveys to ensure that when poor weather conditions are unexpectedly encountered, these do not dominate the data set, in particular for VP watch data. One of the main weather limitations for VP watch data is reduced visibility across the viewshed. During Year 1 the visibility during VP watches was categorised as good 60% of the time, changeable good-moderate 18% of the time, moderate 21% of the time and changeable good-poor only 1% of the time. In addition, no VP watches were undertaken in winds above Beaufort Force 5 and

in terms of precipitation, 72% of the VP watches were noted as dry, with periodic rainfall ranging from drizzle to heavy passing showers recorded on the remaining watches and only one VP watch recorded prolonged rainfall. Therefore, there are no significant weather-related limitations.

Overall, despite the limitations identified, it is concluded that sufficient data was collected over the study period to identify any ornithological constraints that may arise for the proposed wind farm and inform the ornithological impact assessment in conjunction with a second study year.

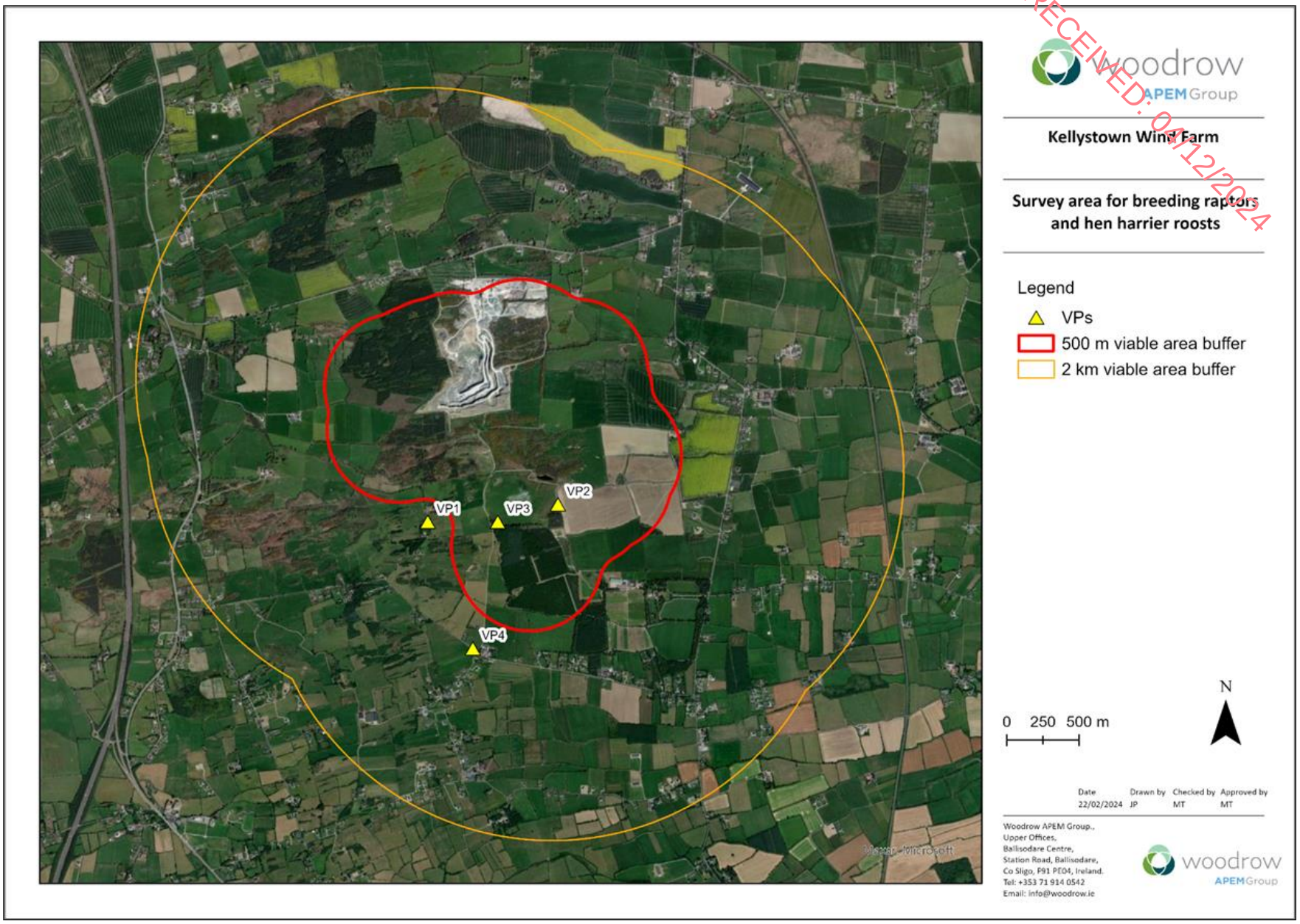


Figure 4: Survey area for breeding raptors and hen harrier roosts within 2 km viable area buffer

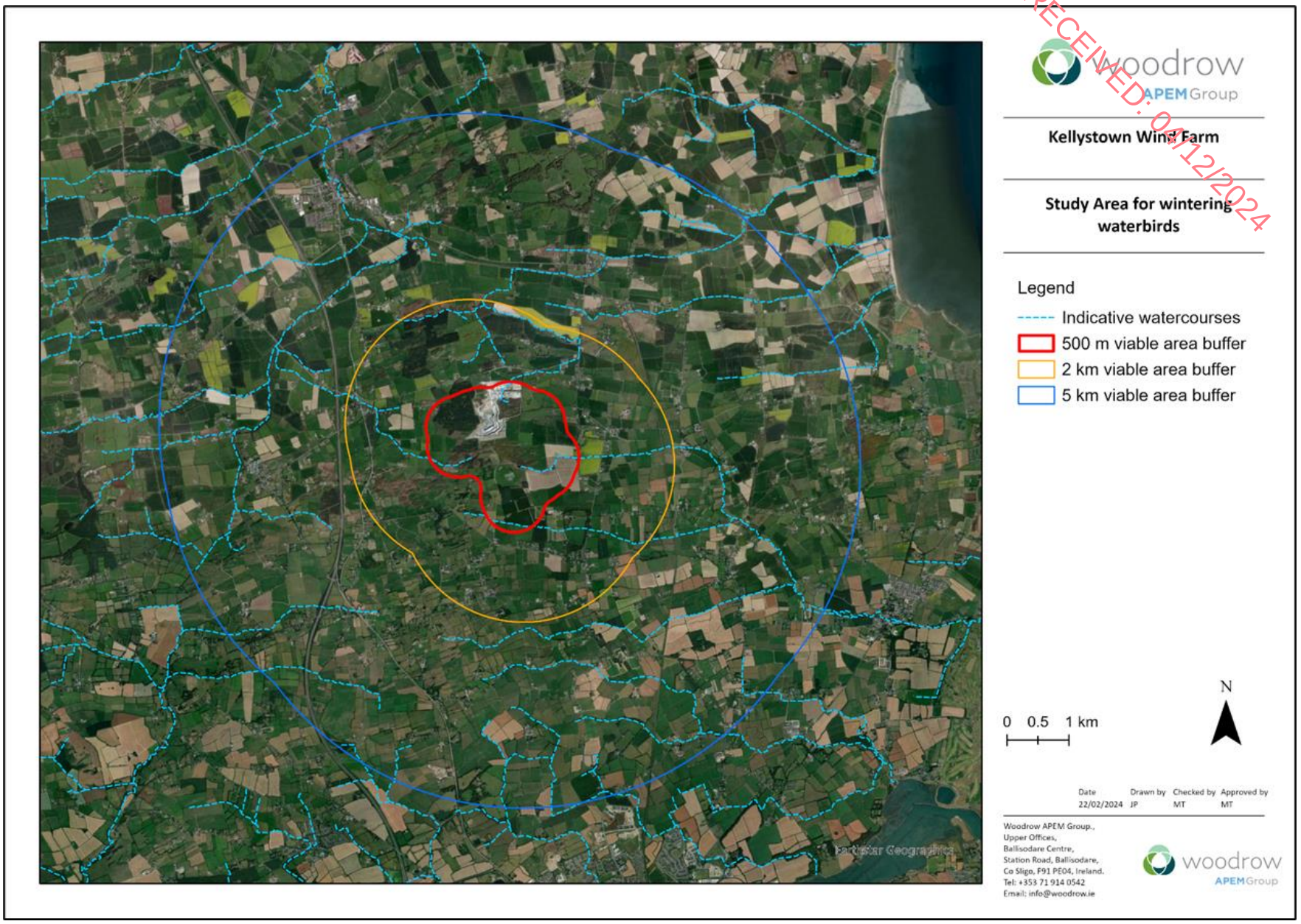


Figure 5: Survey area for wintering waterbird birds within 5 km viable area buffer

5 Survey results

5.1 Vantage Point (VP) watches

A summary of all target species observations during VP watches in Year 1 (September 2021 to August 2022) is provided in Table 9. Full details of target species observations are presented in tables and figures in Appendix 2.

A total of 1,152 observations (obs) from 21 identified target species were recorded during VP watches in Year 1. Buzzard was the species recorded most frequently with a total of 271 obs., followed by black-headed gull (261 obs) and common gull (201 obs). Species highlighted in bold are those with a relatively high number of observations and resultant flight seconds that are likely to require further consideration through collision risk modelling. Two target species, little grebe and moorhen were not recorded in flight and were observed utilising the wetlands in the site.

It is important to note that data presented in Table 9 for Year 1 VP watches is raw data representative of the 500 m viable area buffer which differs from the final 500 m turbine buffer considered within the EIAR. This is illustrated by the flight line maps presented in Appendix 2, which show flight lines in relation to the 500 m buffer based on the finalised proposed turbine locations. In addition, there is substantial overlap in the VP viewsheds employed to cover the 500 m viable area buffer, which results in duplication of survey effort and inflates aggregated values for flight seconds recorded for target species. Duplication in survey effort is controlled by running the data through a collision risk model. A further point to note is that the flight data presented in Table 9 does not distinguish between flight time within different height bands and includes time above and below the potential collision risk zone within the rotor swept area for the proposed turbine models. The further analysis to exclude flight time above or below the rotor swept area is presented within the EIAR. Therefore, while the flight times for target species presented in Table 9 are indicative of site usage, they should be examined in the context of the treatment given within the EIAR and the associated collision risk model, which will account for the final site layout, turbine dimension (collision risk heights) and duplication in survey effort.

The aggregated flight seconds shown in parenthesis in Table 9 are the flight times where, after further analysis, target species were considered to be within the zone of influence for the proposed turbine layout, i.e. the 500 m turbine buffer based on the finalised proposed turbine layout. These flight times within the zone of influence form the basis of the inputs considered for inclusion within Collision Risk Modelling (CRM) depending on flight heights associated with the records, i.e. flight time at heights within the collision risk band for the turbine specifications assessed within the CRMs.

As can be seen in Table 9, for two species, black-tailed godwit and whooper swan, while birds were observed in flight during VP watches, these flights were all beyond the zone of influence considered for collision risk. For some of the target species with the highest values for flight activity, such as black-headed gull and common gull, a significant proportion of flight time was recorded beyond the zone of influence and for these two species respectively, only 11% and 24% of the time was found to be within the 500 m turbine buffer based on the finalised proposed turbine layout. Likewise, the majority of golden plover and curlew flights were beyond the zone of influence and respectively only 1% and 14% of the time was found to be within the 500 m turbine buffer based on the finalised proposed turbine layout.

Table 9: Summary of Year 1 flight activity for target species recorded during VP watches

- No. of obs = number of observations for each target species recorded during VP watches, includes all records - flying, on the ground/pearched and those beyond the 500 m turbine buffer and/or 2 km extend of viewsheds for VPs.
- Bird counts gives the minimum and maximum counts for each target species recorded during VP watches.
- Aggregated seconds is calculated by multiplying the number of birds per observation by the number of flight seconds.
- Total aggregated flight seconds in parenthesis shows flight time within the final 500 m turbine buffer that will be considered for inclusion within Collision Risk Modelling (CRM) for selected species depending on flight heights

Species recorded	No. of obs.	Bird counts		Aggregated seconds recorded		
		Minimum	Maximum	Non-breeding 2021-22	Breeding 2022	Total
Black-headed gull	261	1	278	1,278,090	-	1,278,090 (138,541)
Black-tailed godwit	1	90	90	20,700	-	20,700 (0)
Buzzard	271	1	5	25,647	16,518	42,165 (31,048)
Common gull	201	1	250	451,728	-	451,728 (107,029)
Cormorant	5	1	1	60	387	447 (262)
Curlew	9	1	28	6,572	15	6,587 (912)
Golden plover	7	1	1,000	249,250	225	249,475 (2,515)
Great black-backed gull	6	1	7	45	2,290	2,335 (1,580)
Grey heron	16	1	1	775	188	963 (673)
Gull species	23	1	500	90,000	56,339	146,339 (53,750)
Herring gull	187	1	230	205,160	15,814	220,974 (108,403)
Kestrel	2	1	1	46	36	82 (36)
Lesser black-backed gull	41	1	11	6,138	3,361	9,499 (5,316)
Little egret	7	1	1	235	11	246 (246)
Little grebe	6	1	4	-	-	- (-)
Mallard	9	1	3	47	300	347 (309)
Merlin	1	1	1	31	-	31 (31)
Moorhen	2	1	1	-	-	- (-)
Peregrine	60	1	4	1,132	3,917	5,049 (4,878)
Red kite	1	1	1	-	80	80 (80)
Sparrowhawk	57	1	2	3,023	921	3,909 (1,747)
Whooper swan	2	4	7	180	252	432 (0)

5.2 Site walkover surveys for breeding birds

5.2.1 Dusk surveys

As listed in Table 10, a total of nine target species were recorded during the dusk surveys undertaken over the 2022 breeding season. Figure 6 shows the locations of red and amber-listed birds recorded during the dusk surveys conducted over the 2022 breeding season, with the locations of long-eared owls (green-listed) also shown.

No breeding woodcock behaviour was recorded. Long-eared owls were recorded on four occasions including two consecutive nights in March, calling from the small square block of forestry in the southern part of the wind farm site, and again in June, when a bird was glimpsed briefly flying through trees around the stables, just beyond the 500 m viable area buffer. In August an owl was perched in a similar area. While no breeding was confirmed (e.g. chicks heard), presence of owls in the southern part of the wind farm site over breeding season 2022 suggests that long-eared owls were breeding in the area.

Snipe, possibly two birds, were heard displaying at the end of March to the south of Drumshallon Lough. In June, a snipe was flushed from a marshy area to the west of the Lough. These records provide additional information to help inform snipe breeding distribution, as recorded during lowland breeding wader (snipe) surveys.

Several species were recorded either early or late in the breeding season, including the golden plover recorded in March, which were birds heard faintly flying overhead during the night. Likewise, the mallard, the gull, buzzard and sparrowhawk records were birds flying through the area around dusk.

The late season (August) curlew records were not considered to be birds that were breeding in the area, which is supported by walkover and VP watch data, showing that the earliest curlew recorded in the area was in the late July.

The mallard recorded early in the season was recorded in the wetland west of Drumshallon Lough, which does hold suitable cover for this species to nest in.

Table 10: Bird counts for dusk surveys – breeding season 2022

		Counts per visit				
Species recorded	**BTO code**	**1**	**4**	**6**	**7**	**BoCCI 2020-2026**
Curlew	CU			1	1	Red
Golden plover	GP	1				Red
Snipe	SN	2	1			Red
Herring gull	HG		1	1		Amber
Lesser black-backed gull	LB		1			Amber
Mallard	MA	2				Amber
Buzzard	BZ	1		1		Green
Long-eared owl	LE	2	1		1	Green
Sparrowhawk	SP	1				Green

5.2.2 Site walkovers - lowland breeding wader surveys

Site walkovers, incorporating lowland breeding wader surveys, covering suitable habitat within the 500 m viable area buffer were undertaken on three occasions during the 2022 breeding bird season. As listed in Table 11, there were a total of 56 species recorded. Six red-listed species were detected,

the location of the records are shown in Figure 7 and included three target species - snipe, curlew and kestrel, with the other species being stock dove, meadow pipit and yellowhammer. Kestrel were only recorded once during walkover surveys and the record was a bird in flight, with no breeding behaviour observed.

Based on drumming/chipping behaviour, snipe were considered to be breeding within the 500 m viable area buffer, with activity centred around Drumshallon Lough and the wetland to the west.

The curlew were recorded in late July and involved two observations, with two and three birds recorded in the east of the 500 m viable area buffer, utilising different parts of the large field compartments in this area. As these are the earliest curlew recorded in the area they are not considered to be breeding within or adjacent to the viable area. There were additional non-breeding birds recorded during dusk surveys in August.

Based on Figure 7, yellowhammer were widely distributed through the 500 m viable area buffer and in particular in the eastern part, where cereal fields with hedges are a prominent feature. Meadow pipits were less commonly recorded. There were three stock dove records from the site, which were heard calling in June and in July and could possibly be breeding within the 500 m viable area buffer.

There were 13 amber-listed species recorded during the breeding season site walkovers. As listed in Table 11 and shown in Figure 8, nine of these were passerine species with only three recorded as breeding within the wind farm site, including goldcrest, skylark and willow warbler, although based on habitat availability (scrub) it is likely that linnet also breed. The remainder of the amber-listed species recorded were waterbirds, including: cormorant, mallard, herring gull and lesser-black-backed gull; and were not recorded breeding within the 500 m viable area buffer, as listed in Table 11 and shown in Figure 9; although it is possible that mallard were nesting.

Inclusive of the green-listed breeding species recorded, the avian assemblages are representative of the range of habitats occurring within the 500 m viable area buffer.

Table 11: Species list and counts for walkover surveys – breeding season 2022

Species highlighted in **bold** indicate breeding/territorial behaviour was recorded within the site

Species recorded	BTO code	Counts per visit			BoCCI 2020-2026
		1	2	3	
Curlew	CU			5	Red
Kestrel	K	1			Red
Meadow pipit	MP	5	4	6	Red
Snipe	SN	1	2		Red
Stock dove	SD		1	2	Red
Yellowhammer	Y	10	9	14	Red
Cormorant	CA			1	Amber
Goldcrest	GC	16	13	15	Amber
Herring gull	HG	2			Amber
House martin	HM			3	Amber
House sparrow	HS			1	Amber
Lesser black-backed gull	LB		3		Amber
Linnet	LI	3	7	43	Amber
Mallard	MA	4			Amber
Sand martin	SM		7		Amber
Skylark	S	3	3	3	Amber
Starling	SG		6		Amber
Swallow	SL	7	33	42	Amber
Willow warbler	WW	21	6	2	Amber
Blackbird	B	40	34	27	Green
Blackcap	BC	15	13	8	Green
Blue tit	BT	5	16	11	Green
Bullfinch	BF		5	6	Green
Buzzard	BZ	3	5	4	Green
Chaffinch	CH	28	22	9	Green
Chiffchaff	CC	13	4	8	Green
Coal tit	CT		12	1	Green
Collared dove	CD	1			Green
Cuckoo	CK			1	Green
Dunnock	D	15	17	26	Green
Feral pigeon	FP	2	1		Green
Goldfinch	GO		7	40	Green
Grasshopper warbler	GH	1			Green
Great tit	GT	11	8	6	Green
Grey heron	H		1		Green
Hooded (grey) crow	HC	36	17	13	Green
Jackdaw	JD	12		15	Green
Jay	J		3	6	Green
Lesser redpoll	LR			2	Green
Little grebe	LG		4	1	Green
Magpie	MG	2	1	7	Green
Mistle thrush	M		4	1	Green
Peregrine	PE			2	Green
Pheasant	PH	1	1	1	Green – non-native
Pied wagtail	PW	2	5		Green
Reed bunting	RB	3	6	7	Green
Robin	R	21	14	15	Green
Rook	RO	267	66	73	Green
Sedge warbler	SW		1	2	Green
Song thrush	ST	10	8	6	Green
Sparrowhawk	SH			3	Green
Stonechat	SC		1	2	Green
Treecreeper	TC			1	Green
Whitethroat	WH	2	4	1	Green
Woodpigeon	WP	89	80	55	Green
Wren	WR	51	49	37	Green

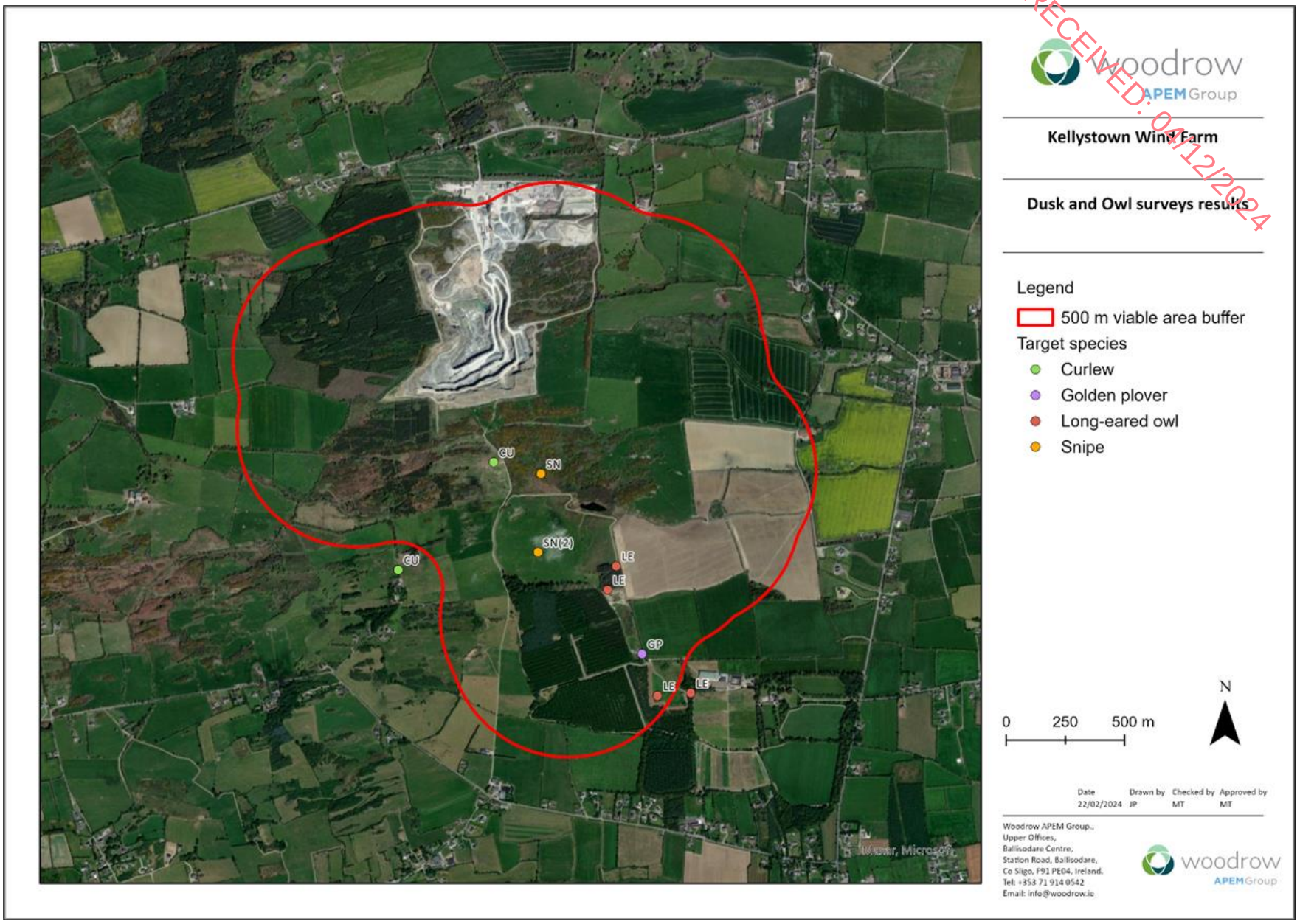


Figure 6: Target species recorded during dusk surveys – breeding 2022

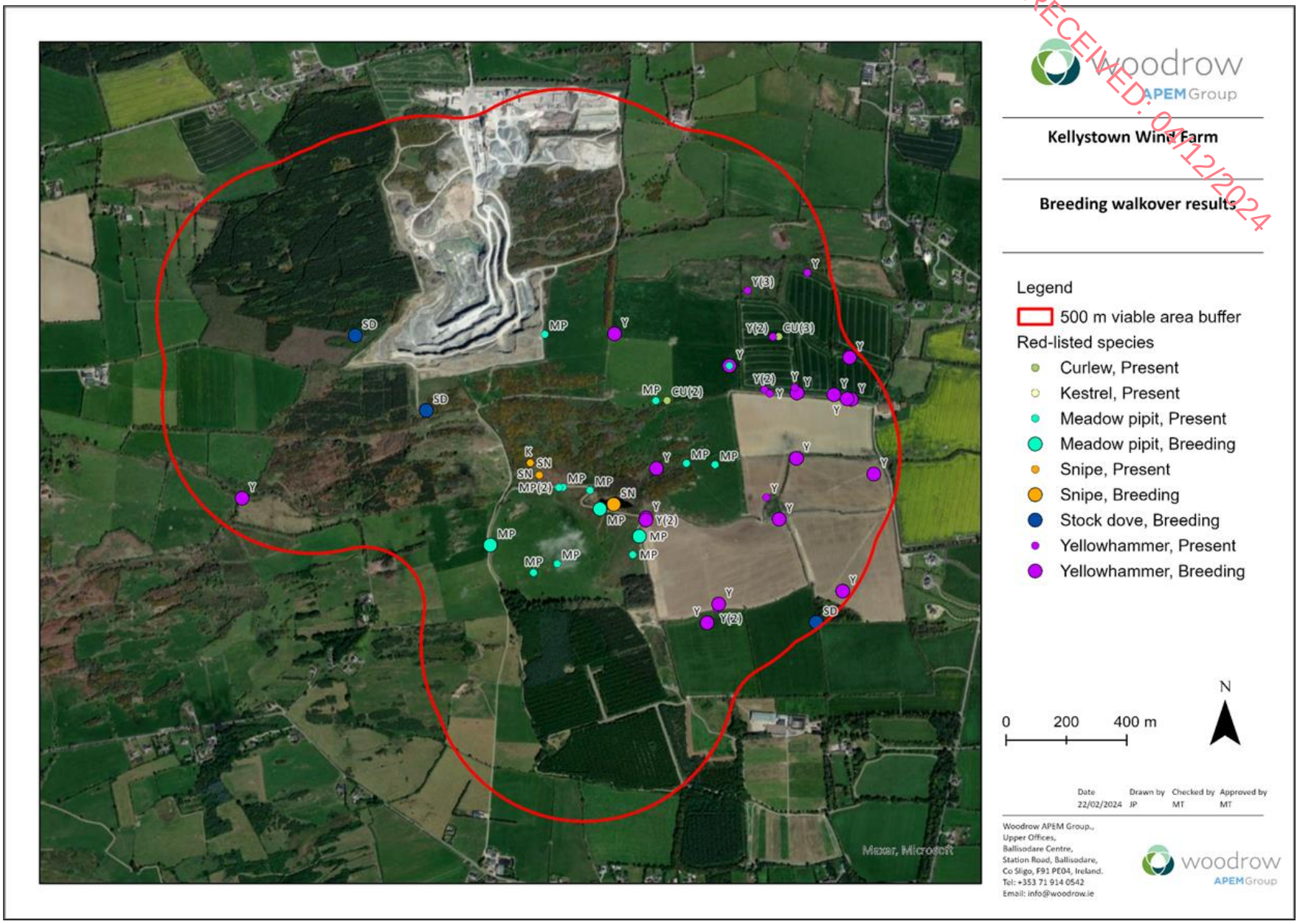


Figure 7: Red-listed species recorded during site walkovers – breeding 2022

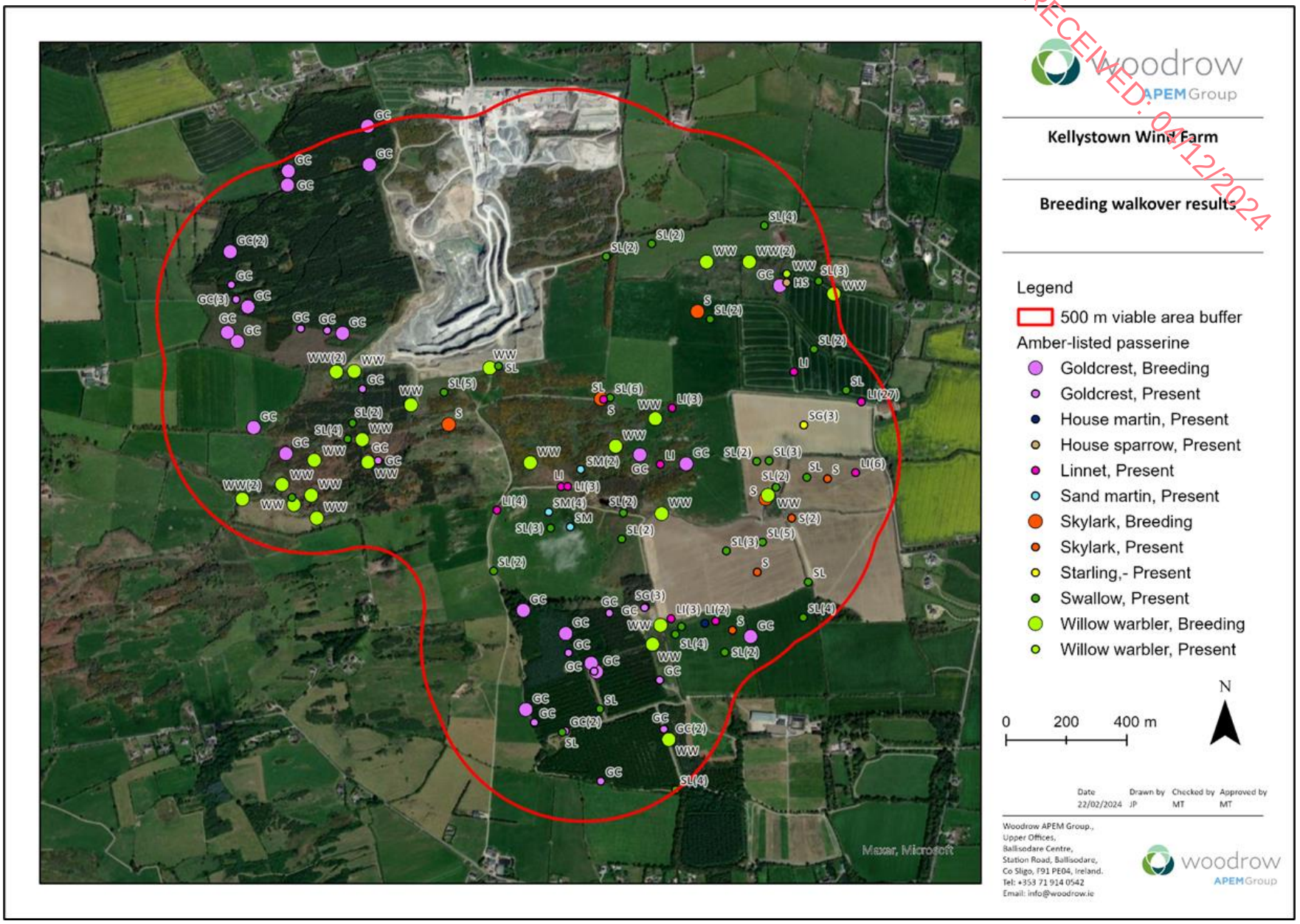


Figure 8: Amber-listed passerines recorded during site walkover surveys – breeding 2022

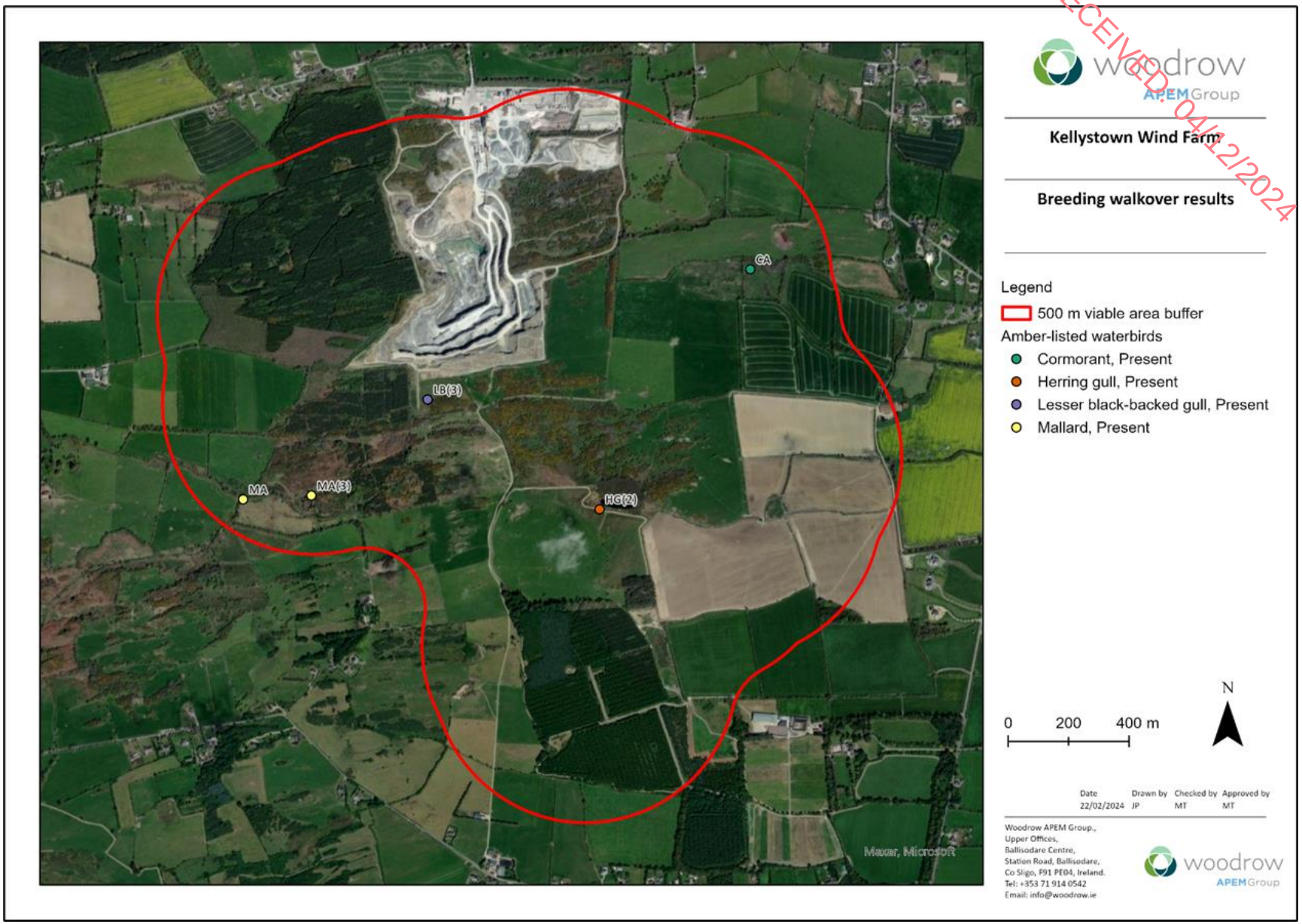


Figure 9: Amber-listed waterbirds recorded during site walkover surveys – breeding 2022

5.3 Wider area breeding raptor surveys

Four species of raptors, as listed in Table 12, were recorded during the wider area surveys undertaken during the 2022 breeding season. These surveys also covered suitable habitat within the wind farm site. The distribution of observations recorded during wider area raptors surveys during the 2022 breeding season is shown in Figure 10. In Figure 11 observations of breeding/territorial behaviour recorded during both the wider area (2 km) breeding raptor surveys and VP watches have been combined to provide a map showing the indicative breeding distribution of raptors within the 2 km viable area buffer.

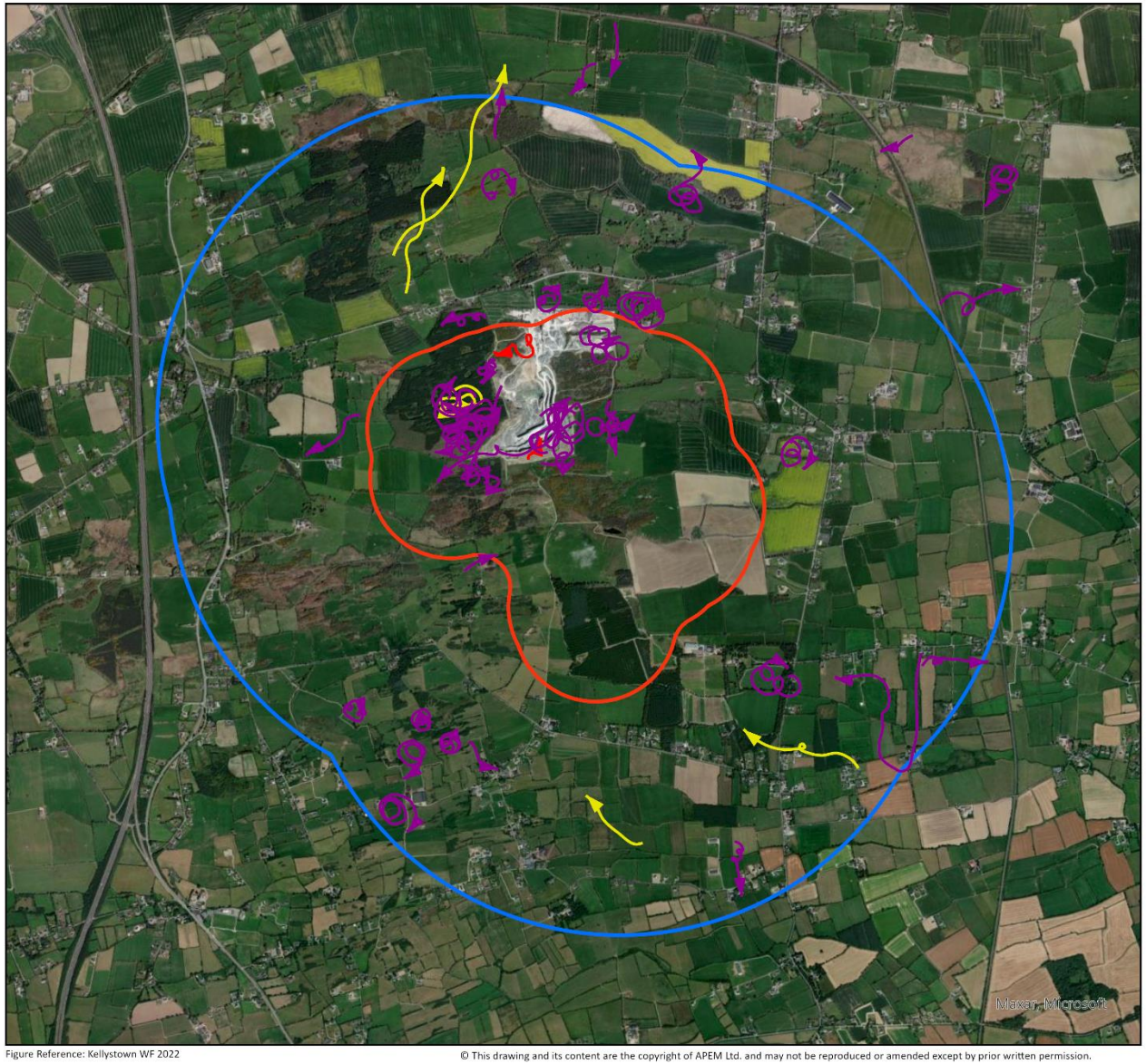
Accounting for survey effort, buzzard was the most frequently recorded raptor species in the 2 km buffer with 32 observations over the 10 survey dates. Based on soaring behaviour early in the spring, 3-4 possible territories were identified (Figure 11). However, there may have been a relatively high proportion of young birds, just starting to pair up and establish territories, as at times 4-5 birds were seen soaring together over suitable habitat. Activity within the wind farm site appeared to be linked to a pair possibly breeding in the plantation on the western side of the quarry, although territorial behaviour possibly by the same pair was also observed over the southern plantation.

Sparrowhawk were actively observed display in spring and two possible nesting territories were identified in the 500 m viable area buffer, as for buzzard observed breeding behaviour was linked to the plantation west of the quarry and the southern plantation. The possible territory in the southern plantation was confirmed during VP watches from VP2, with young being fed by an adult at the nest. A further five possible sparrowhawk territories were identified within the 2 km buffer surrounding the viable area (Figure 11).

Kestrel was recorded once during the breeding season 2022 and no breeding or territorial behaviours were observed. This fits with VP watch data and site walkovers, which only captured a very limited amount of kestrel flight activity.

Table 12: Raptor counts for wider area surveys – breeding season 2022
Species highlighted in **bold** indicate that breeding/territorial behaviour was recorded

Species recorded	BTO code	Counts per visit										BoCCI 2020-2026
		1	2	3	4	5	6	7	8	9	10	
Kestrel	K							1				Red
Buzzard	BZ	32	14				1				2	Green
Peregrine	PE			2	4	8	5	10	11	26	12	Green
Sparrowhawk	SH	5	1									Green



woodrow APEM Group

Kellystown
P00008529

Wider raptor survey results
Breeding season 2022

Legend

- 500m buffer
- 2km buffer
- Buzzard
- Kestrel
- Sparrowhawk

N

0 1 km

Scale:	Date	Drawn by	Checked by	Approved by
1:33,000	11/09/2024	CB	XX	XX

Woodrow APEM Group.,
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Ballisodare Centre,
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Figure Reference: Kellystown WF 2022

Figure 10: Raptors activity recorded during wider area (2 km) raptor surveys

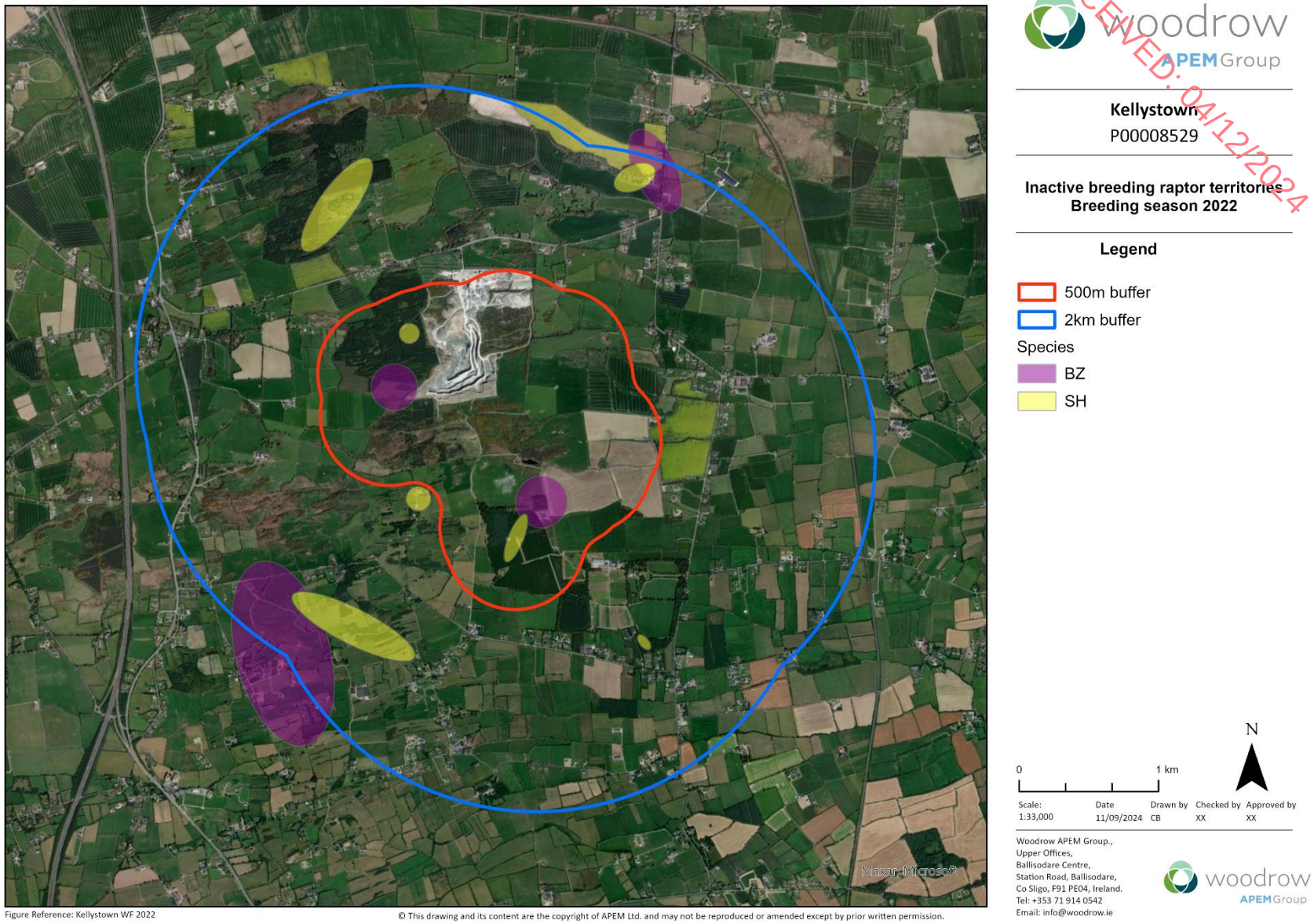


Figure 11: Indicative breeding raptor territories within 2 km of the viable area

5.4 Winter site walkovers

Winter site walkovers covering the 500 m viable area buffer were undertaken on three visits during the 2021-2022 non-breeding season. A total of 34 species were recorded during the Year 1 winter walkovers. Table 13 lists the species and the number of observations recorded on each visit. Species are listed alphabetically by conservation status. Figure 12 and Figure 13 show the locations of red and amber-listed birds recorded during the 2021-22 non-breeding season, respectively.

A total of four red-listed species were registered during winter site walkovers within the 500 m viable area buffer. Three of these species were passerines, including: redwing, meadow pipit and yellowhammer, and one was a wader species, snipe. Snipe were recorded widely across the site in small numbers (max flock size 7 birds) in different habitats, including a forestry ride/drain with the rest of the locations being associated with marshy/wet ground.

A total of eight amber listed target species were recorded during the Year 1 winter walkovers, including four species of gulls (black-headed gull, common gull, herring gull, and lesser-black backed gull) and four passerines (goldcrest, starling, linnet, and skylark). The majority of gull observations were of birds flying through the 500 m viable area buffer and a flock of 200 black-headed gulls was recorded beyond the 500 m viable area buffer.

Table 13: Bird counts for winter walkovers – non-breeding season 2021-22

Species recorded	BTO code	Counts per visit			BoCCI 2020-2026
		1	2	3	
Meadow pipit	MP	4	1	2	Red
Redwing	RE	86	104	50	Red
Snipe	SN		10	4	Red
Yellowhammer	Y			2	Red
Black-headed gull	BH	209			Amber
Common gull	CM	3	1		Amber
Goldcrest	GC	6	14	5	Amber
Herring gull	HG	3	1		Amber
Lesser black-backed gull	LB			2	Amber
Linnet	LI		21		Amber
Skylark	S		1		Amber
Starling	SG	150		100	Amber
Blackbird	B	1	18	10	Green
Blue tit	BT	1	3	3	Green
Bullfinch	BF	5	1	6	Green
Buzzard	BZ	5	3	4	Green
Chaffinch	CH	2	68	4	Green
Coal tit	CT		2	1	Green
Dunnock	D	1	5	1	Green
Fieldfare	FF	1	100		Green
Goldfinch	GO	2	1		Green
Great tit	GT	1	2	2	Green
Grey heron	H		1		Green
Jay	J		2		Green
Lesser redpoll	LR			1	Green
Long-tailed tit	LT		11	6	Green
Pied wagtail	PW	3	2		Green
Raven	RN		1		Green
Red-legged partridge	RL	1			Green – non-native
Robin	R	2	12	10	Green
Siskin	SK	1	10		Green

Species recorded	BTO code	Counts per visit			BoCCI 2020-2026
		1	2	3	
Song thrush	ST	1	6	8	Green
Treecreeper	TC			1	Green
Wren	WR	2	9	6	Green

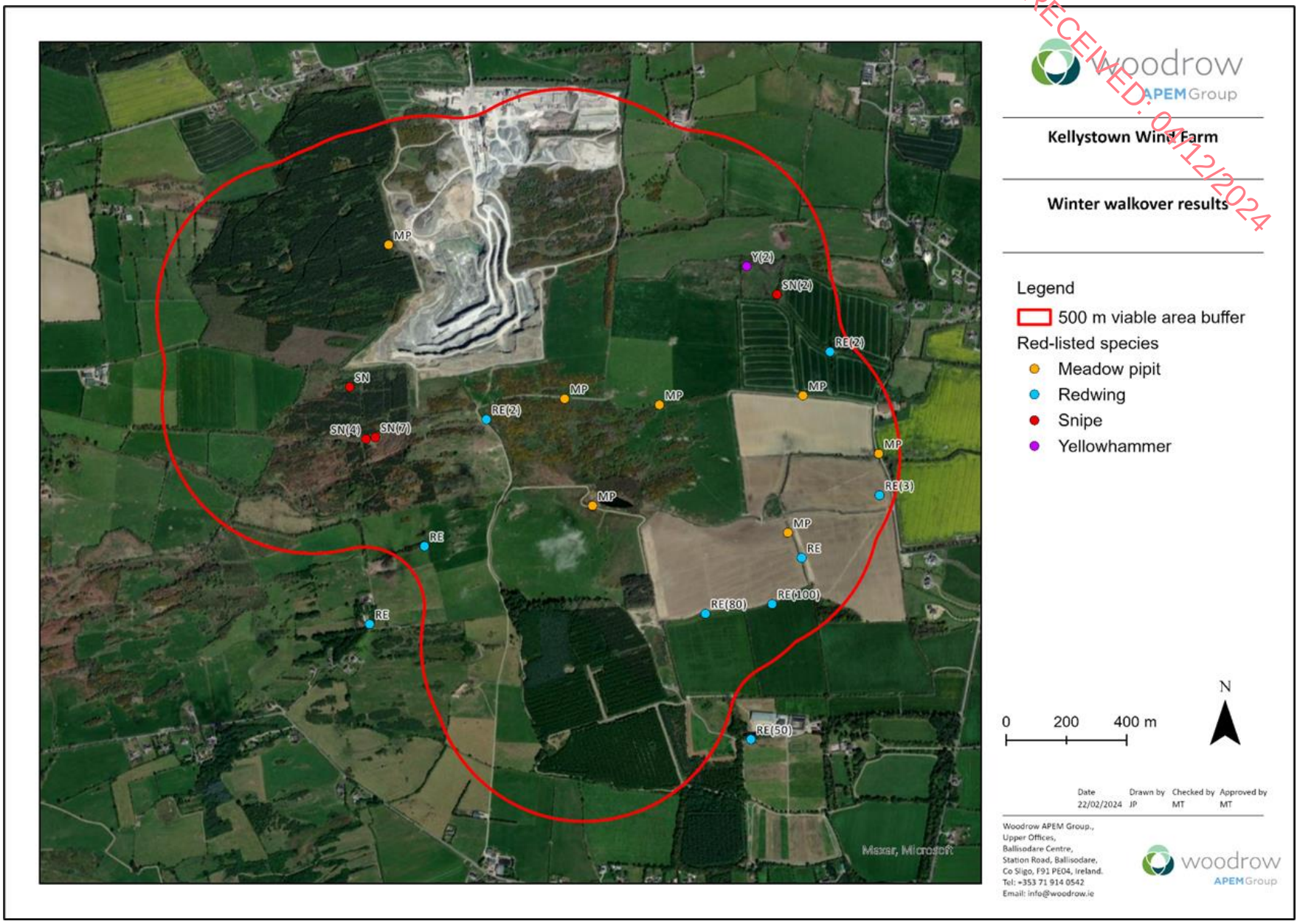


Figure 12: Red-listed bird species recorded during site walkovers – winter 2021-22

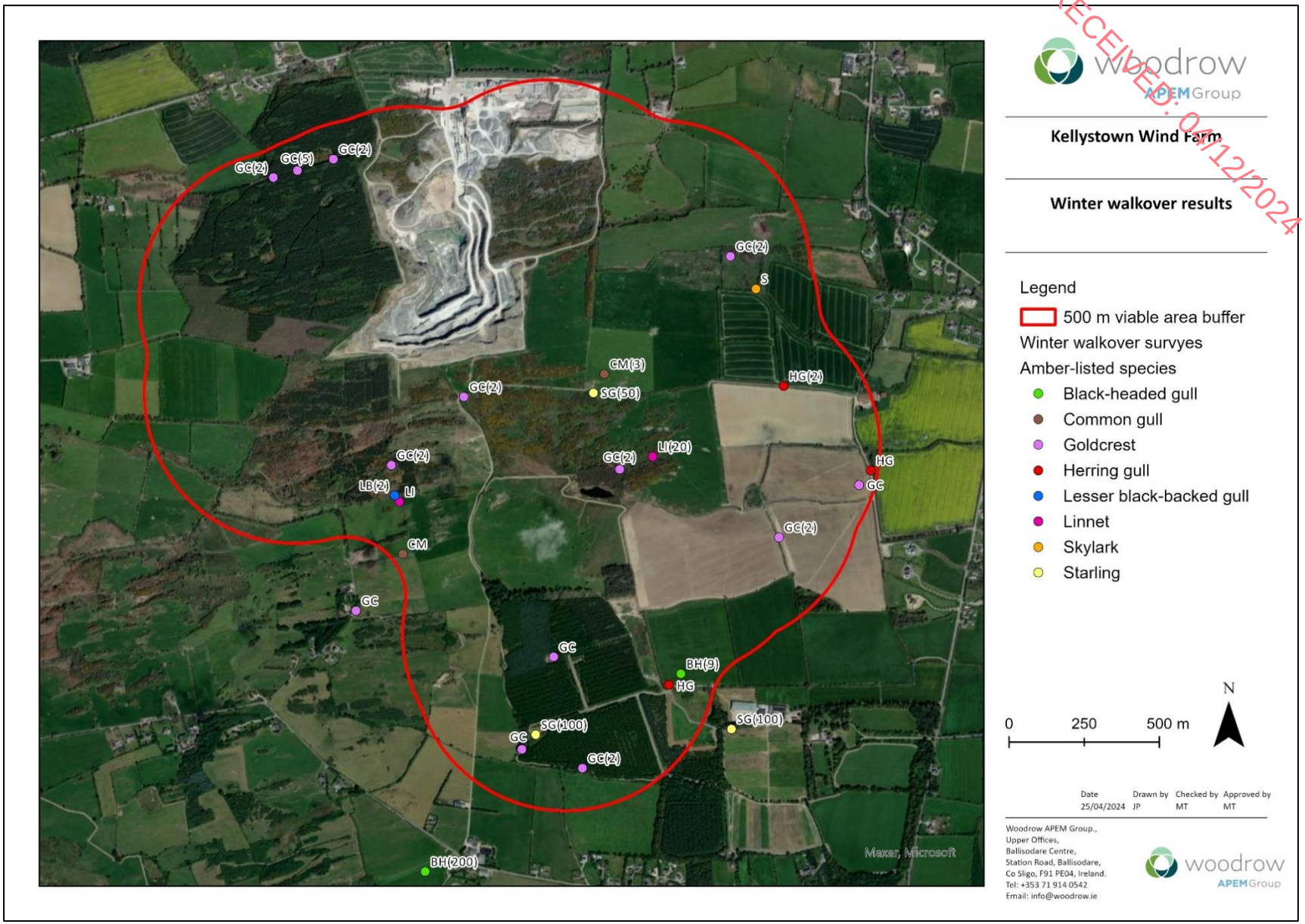


Figure 13: Amber-listed bird species recorded during site walkovers – winter 2021-22

5.5 Wider area wintering waterbird surveys

Table 14 lists the species and the number of individuals recorded on each visit for the wider area wintering waterbird surveys conducted over the 2021-22 non-breeding season. Figure 14, Figure 15 and Figure 16 show the aggregated distribution of red- and amber-listed species recorded during the Year 1 wider area wintering waterbird surveys.

From the survey results, a total of 19 species of waterbird were recorded and four raptor species. Notably no migratory swans or geese were recorded.

In terms of waterbird numbers and distribution, the monthly count data shows that gulls occur widely across the 2 km buffer and in notable numbers, particularly black-headed gulls (mean count: 589, max. 3,108) and common gulls (mean count: 171, max. 686) and to a lesser degree herring gulls (mean count: 43, max. 269) and lesser black-backed gulls (mean count: 7, max. 17).

The most regularly occurring wader species was lapwing (mean count: 400, max. 806); however unlike for gulls these flocks were generally recorded south of Dunleer, west of the M1 and over 2 km from the viable area. Small numbers of curlew (flocks ranging from 2 to 24 birds) were regularly picked up to the east of the viable area. Likewise, the records for black-tailed godwit (320 birds in February) and golden plover (250 birds in March) were recorded approximately 4 km south-east and north-east of the viable area, respectively. Interestingly, of these wader species only lapwing have not been recorded within or adjacent to the viable area, with curlew (1-28 birds, 9 obs), black-tailed godwit (90 birds, 1 obs) and golden plover (1-1,000 birds, 7 obs) recorded during VP watches in Year 1. The large golden plover flock (1,000 birds) and the only black-tailed godwit flock (90 birds) observed during VP watches were recorded in the area to the north of the 500 m viable area buffer - see maps in Appendix 2.

The other species listed in Table 14, were not considered to occur in notable numbers.

5.6 Hen harrier roost searches

No hen harrier roosts, or individual birds, were recorded during the targeted hen harrier roost searches, and/or during other surveys undertaken over winter 2021-22 within or adjacent to the 500 m viable area buffer. The historic roost site *c*. 2 km east of the viable area was not found to be occupied.

Roost searches covering potential habitat within the site did not record any additional noteworthy species, apart from wintering woodcock and of interest a roost survey covering Drumshallon Lough recorded four long-eared owls in the area.

Table 14: Bird counts for wintering waterbirds surveys – non-breeding season 2021-22

Month	September	October	October	November	December	December	January	February	February	March
Visit	1	2	3	4	5	6	7	8	9	10
Date(s)	13/09/2021	08/10/2021	21/10/2021	01&02/11/2021	02/12/2021	17/12/2021	21&25/01/2022	02,03,04/02/2022	22/02/2022	08/03/2022
Black-headed gull	89	379	494	3,108	187	179	361	524	293	271
Black-tailed godwit									320	
Common gull	3	7	138	140	44	5	113	375	197	686
Coot					1					
Cormorant							1	1		
Curlew		8	23	13			46		22	
Golden plover					1					250
Grey heron					1		1			
Herring gull	3	3	21	23		2	7	26	32	269
Kingfisher						1				1
Lapwing			69	74	536		806	516		
Lesser black-backed gull	15		6	17	2			2	2	6
Little egret					2					
Little grebe			1	6	5		4	4		10
Mallard					9		3	2		6
Moorhen			2	5	10		4	4		1
Mute swan			2	2						
Ruff			1							
Teal					8					
Raptor species										
Buzzard			9	20	4		9	2	2	6
Kestrel		1								
Merlin						1				
Sparrowhawk		1	2			1	1			2

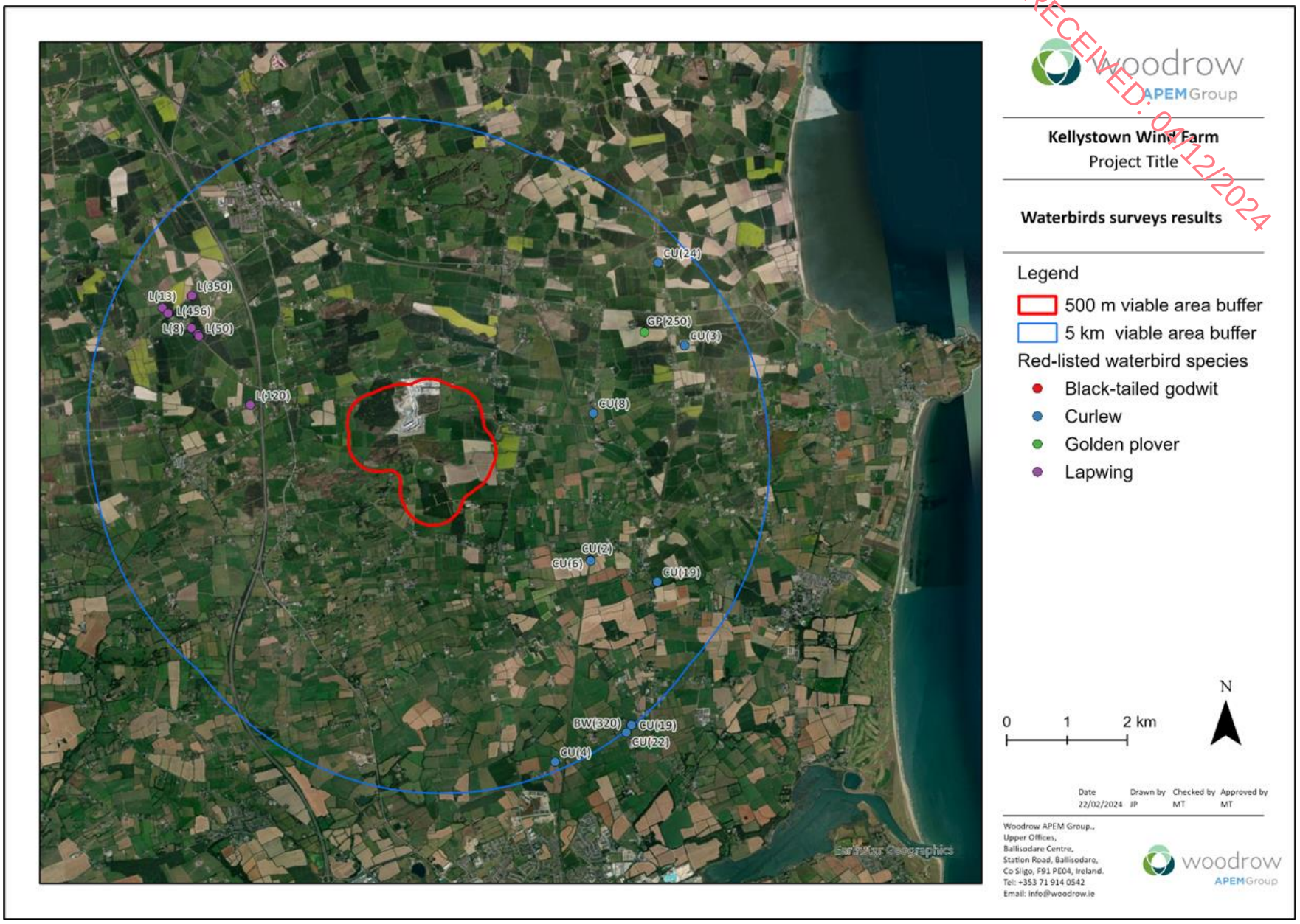


Figure 14: Wider area waterbird surveys – red-listed species – winter 2021-22

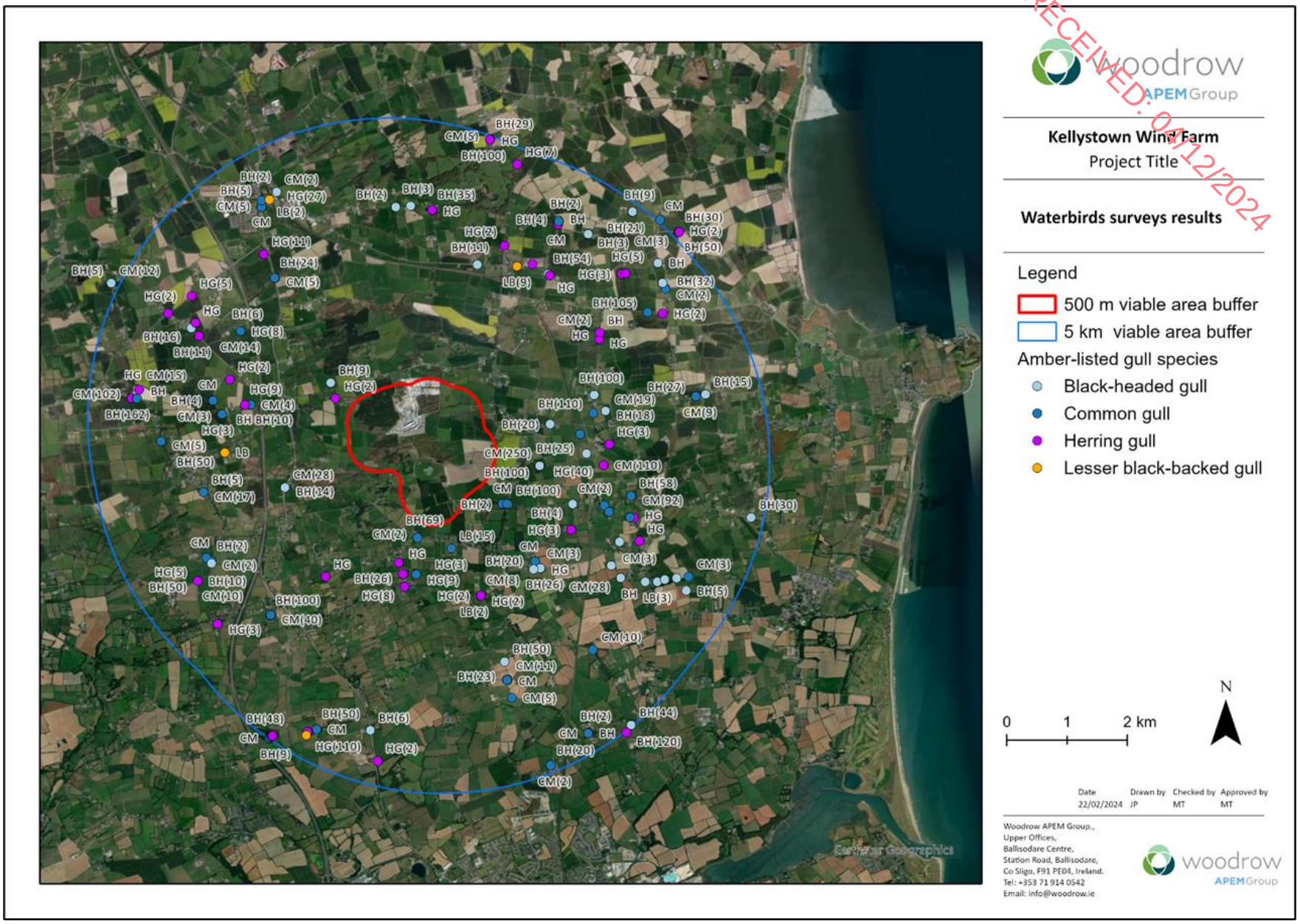
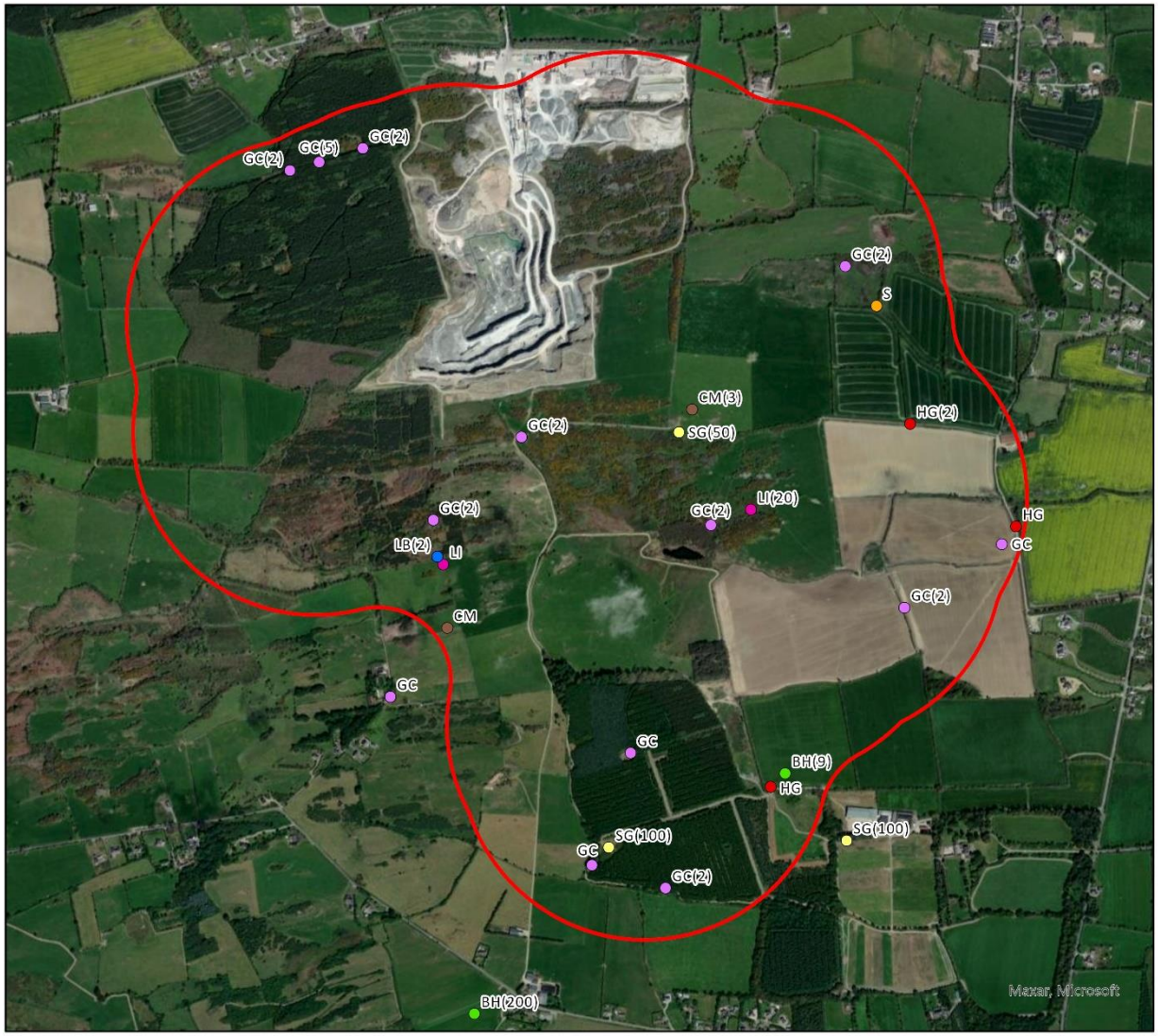


Figure 15: Wider area waterbird surveys – amber-listed gull species – winter 2021-22



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Kellystown Wind Farm

Winter walkover results

Legend

- 500 m viable area buffer

Winter walkover survyes

Amber-listed species

- Black-headed gull
- Common gull
- Goldcrest
- Herring gull
- Lesser black-backed gull
- Linnet
- Skylark
- Starling

N

0 250 500 m

Date	Drawn by	Checked by	Approved by
25/04/2024	JP	MT	MT

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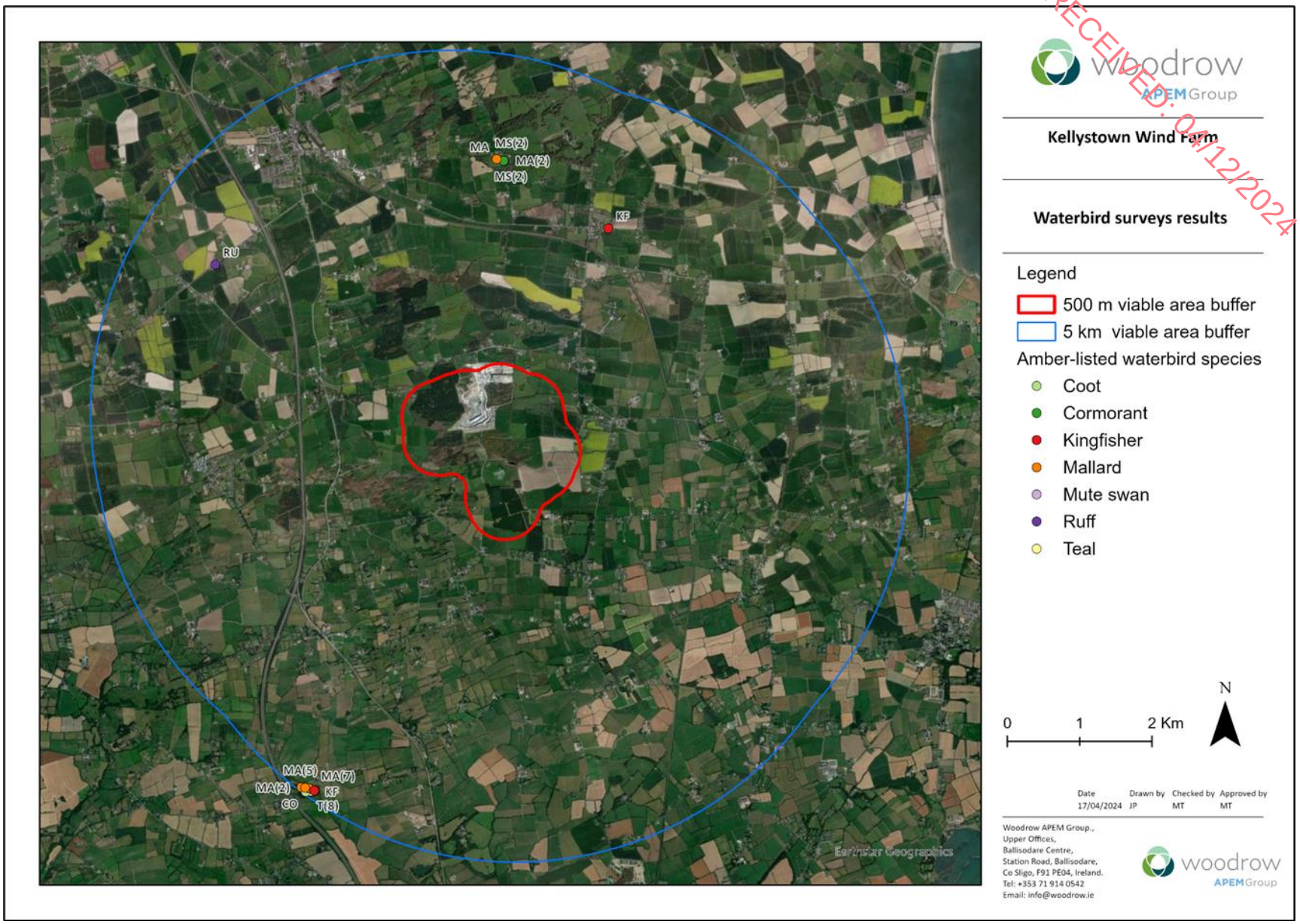

Figure 16: Wider area waterbird surveys – amber-listed other waterbird species – winter 2021-22

6 Main findings - species synopsis

The following sections provide a summary of the main findings from the Year 1 ornithological baseline study conducted for the proposed Kellystown Wind Farm, Co. Louth between September 2021 and August 2022 (Year 1).

6.1 Waterbirds

6.1.1 Swans, geese and ducks

During Year 1, the VP watches covering the 500 m viable area buffer did not record any goose flight activity, and none were detected in the wider area surveys extending out to 5 km. In particular, no greylag geese, as a SCI of nearby SPAs, were recorded. There were two whooper flight lines recorded, one in Nov-2021 and one in Mar-2022, both well east of the 500 m viable area buffer, involving small flocks (4 and 7 birds). There were no regular flight paths between roosts and foraging areas identified for this species, and no whooper swans were recorded during wider area surveys.

Small numbers of mallards were recorded during both the winter and breeding season within the 500 m viable area buffer. The wetland south of the quarry appears to be the only feature attracting this species into the site - Figure A2.8 in Appendix 2 shows mallard flight lines. Limited numbers of mute swan, mallard and teal were recorded during wider area wintering waterbird surveys. This result is a function of the low availability of wetland habitats in the wider area, especially larger waterbodies capable of supporting any significant concentrations of wintering waterbirds.

Based on Year 1 data, considering the notably low/non-existent swan, goose and duck activity overall, the proposed wind farm site as assessed (500 m viable area buffer) is not considered to pose any risk to populations of these bird species. Wider area surveys in conjunction with flight line data for the 500 m viable area buffer show that there is no ecological linkages with any SPAs designated for these species, in particular the greylag goose flock associated with the Stabannan-Braganstown SPA and Dundalk Bay SPA.

6.1.2 Waders

Three species of waders, including: black-tailed godwit, curlew and golden plover were recorded during VP watches and flight lines are shown in Figure A2.6 in Appendix 2. Most flights occurred beyond the 500 m viable area buffer and were associated with non-breeding birds. Of these three species, only curlew were recorded in small numbers utilising the wind farm site, i.e. recorded on the ground roosting or foraging. During the winter woodcock and snipe were recorded utilising the wind farm site. Snipe was the only wader species recorded breeding within the wind farm site.

Only one flock of black-tailed godwits (90 birds) was recorded during VP watches, and this was to the north of the 500 m viable area buffer. During wider areas survey, only a single black-tailed godwit flock was recorded approximately 4 km to the south-east of the 500 m viable area buffer. Based on Year 1 data, the proposed wind farm site as assesses (500 m viable area buffer) is not considered to pose any significant risk to black-tailed godwit.

Surveys indicate that the 500 m viable area buffer was periodically utilised by small flocks of curlew (< 30 birds) and during walkovers/dusk surveys small numbers were recorded in July and August. This late summer usage was not considered to be associated with breeding in the environs of the 500 m viable area buffer. While the largest flock (75 birds) was recorded commuting through the 500 m viable area buffer, this did not emerge as a regularly utilised flight path and the majority of the flight activity was recorded on the periphery of the 500 m viable area buffer, to the north-east and south-

west of the 500 m viable area buffer. Flocks of wintering curlew were regularly recorded occupying the wider area to the east of the 500 m viable area buffer. Based on Year 1 data, although the observed frequency of site usage and numbers recorded was relatively low for curlew, it is considered that the proposed wind farm site as assessed (500 m viable area buffer) poses a low level of potential risk to this species. Patterns of usage in Year 2 should be examined in conjunction with Year 1 to determine potential for likely significant effects.

There were seven golden plover flight observations recorded during VP watches, however much of the activity was beyond the 500 m viable area buffer and flocks were not frequently recorded in the wider area during wintering waterbird surveys. The largest flocks (500 and 1,000 birds) were recorded on the same day in March and were observed flying north-east of the 500 m viable area buffer. No birds were recorded utilising the 500 m viable area buffer for foraging or roosting and only three flights were observed within the 500 m viable area buffer, with small numbers recorded during each observation (1, 5 and 12 birds), which amounted to only 1% of the aggregated flight time as reported in Table 9. Based on Year 1 data, the proposed wind farm site as assessed (500 m viable area buffer) is not considered to pose any significant risk to golden plover.

Lapwing were only recorded during wider area surveys in Year 1 and were regularly recorded in the western periphery of the 5 km wider area over the winter. No lapwing was recorded within *c*. 2 km of the viable area. Based on Year 1 data, the proposed wind farm site as assessed (500 m viable area buffer) is not considered to pose a risk to lapwing.

The only breeding species of wader recorded was snipe. It is estimated that the 500 m viable area buffer supports to 2-3 territories centred around Drumshallon Lough and associated wetlands. No roding woodcock were detected during dusk surveys, although potentially suitable habitat does occur within the 500 m viable area buffer. Snipe and woodcock utilise the 500 m viable area buffer over the winter. Based on Year 1 data and in the absence of mitigation measures there is a potential risk of disturbance/displacement effects on breeding snipe due to the proposed wind farm site as assessed (500 m viable area buffer). It is considered that the proposed wind farm site as assessed (500 m viable area buffer) also poses a low level of potential risk to wintering snipe and woodcock utilising the 500 m viable area buffer, and in particular removal of tree/scrub cover represents habitat loss for wintering woodcock.

6.1.3 Gulls

Five species of gulls, were recorded during VP watches, including: black-headed gull, common gull, herring gull, great black-backed gull, and lesser black-backed gull. Flight lines are shown in Appendix 2, see Figure A2.1, Figure A2.2, Figure A2.3, Figure A2.4.

All these species are amber-listed, except for great black-backed gull, which is green-listed (Gilbert *et al*., 2021). Three of the species recorded are also listed as Special Conservation Interests (SCIs) of the Dundalk Bay SPA, located *c*. 8.5 km north-east of the viable area and is noted as supporting nationally important populations of three wintering gull species: black-headed gull (6,643), common gull (551) and herring gull (754). In addition, herring gull (609) is also listed as a SCI of the River Nanny Estuary and Shore SPA, located *c*. 12.7 km south-east from the viable area.

During Year 1, black-headed gulls (261 observations), common gulls (201 observations) and herring gulls (187 observations) emerged as some of the most frequently recorded target species (along with buzzards), both within the 500 m viable area buffer and across the wider area. As shown in Table 9, flight activity for black-headed gulls and common gulls was highest during the non-breeding season, with herring gull also exhibiting a similar pattern of higher winter usage, with significantly lower levels

of flight activity recorded during the breeding season. During the breeding season a high proportion of the gulls recorded were noted as sub-adult, which combined with the drop off in usage, indicates that gulls do not commute from breeding colonies to forage in the general area. Flock sizes of up to 278 birds (mean 21), 250 birds (mean 11), and 230 birds (mean 9) were recorded for black-headed gulls, common gulls and herring gulls, respectively. Lesser black-backed gulls were recorded less frequently (41 observations with flocks of up to 11 birds) and as would be expected only relatively small numbers of great black-backed gull were recorded (six observations with flocks of up to seven birds). As reported in Table 9, a significant proportion of flight time recorded for gulls during VP watches was beyond the 500 m turbine buffer based on the finalised proposed turbine layout (zone of influence for collision risk). Flight time beyond the zone of influence for collision is excluded from consideration within the CRMs for target species and the final analysis excluded flight time for black-headed gull (89%), common gull (76%), herring gull (51%) and lesser black-backed gull (44%) and great black-backed gull (32%).In Table 9, there is an entry for gull species. This includes observations when the type of gull could not be determined. Typically, this occurred due to a combination of distance from the observer, effects of glare and the composition of the flock being observed, especially when more distant flocks were birds in juvenile/sub-adult plumage and if occurring as mixed species gull flocks. For some instances when gull species were recorded, they were noted as suspected juvenile herring gulls and at times mixed herring gull/common gull flocks. While there were definitely flight paths within the 500 m viable area buffer, a high proportion of the time was recorded beyond this, and for instance, the 90,000 flight seconds attributed to the non-breeding season was generated entirely by an unidentified gull flock of *c*. 300 birds flying north of the quarry, i.e. beyond the 500 m viable area buffer. Overall, 63% of the flight time for unidentified gull species recorded during VP watches in Year 1 could be excluded from consideration within the CRM, as reported in Table 9.

In summary a significant proportion of gull flight activity occurred beyond the 500 m viable area buffer and these flight times, as incorporated in Table 9, will be excluded from the collision risk model, as they are considered beyond the zone of influence. Gull flights occurring within the wind farm site were associated with birds commuting through the area or with flocks foraging/roosting in agricultural fields. Improved grassland and tillage where the main habitats utilised by gulls within the wind farm site, however gulls are usually attracted to specific agricultural activities such as spreading of slurry, ploughing, and cutting of silage. Observations during wider area surveys show that gulls utilise the area surrounding the wind farm site extensively and the types of agricultural activities attracting these species inland are widely available.

Based on the density of use by gull species within the 500 m viable area buffer, there is potential for likely significant effects due to collision risk for black-headed gull, common gull and herring gull, and at a lower level lesser black-blacked gull and great black-backed gull. Collision risk modelling and examination of local/SPA populations will be required to determine the magnitude of effect, i.e., does the location of the proposed turbines present a collision risk that has the potential to exceed background levels of mortality. Based on the large extent of habitat availability in the wider area any potential displacement effects as a result of the proposed wind farm site as assessed (500 m viable area buffer) are not likely to affect gull populations significantly.

6.1.4 Other waterbird species

Grey heron were recorded 16 times during VP watches, with flight activity focused on Drumshallon Lough and associated wetlands to the west – see Appendix 2: Figure A2.7. As shown in Table 9, flight activity was highest over the winter (775 seconds) compared to the breeding season (188 seconds). This supports the observation from site walkovers that no heronries were located within or directly adjacent to the viable area. Therefore, while a certain level of collision risk may be predicted for grey

heron, it is anticipated that the proposed wind farm as assessed (500 m viable area buffer) will not pose a significant risk to the national grey heron population.

Little egrets were recorded less often than grey heron, with birds observed multiple times, but only on three survey dates – see Appendix 2: Table A2.8. As for grey heron, little egret flight activity was higher out of the breeding season and again no heronry was located. Drumshallon Lough, along with streams and drains provide foraging habitat for this species. Little egret can be under recorded, as birds tend to occur in low densities and are often obscured from view below the banks of rivers and drainage lines. Although little egret is listed as an Annex I species, it is green-listed in Ireland, as birds only recently colonised and the population size and range is expanding. Based on low recorded usage of the area during Year 1, the proposed wind farm site as assessed (500 m viable area buffer) is not considered important for this species.

Similar low densities of site usage were recorded for cormorant, with only five flight observations recorded during Year 1. Drumshallon Lough was considered too small to regularly support cormorant usage and the streams within the site were narrow and shallow. The flight observations were of birds commuting through the area, however no regularly utilised flight path emerged. Therefore, based on Year 1 data and the low-level flight activity recorded, the proposed development site as assessed (500 m viable area buffer) is not considered important for this species.

A pair of little grebes was confirmed as breeding within the 500 m viable area buffer and was utilising Drumshallon Lough. Water rail were recorded calling during dusk watches and moorhen were observed occasionally, and both species were noted as possibly breeding, with activity centred on Drumshallon Lough and associated wetlands. Any construction works that adversely affect these wetland habitats, e.g. altering water levels, has the potential to impact directly and indirectly on breeding little grebes, water rail and moorhen. As these species are green-listed, population level effects are not anticipated, and the magnitude of effect will be localised.

6.2 Birds of prey

Seven birds of prey including: buzzard, kestrel, merlin, peregrine, sparrowhawk, red kite, and long-eared owl were recorded during all surveys undertaken during Year 1. All these species are green-listed on the BoCCI list, with the exception of kestrel and red kite which are red-listed species, due to recent population decline in the Irish kestrel population and for red kite because birds have only recently been re-introduced to Ireland (Gilbert *et al*., 2021). Peregrine is also listed under Annex I of the Birds Directive (Gilbert *et al*., 2021). Details of breeding peregrine are contained within the Confidential Annex.

6.2.1 Buzzard

Over Year 1, buzzards were the most commonly recorded target species, with 271 observations recorded during VP watches - see Table 9 and flight line maps in Appendix 2: Figure A2.9 and Figure A2.10 .Typically, single birds were observed regularly foraging or commuting through the wind farm site, with occasionally up to five birds observed simultaneously. As shown in Figure 10, territorial behaviour was observed at several locations within the 2 km viable area buffer and based on early spring soaring behaviour and VP watch data, 3-4 possible territories were identified. Activity within the 500 m viable area buffer appeared to be linked to a pair possibly breeding in the plantation on the western side of the quarry, although territorial behaviour possibly by the same pair was also observed over the southern plantation. No successful breeding attempt was confirmed at either location.

Based on observed flight activity in Year 1, there is potential for likely significant effects to buzzards breeding locally, due to collision risk. Any inappropriately timed felling required for the proposed wind

farm site also has the potential to directly impact the pair identified as possibly breeding and will reduce the availability of nesting habitat. Overall, the magnitude of effect will be moderated by the green-listed conservation status of buzzard, which is based on the recent and continuing expansion of this species across Ireland (Lusby, 2011 and Lewis *et al*., 2019a). In addition, buzzards are a raptor species that exhibits relatively high fecundity and pairs typically have multiple nest site options within a breeding territory (Hardey *et al*., 2013), which can insulate a given pair from the effects of localised tree felling.

6.2.2 Sparrowhawk

During Year 1, a total of 57 sparrowhawk observations were recorded during VP watches - see Table 9 and flight line map in Appendix 2: Figure A2.11. Sparrowhawk were actively observed displaying in spring and two possible nesting territories were identified within the 500 m viable area buffer and, as for buzzard, observed breeding behaviour was linked to the plantation west of the quarry and the southern plantation – see Figure 10. The possible territory in the southern plantation was confirmed during VP watches from VP2, with young being fed by an adult at the nest. A further five possible sparrowhawk territories were identified within the 2 km buffer surround the viable area.

Typically, the majority of sparrowhawk flights are below the rotor swept area and predicted collision risk for this species is generally low. However, recent trends for turbines with lower rotor swept areas increases collision risk for this species. Based on observed flight activity in Year 1, there is potential for likely significant effects to sparrowhawks breeding locally, due to collision risk. Any inappropriately timed felling required for the proposed wind farm site also has the potential to directly impact the 1-2 pairs breeding and will reduce the availability of nesting habitat. Overall, the magnitude of effect will be moderated by the green-listed conservation status of sparrowhawk, which is based on the recently improved status in Ireland and apparent stabilisation of historic declines (Gilbert *et al*., 2021 and Lewis *et al*., 2019a). As with buzzards, sparrowhawks are a raptor species where pairs typically have multiple nest site options within a breeding territory (Hardey *et al*., 2013), which can insulate a given pair from the effects of localised tree felling.

6.2.3 Owls

Long-eared owls were the only owl species recorded during dusk surveys. Based on observed activity there was at least one pair within the 500 m viable area buffer. Long-eared owls were most active in the southern part of the wind farm site and were considered to be breeding in this area. There were also four birds recorded over the winter during a hen harrier roost survey covering Drumshallon Lough.

Any inappropriately timed felling required for the proposed wind farm site has the potential to directly impact breeding birds and will reduce the availability of nesting habitat. Due to low flight behaviour long-eared owls are generally considered to be at low risk of colliding with large turbines. However, as for sparrowhawk, recent trends for turbines with lower rotor swept areas may increase collision risk for this nocturnal species.

6.2.4 Other raptor species exhibiting low usage

Kestrel

As shown by the flight line map in Appendix 2: Figure A2.12, only two kestrel flights were observed during VP watches conducted over Year 1. A single foraging kestrel was also recorded during breeding season walkover surveys. No breeding or territorial behaviour was observed for this species within the 500 m viable area buffer or surrounding area. Based on Year 1 surveys, considering the low number of kestrel observations the proposed wind farm site as assessed (500 m viable area buffer) is not considered to pose a risk to local kestrel populations. It is worth noting that the recent population

decline reported for this species has been accompanied by a shift in abundance from the northern to the southern half the country, which may explain the low number of records for the 500 m viable area buffer (Balmer *et al*., 2013).

Merlin

Over Year 1, merlin was only recorded once within the 500 m viable area buffer, with a single bird recorded during a winter VP watch – see Appendix 2: Figure A2.12. The proposed wind farm site as assessed (500 m viable area buffer) had no suitable nesting habitat for breeding merlin and this lack of suitable breeding habitat was mirrored in the wider area. The limited availability of wetland habitats attracting large concentration of wintering waterbirds in the general area is also likely to limit merlin usage over the winter. Therefore, based on Year 1 data, the proposed wind farm site as assessed (500 m viable area buffer) and surrounding area was not found to be important for merlin and the proposed wind farm site as assessed (500 m viable area buffer) is not considered to pose a risk to the national merlin population.

Red kite

Over Year 1, red kite was only recorded once in the vicinity of the viable area, with a single bird recorded heading west over the quarry during a winter VP watch – see Appendix 2: Figure A2.12. There were no records of red kite in the wider area and sightings in Co. Louth are still considered relatively uncommon. Therefore, the proposed wind farm site as assessed (500 m viable area buffer) is not considered to pose a risk to the national red kite population.

Hen harrier

During Year 1, no hen harriers were recorded during VP watches and no breeding or roosting activity was recorded within the 2 km viable area buffer. In addition, the habitat availability within both the 500 m and 2 km buffers was assessed as having very limited potential suitability for breeding hen harriers. This assessment is supported by the lack of breeding hen harrier in this region (see Balmer *et al*., 2013, Ruddock *et al*., 2016). Therefore, based on the lack of records during Year 1, the proposed wind farm as assessed (500 m viable area buffer) site is not considered to pose a risk to the national hen harrier population.

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Appendix 1 – BTO Species Codes

BTO SPECIES CODES

AC	Arctic Skua	GA	Gadwall	LE	Long-eared Owl	SM	Sand Martin
AE	Arctic Tern	GX	Gannet	LT	Long-tailed Tit	SS	Sanderling
AV	Avocet	GW	Garden Warbler	MG	Magpie	TE	Sandwich Tern
BO	Barn Owl	GY	Garganey	MA	Mallard	VI	Savi's Warbler
BY	Barnacle Goose	GC	Goldcrest	MN	Mandarin Duck	SQ	Scarlet Rosefinch
BA	Bar-tailed Godwit	EA	Golden Eagle	MX	Manx Shearwater	SP	Scaup
BR	Bearded Tit	OL	Golden Oriole	MR	Marsh Harrier	CY	Scottish Crossbill
BS	Berwick's Swan	GF	Golden Pheasant	MT	Marsh Tit	SW	Sedge Warbler
BI	Bittern	GP	Golden Plover	MW	Marsh Warbler	NS	Serin
BK	Black Grouse	GN	Goldeneye	MP	Meadow Pipit	SA	Shag
TY	Black Guillemot	GO	Goldfinch	MU	Mediterranean Gull	SU	Shelduck
BX	Black Redstart	GD	Goosander	ML	Merlin	SX	Shorelark
BJ	Black Tern	GI	Goshawk	M.	Mistle Thrush	SE	Short-eared Owl
B.	Blackbird	GH	Grasshopper Warbler	MO	Montagu's Harrier	SV	Shoveler
BC	Blackcap	GB	Great Black-backed Gull	MH	Moorhen	SK	Siskin
BH	Black-headed Gull	GG	Great Crested Grebe	MS	Mute Swan	S.	Skylark
BN	Black-necked Grebe	ND	Great Northern Diver	N.	Nightingale	SZ	Slavonian Grebe
BW	Black-tailed Godwit	NX	Great Skua	NJ	Nightjar	SN	Snipe
BV	Black-throated Diver	GS	Great Spotted Woodpecker	NH	Nuthatch	SB	Snow Bunting
BT	Blue Tit	GT	Great Tit	OP	Osprey	ST	Song Thrush
BU	Bluethroat	GE	Green Sandpiper	OC	Oystercatcher	SH	Sparrowhawk
BL	Brambling	G.	Green Woodpecker	PX	Peafowl/Peacock	AK	Spotted Crake
BG	Brent Goose	GR	Greenfinch	PE	Peregrine	SF	Spotted Flycatcher
BF	Bullfinch	GK	Greenshank	PH	Pheasant	DR	Spotted Redshank
BZ	Buzzard	H.	Grey Heron	PF	Pied Flycatcher	SG	Starling
CG	Canada Goose	P.	Grey Partridge	PW	Pied Wagtail	SD	Stock Dove
CP	Capercaillie	GV	Grey Plover	PG	Pink-footed Goose	SC	Stonechat
C.	Carrion Crow	GL	Grey Wagtail	PT	Pintail	TN	Stone-curlew
CW	Cetti's Warbler	GJ	Greylag Goose	PO	Pochard	TM	Storm Petrel
CH	Chaffinch	GU	Guillemot	PM	Ptarmigan	SL	Swallow
CC	Chiffchaff	FW	Guineafowl (Helmeted)	PU	Puffin	SI	Swift
CF	Chough	HF	Hawfinch	PS	Purple Sandpiper	TO	Tawny Owl
CL	Cirl Bunting	HH	Hen Harrier	Q.	Quail	T.	Teal
CT	Coal Tit	HG	Herring Gull	RN	Raven	TK	Temminck's Stint
CD	Collared Dove	HY	Hobby	RA	Razorbill	TP	Tree Pipit
CM	Common Gull	HZ	Honey Buzzard	RG	Red Grouse	TS	Tree Sparrow
CS	Common Sandpiper	HC	Hooded Crow	KT	Red Kite	TC	Treecreeper
CX	Common Scoter	HP	Hoopoe	ED	Red-backed Shrike	TU	Tufted Duck
CN	Common Tern	HM	House Martin	RM	Red-breasted Merganser	TT	Turnstone
CO	Coot	HS	House Sparrow	RQ	Red-crested Pochard	TD	Turtle Dove
CA	Cormorant	JD	Jackdaw	FV	Red-footed Falcon	TW	Twite
CB	Corn Bunting	J.	Jay	RL	Red-legged Partridge	WA	Water Rail
CE	Corncrake	K.	Kestrel	NK	Red-necked Phalarope	W.	Wheatear
CI	Crested Tit	KF	Kingfisher	LR	Redpoll (Lesser)	WM	Whimbrel
CR	Crossbill (Common)	KI	Kittiwake	RK	Redshank	WC	Whinchat
CK	Cuckoo	KN	Knot	RT	Redstart	WG	White-fronted Goose
CU	Curlew	LM	Lady Amherst's Pheasant	RH	Red-throated Diver	WH	Whitethroat
DW	Dartford Warbler	LA	Lapland Bunting	RE	Redwing	WS	Whooper Swan
DI	Dipper	L.	Lapwing	RB	Reed Bunting	WN	Wigeon
DO	Dotterel	TL	Leach's Petrel	RW	Reed Warbler	WT	Willow Tit
DN	Dunlin	LB	Lesser Black-backed Gull	RZ	Ring Ouzel	WW	Willow Warbler
D.	Dunnock	LS	Lesser Spotted Woodpecker	RP	Ringed Plover	OD	Wood Sandpiper
EG	Egyptian Goose	LW	Lesser Whitethroat	RI	Ring-necked Parakeet	WO	Wood Warbler
E.	Eider	LI	Linnet	R.	Robin	WK	Woodcock
FP	Feral Pigeon	ET	Little Egret	DV	Rock Dove (not feral)	WL	Woodlark
ZL	Feral/hybrid goose	LG	Little Grebe	RC	Rock Pipit	WP	Woodpigeon
ZF	Feral/hybrid mallard type	LU	Little Gull	RO	Rook	WR	Wren
FF	Fieldfare	LO	Little Owl	RS	Roseate Tern	WY	Wryneck
FC	Firecrest	LP	Little Ringed Plover	RY	Ruddy Duck	YW	Yellow Wagtail
F.	Fulmar	AF	Little Tern	RU	Ruff	Y.	Yellowhammer

Appendix 2 – Year 1 flight line data for target species

List of figures

List of Tables

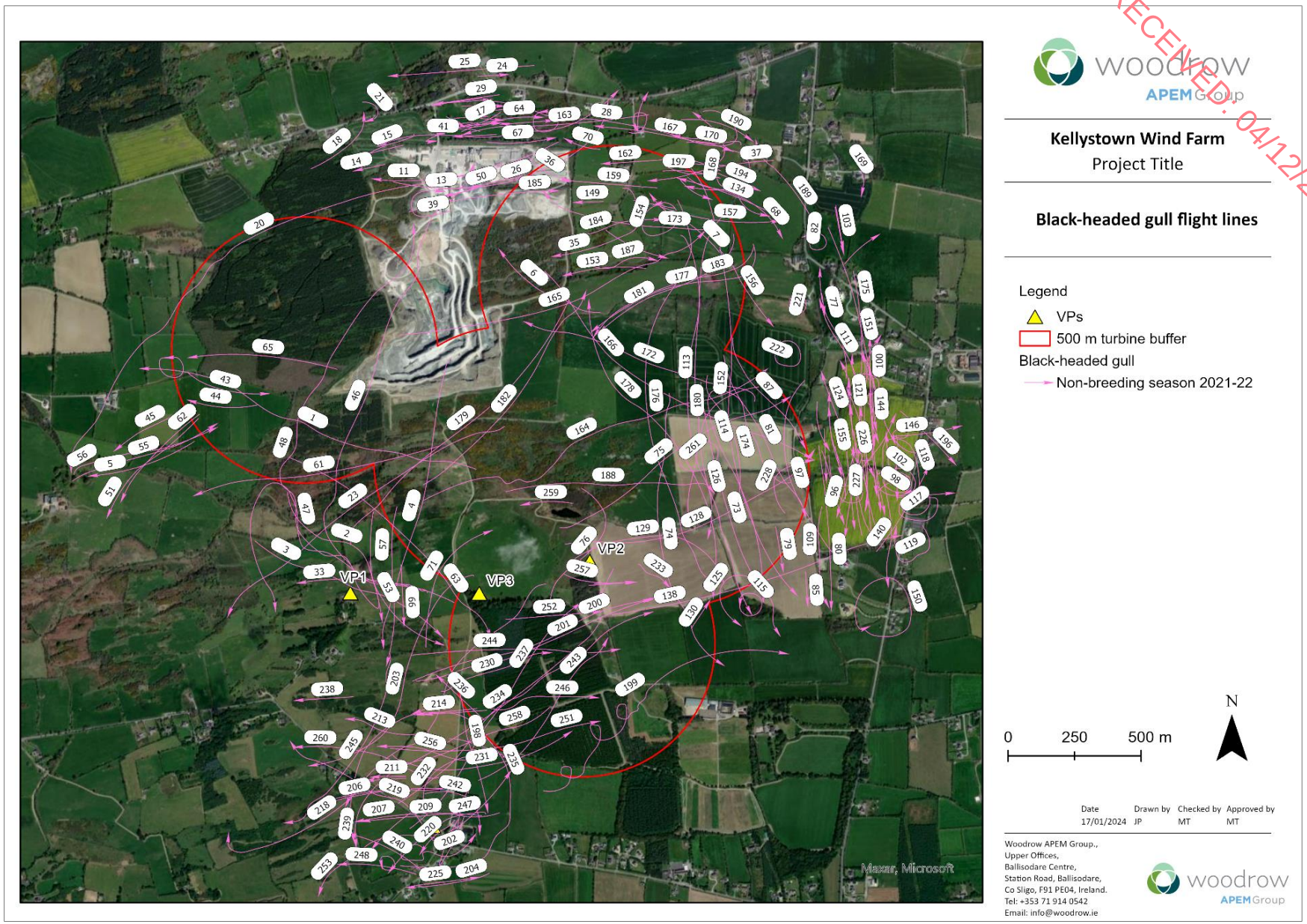

Figure A2.1: Black-headed gull flight lines

Table A2.1 VP watch data for black-headed gull

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	1	13/09/2021	1058	BH	Black-headed gull	16	110	25	15-35			Commuting	
2	1	13/09/2021	1109	BH	Black-headed gull	1	65	20				Commuting	
3	1	13/09/2021	1135	BH	Black-headed gull	2	75	20	15-15			Commuting	
4	1	17/09/2021	823	BH	Black-headed gull	1	140	25	15-35			Commuting	
5	1	04/10/2021	915	BH	Black-headed gull	37	80	30			Ad, Juv	Flying	Mixed flock with Common Gulls, flying W
6	1	04/10/2021	943	BH	Black-headed gull	3	47	30			2 Ad, 1 Juv	Flying	Flying NW
7	1	04/10/2021	950	BH	Black-headed gull	3	42	20			Ad	Flying	Flying W
8	1	04/10/2021	1001	BH	Black-headed gull	3	140	30			Ad	Flying	Flying SE
9	1	04/10/2021	1022	BH	Black-headed gull	2	8	20			Ad	Flying	Flying W
10	1	08/10/2021	1118	BH	Black-headed gull	1	40	40			Ad	Flying	Flying W
11	1	08/10/2021	1302	BH	Black-headed gull	18	30	40				Flying	Flying W
12	1	08/10/2021	1328	BH	Black-headed gull	10	20	50				Flying	Flying W
13	1	08/10/2021	1334	BH	Black-headed gull	3	50	50			Ad	Flying	Flying W
14	1	08/10/2021	1338	BH	Black-headed gull	7	35	60	60-40			Circling	Circling, then drifted W and down
15	1	08/10/2021	1346	BH	Black-headed gull	12	30	40				Flying	Flying W
16	1	09/11/2021	1000	BH	Black-headed gull	17	60	30				Flying	Regular flights along R170.
17	1	09/11/2021	1053	BH	Black-headed gull	48	370	60	30-100			Circling	Circling and drifting E, some turned back W and the rest continued
18	1	09/11/2021	1106	BH	Black-headed gull	1	50	40				Flying	Flying NE
19	1	09/11/2021	1125	BH	Black-headed gull	55	246	50	30-80			Circling	Circling, drifting E
20	1	09/11/2021	1129	BH	Black-headed gull	6	340	30				Flying	Popped up over quarry, flying W
21	1	09/11/2021	1143	BH	Black-headed gull	10	65	40				Circling	Circling out from behind trees, but soon drifted back in again
22	1	09/11/2021	1148	BH	Black-headed gull	56	60	50	40-60			Flying	Flying
23	1	09/11/2021	1150	BH	Black-headed gull	17	90	20				Flying	Flying W, turned S
24	1	09/11/2021	1225	BH	Black-headed gull	1	30	40				Flying	Flying E
25	1	17/11/2021	1401	BH	Black-headed gull	22	140	30				Flying	Flying slowly W, quite distant
26	1	17/11/2021	1421	BH	Black-headed gull	1	140	120	20-120			Circling	Drifting E, then N, dropping
27	1	17/11/2021	1443	BH	Black-headed gull	1	90	50	50-80			Flying	Flying E, then circled, getting more distant
28	1	01/12/2021	837	BH	Black-headed gull	200	600	30				Flying	Flying about, ultimately W
29	1	01/12/2021	915	BH	Black-headed gull	100	180	30				Flying	Flying W, quite distant
30	1	01/12/2021	931	BH	Black-headed gull	2	20	30				Flying	Flying E
31	1	01/12/2021	941	BH	Black-headed gull	1	20	30				Flying	Flying E
32	1	01/12/2021	1013	BH	Black-headed gull	5	20	20				Flying	Flying E
33	1	01/12/2021	1039	BH	Black-headed gull	40	156	20				Flying	Flying from S to join HG flock, then split, some flew W or N
34	1	01/12/2021	1058	BH	Black-headed gull	2	40	20				Flying	Flying E
35	1	01/12/2021	1100	BH	Black-headed gull	1	52	10			Juv	Flying	Flying low over fields
36	1	01/12/2021	1110	BH	Black-headed gull	4	32	20				Flying	Flying E
37	1	01/12/2021	1119	BH	Black-headed gull	6	170	20				Flying	Flying W
38	1	07/01/2022	952	BH	Black-headed gull	11	68	30				Flying	Flying back & forth, beyond quarry
39	1	07/01/2022	1003	BH	Black-headed gull	2	40	20				Flying	Flying over quarry

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
40	1	07/01/2022	1035	BH	Black-headed gull	3	25	30				Flying	Flying back & forth
41	1	07/01/2022	1145	BH	Black-headed gull	1	43	30				Flying	Flying W
42	1	07/01/2022	1200	BH	Black-headed gull	49	40	10	0-10-0			Flying	Flew up from field, circled, back down again
43	1	07/01/2022	1210	BH	Black-headed gull	49	70	10	0-10-0			Flying	Flew from one field to another
44	1	07/01/2022	1215	BH	Black-headed gull	49	30	5	0-5-0			Flying	Relocated field again
45	1	07/01/2022	1228	BH	Black-headed gull	49	25	5	0-5-0			Flying	Relocating
46	1	10/01/2022	1240	BH	Black-headed gull	3	150	40				Circling	Flew about field beside VP, then away S, circled quarry
47	1	10/01/2022	1245	BH	Black-headed gull	2	90	40				Circling	Flew in from E, then away S, circling for a bit
48	1	10/01/2022	1245	BH	Black-headed gull	1	90	20				Flying	Flew in with previous 2 birds but then headed N
49	1	10/01/2022	1255	BH	Black-headed gull	1	10	30	30-20			Flying	Flying W
50	1	10/01/2022	1318	BH	Black-headed gull	1	10	30				Flying	Flying E
51	1	10/01/2022	1341	BH	Black-headed gull	14	30	5				Flying	Feeding in field, relocated to another
52	1	10/01/2022	1433	BH	Black-headed gull	2	70	40	40-20			Circling	In distance, beyond quarry, then dropped
53	1	10/01/2022	1440	BH	Black-headed gull	6	78	20	30-20			Flying	Flying SE
54	1	10/01/2022	1446	BH	Black-headed gull	1	7	20				Flying	Flying E
55	1	10/01/2022	1457	BH	Black-headed gull	64	30	10	10-0			Flying	Flying in to feed in field
56	1	10/01/2022	1502	BH	Black-headed gull	64	30	10	0-10-0			Flying	Flew up and about, then relocated to another field
57	1	10/01/2022	1504	BH	Black-headed gull	4	50	20				Flying	Flying S, low over field to E of VP
58	1	02/02/2022	1313	BH	Black-headed gull	17	40	30				Flying	Flying W
59	1	02/02/2022	1324	BH	Black-headed gull	12	100	50				Circling	Circling & drifting further away
60	1	02/02/2022	1329	BH	Black-headed gull	6	40	30				Flying	Flying W
61	1	07/02/2022	937	BH	Black-headed gull	7	100	20				Flying	Flying W
62	1	07/02/2022	955	BH	Black-headed gull	47	45	10				Flying	Relocating field
63	1	07/02/2022	1011	BH	Black-headed gull	2	55	30				Flying	Flying S
64	1	07/02/2022	1037	BH	Black-headed gull	2	30	30				Flying	Flying E
65	1	07/02/2022	1052	BH	Black-headed gull	2	45	20	20-30-20			Flying	Flying W
66	1	07/02/2022	1103	BH	Black-headed gull	1	20	10				Flying	Flying S
67	1	13/03/2022	1446	BH	Black-headed gull	60	25	30				Flying	Moving E
68	1	13/03/2022	1504	BH	Black-headed gull	80	75	30				Flying	Flying S
69	1	13/03/2022	1552	BH	Black-headed gull	75	300	30				Circling	Flying W, then circled, then departed E in large stream
70	1	13/03/2022	1632	BH	Black-headed gull	50	150	40	20-40-20			Flying	Flying about, clumping upwards, then dropping
71	1	13/03/2022	1645	BH	Black-headed gull	2	50	40				Flying	Flying NE
72	1	13/03/2022	1613	BH	Black-headed gull	7	45	20				Flying	Flying W
73	2	16/09/2021	837	BH	Black-headed gull	2	120	20	15-20			Commuting	
74	2	16/09/2021	920	BH	Black-headed gull	1	135	25	20-30			Commuting	
75	2	16/09/2021	946	BH	Black-headed gull	1	120	35	30-40			Commuting	
76	2	23/09/2021	807	BH	Black-headed gull	9	135	20				Commuting	
77	2	04/10/2021	1102	BH	Black-headed gull	13	125	20			Ad	Flying	Flying N
78	2	04/10/2021	1123	BH	Black-headed gull	1	60	40	20-40		Ad	Flying	Flying N
79	2	04/10/2021	1129	BH	Black-headed gull	1	16	30			Ad	Flying	Flying S
80	2	04/10/2021	1135	BH	Black-headed gull	11	140	30			Ad	Flying	Flying S
81	2	04/10/2021	1141	BH	Black-headed gull	3	117	50	40-50		Ad	Flying	Flying S
82	2	04/10/2021	1120	BH	Black-headed gull	1	20	40			Ad	Flying	Flying S

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
83	2	04/10/2021	1211	BH	Black-headed gull	1	59	30			Ad	Flying	Flying N
84	2	04/10/2021	1219	BH	Black-headed gull	3	53	30			Ad	Flying	Flying S
85	2	04/10/2021	1229	BH	Black-headed gull	8	45	20			Ad	Flying	Flying S
86	2	04/10/2021	1234	BH	Black-headed gull	1	5	20			Ad	Flying	Flying down behind trees
87	2	04/10/2021	1255	BH	Black-headed gull	4	49	30			Ad	Flying	Flying S
88	2	04/10/2021	1306	BH	Black-headed gull	11	90	40			Ad	Flying	Flying S
89	2	04/10/2021	1322	BH	Black-headed gull	3	110	30	30-100		Ad	Flying	Flying S, one then circled up quite high
90	2	04/10/2021	1328	BH	Black-headed gull	5	40	20			Ad	Flying	Flying S
91	2	04/10/2021	1344	BH	Black-headed gull	1	50	80	40-80		Ad	Circling	
92	2	07/10/2021	1437	BH	Black-headed gull	1	35	30			Ad	Flying	Flying S
93	2	07/10/2021	1521	BH	Black-headed gull	1	28	30			Ad	Flying	Flying S
94	2	07/10/2021	1544	BH	Black-headed gull	17	210	40	40-20		Ad	Flying	Flying S
95	2	07/10/2021	1630	BH	Black-headed gull	2	50	30			Ad	Flying	Flying back & forth
96	2	07/10/2021	1639	BH	Black-headed gull	30	60	40	20-40		Ad	Flying	Flying N
97	2	07/10/2021	1655	BH	Black-headed gull	1	150	50	30-50-20		Ad	Flying	Flying S
98	2	10/11/2021	1334	BH	Black-headed gull	16	240	40	30-60			Circling	Drifting E
99	2	10/11/2021	1342	BH	Black-headed gull	4	75	30				Flying	Flying S
100	2	10/11/2021	1350	BH	Black-headed gull	12	300	30				Flying	Flying back and forth
101	2	10/11/2021	1414	BH	Black-headed gull	29	30	20				Flying	Flying S
102	2	10/11/2021	1419	BH	Black-headed gull	11	90	40				Circling	Drifting N
103	2	10/11/2021	1425	BH	Black-headed gull	2	36	20				Flying	Flying N
104	2	10/11/2021	1438	BH	Black-headed gull	8	30	20				Flying	Flying N
105	2	10/11/2021	1515	BH	Black-headed gull	1	14	20				Flying	Flying N
106	2	10/11/2021	1549	BH	Black-headed gull	3	80	40				Flying	Flying NE
107	2	16/11/2021	1009	BH	Black-headed gull	36	45	30				Flying	Flying N
108	2	16/11/2021	1027	BH	Black-headed gull	25	45	30				Flying	Flying N
109	2	16/11/2021	1135	BH	Black-headed gull	88	240	40	20-50			Circling	Flew up, circled, then flew N & down
110	2	16/11/2021	1143	BH	Black-headed gull	270	200	30				Flying	Circling for a bit, then streaming N
111	2	16/11/2021	1152	BH	Black-headed gull	233	480	30	20-50			Flying	Up again & flying about
112	2	16/11/2021	1156	BH	Black-headed gull	9	50	60				Flying	Flying N to join other gulls
113	2	16/11/2021	1203	BH	Black-headed gull	128	180	50	20-60			Flying	Flying up, circling, drifting E, then N
114	2	16/11/2021	1220	BH	Black-headed gull	67	120	20				Flying	Flying S
115	2	16/11/2021	1247	BH	Black-headed gull	278	360	20				Flying	Flying about
116	2	16/11/2021	1050	BH	Black-headed gull	200	600	30	20-60			Circling	Flew up from field, circling, drifting S
117	2	03/12/2021	939	BH	Black-headed gull	100	330	40	20-50			Circling	Column of gulls, circling then headed N.
118	2	03/12/2021	950	BH	Black-headed gull	250	480	30	20-40			Flying	Mass of gulls up from field, flew N then back S.
119	2	03/12/2021	1017	BH	Black-headed gull	30	210	30	20-40			Flying	Circling & flying about, S & then back N again
120	2	03/12/2021	1055	BH	Black-headed gull	50	180	30	20-40			Flying	Flying & circling
121	2	03/12/2021	1117	BH	Black-headed gull	3	45	20				Flying	Flying N
122	2	03/12/2021	1159	BH	Black-headed gull	4	30	20				Flying	Flying S
123	2	06/12/2021	1258	BH	Black-headed gull	7	120	30				Flying	Flying about
124	2	06/12/2021	1332	BH	Black-headed gull	1	36	20				Flying	Flying N
125	2	06/12/2021	1346	BH	Black-headed gull	4	40	30				Flying	Circling above trees, then away S

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
126	2	06/12/2021	1408	BH	Black-headed gull	1	165	40				Flying	Flying S
127	2	06/12/2021	1421	BH	Black-headed gull	2	25	20	30-40-30			Flying	Flying about
128	2	06/12/2021	1457	BH	Black-headed gull	1	80	40				Flying	Flying E
129	2	06/12/2021	1525	BH	Black-headed gull	1	20	40				Flying	Flying E, then S
130	2	06/12/2021	1545	BH	Black-headed gull	2	65	10				Flying	Flying out of field and E
131	2	12/01/2022	1009	BH	Black-headed gull	3	45	30				Flying	Flying S
132	2	12/01/2022	1058	BH	Black-headed gull	3	35	30				Flying	Flying N
133	2	12/01/2022	1133	BH	Black-headed gull	3	45	20			Ad	Flying	Flying about
134	2	12/01/2022	1156	BH	Black-headed gull	1	35	20			Ad	Flying	Flying W
135	2	12/01/2022	1220	BH	Black-headed gull	2	10	20			Ad	Flying	Flying SW
136	2	12/01/2022	1244	BH	Black-headed gull	4	45	20			Ad	Flying	Flying S
137	2	12/01/2022	1250	BH	Black-headed gull	3	50	20			Ad	Flying	Flying S
138	2	20/01/2022	1349	BH	Black-headed gull	6	110	40	30-40			Flying	Flying E
139	2	20/01/2022	1432	BH	Black-headed gull	3	195	30				Flying	Flying S
140	2	20/01/2022	1458	BH	Black-headed gull	3	250	40				Flying	Flying NE
141	2	20/01/2022	1545	BH	Black-headed gull	1	90	30			Juv	Flying	Flying NE
142	2	04/02/2022	1412	BH	Black-headed gull	50	250	20	20-40			Flying	Flying about, then down
143	2	04/02/2022	1425	BH	Black-headed gull	95	270	20	20-40			Flying	Flying about, then down
144	2	04/02/2022	1446	BH	Black-headed gull	95	230	20				Flying	Up again
145	2	04/02/2022	1512	BH	Black-headed gull	20	60	20				Flying	Flying about
146	2	04/02/2022	1546	BH	Black-headed gull	9	75	50	20-50			Circling	Flew up circling, drifting away E
147	2	04/02/2022	1600	BH	Black-headed gull	180	210	40				Circling	Flying about, circling, moving further away
148	2	13/03/2022	1130	BH	Black-headed gull	15	60	20				Flying	Flying about fields E of road
149	2	13/03/2022	1150	BH	Black-headed gull	1	10	10			Juv	Flying	Flying W
150	2	13/03/2022	1224	BH	Black-headed gull	2	510	20	0-20			Flying	Flew up from earlier, similar to 10:25
151	2	13/03/2022	1255	BH	Black-headed gull	1	180	20				Flying	Flying S
152	2	13/03/2022	1312	BH	Black-headed gull	115	660	20	30-20			Circling	Flew in from N, circled, attempted to land, then up and away
153	3	04/10/2021	1425	BH	Black-headed gull	1	45	40	40-30		Ad	Circling	Flying W
154	3	04/10/2021	1432	BH	Black-headed gull	1	20	50			Ad	Circling	Circling near HG, then dropped
155	3	04/10/2021	1458	BH	Black-headed gull	2	29	20			Ad	Circling	Flying N
156	3	04/10/2021	1502	BH	Black-headed gull	2	58	30			Ad	Circling	Flying SW
157	3	04/10/2021	1518	BH	Black-headed gull	1	240	40			Ad	Circling	Flying E
158	3	04/10/2021	1518	BH	Black-headed gull	2	20	30			Ad	Circling	Flying W
159	3	04/10/2021	1531	BH	Black-headed gull	5	90	30	30-20		Ad	Circling	Flying W
160	3	04/10/2021	1550	BH	Black-headed gull	2	30	40			Ad	Flying	Flying W
161	3	04/10/2021	1610	BH	Black-headed gull	1	40	40			Ad	Flying	Flying E
162	3	04/10/2021	1645	BH	Black-headed gull	3	80	50	50-30		Ad	Flying	Flying W
163	3	04/10/2021	1651	BH	Black-headed gull	2	105	30			Ad	Flying	Flying W
164	3	23/09/2021	1751	BH	Black-headed gull	1	110	35	25-40			Commuting	
165	3	23/09/2021	1827	BH	Black-headed gull	6	95	50				Commuting	
166	3	23/09/2021	1909	BH	Black-headed gull	38	120	60	55-70			Commuting	
167	3	07/10/2021	1102	BH	Black-headed gull	12	120	30			11 Ad, 1 Juv	Flying	Flying W
168	3	10/11/2021	1041	BH	Black-headed gull	51	150	30	30-80			Flying	Circling & flying N

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
169	3	10/11/2021	1229	BH	Black-headed gull	66	150	40	30-50			Flying	Initially circling, then flew S
170	3	16/11/2021	1335	BH	Black-headed gull	10	110	30				Flying	Flying back & forth
171	3	16/11/2021	1410	BH	Black-headed gull	14	80	30				Flying	Flying E
172	3	03/12/2021	1258	BH	Black-headed gull	1	53	30	30-0		Juv	Flying	Flew across buffer zone, landed in cow field
173	3	03/12/2021	1425	BH	Black-headed gull	19	97	20				Flying	Flying W
174	3	06/12/2021	929	BH	Black-headed gull	5	45	20				Flying	Flying S
175	3	06/12/2021	931	BH	Black-headed gull	5	195	30				Flying	Flying S
176	3	06/12/2021	959	BH	Black-headed gull	2	120	30				Flying	Flying S
177	3	06/12/2021	1001	BH	Black-headed gull	1	45	20	20-0			Flying	Flew in and landed in field
178	3	06/12/2021	1024	BH	Black-headed gull	3	55	20				Flying	Flew in and landed in field
179	3	06/12/2021	1030	BH	Black-headed gull	9	180	20	0-20			Flying	Flew up from field, and away SW
180	3	06/12/2021	1047	BH	Black-headed gull	1	90	20				Flying	Flying S
181	3	06/12/2021	1134	BH	Black-headed gull	2	75	20				Flying	Flying S
182	3	06/12/2021	1145	BH	Black-headed gull	1	66	10				Flying	Flew in and landed in field
183	3	06/12/2021	1207	BH	Black-headed gull	2	76	20	30-20			Flying	Flying S
184	3	12/01/2022	1328	BH	Black-headed gull	45	205	40	20-40			Circling	Flew up from over the hill, circled up and drifted E before dropping
185	3	12/01/2022	1403	BH	Black-headed gull	5	80	30			Ad	Circling	Flying and circling over quarry, moving E
186	3	12/01/2022	158	BH	Black-headed gull	60	135	20	20-30-20			Circling	Flew up, circled about, dropped
187	3	12/01/2022	159	BH	Black-headed gull	1	35	20			Juv	Flying	Flying E
188	3	12/01/2022	1530	BH	Black-headed gull	4	80	40			3 Ad, 1 Juv	Flying	Flying E
189	3	12/01/2022	1546	BH	Black-headed gull	2	32	20				Flying	Flying SE
190	3	20/01/2022	1005	BH	Black-headed gull	2	45	20				Flying	Flying E
191	3	20/01/2022	1119	BH	Black-headed gull	5	50	30				Flying	Flying E
192	3	20/01/2022	1221	BH	Black-headed gull	1	15	20				Flying	Flying W
193	3	20/01/2022	1242	BH	Black-headed gull	1	7	20	30-20			Flying	Flying down behind hill
194	3	04/02/2022	1120	BH	Black-headed gull	13	80	20	20-40-20			Flying	Flying about
195	3	04/02/2022	1217	BH	Black-headed gull	150	60	20				Flying	Flew about a bit, then back down to field
196	3	07/03/2022	947	BH	Black-headed gull	2	40	20				Flying	Flying SE
197	3	07/03/2022	950	BH	Black-headed gull	1	20	20				Flying	Flying E
198	4	16/09/2021	1525	BH	Black-headed gull	6	55	25	15-35			Commuting	
199	4	16/09/2021	1703	BH	Black-headed gull	32	165	30	01-10-40			Commuting	
200	4	16/09/2021	1746	BH	Black-headed gull	11	95	35	25-40			Commuting	
201	4	16/09/2021	1801	BH	Black-headed gull	3	90	40	35-45			Commuting	
202	4	07/10/2021	856	BH	Black-headed gull	23	208	20	20-0-20		20 Ad, 3 Juv	Flying	Flew in and circled field, tried to land a couple of times, then departed
203	4	07/10/2021	909	BH	Black-headed gull	2	405	20	20-30-20		Ad	Flying	Flying SW
204	4	07/10/2021	1013	BH	Black-headed gull	26	180	20			Ad	Flying	Flying W, seem to have been feeding in a field to the SW
205	4	07/10/2021	1014	BH	Black-headed gull	3	60	20			Ad	Flying	Flying N towards site, but lost behind shed
206	4	02/11/2021	821	BH	Black-headed gull	2	30	10				Flying	Flying W
207	4	02/11/2021	832	BH	Black-headed gull	22	120	10	10-0			Feeding	Flying W, then landed
208	4	02/11/2021	855	BH	Black-headed gull	1	15	10				Flying	Flying W
209	4	02/11/2021	910	BH	Black-headed gull	1	30	15				Flying	Flying SW
210	4	02/11/2021	918	BH	Black-headed gull	7	50	10				Flying	Flying SW
211	4	02/11/2021	926	BH	Black-headed gull	1	30	10				Flying	Flying W

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
212	4	02/11/2021	942	BH	Black-headed gull	3	10	10				Flying	Flying N
213	4	02/11/2021	1001	BH	Black-headed gull	1	23	20				Flying	Flying W
214	4	02/11/2021	1011	BH	Black-headed gull	2	15	5				Flying	Flying low, seemingly landed
215	4	02/11/2021	1011	BH	Black-headed gull	1	50	15				Flying	Flying W
216	4	02/11/2021	1039	BH	Black-headed gull	1	10	5				Flying	Flying W
217	4	02/11/2021	1044	BH	Black-headed gull	2	123	20	Oct-20			Flying	Circling field, flying back & forth
218	4	08/10/2021	814	BH	Black-headed gull	2	230	30			Ad	Flying	Flying S
219	4	08/10/2021	949	BH	Black-headed gull	3	190	30			1 Ad, 2 Juv	Flying	Flying W
220	4	08/10/2021	1028	BH	Black-headed gull	135	280	20	20-10-20		Ad, Juv	Feeding	Flew into land in field to feed. Remained until the end of the survey
221	4	09/11/2021	1316	BH	Black-headed gull	28	280	80	40-80			Circling	
222	4	09/11/2021	1339	BH	Black-headed gull	8	110	40				Circling	Circling, then dropping
223	4	09/11/2021	1352	BH	Black-headed gull	23	30	30				Flying	Flying N
224	4	09/11/2021	1357	BH	Black-headed gull	70	218	80	40-100-20			Circling	Circling, then moved N & down
225	4	09/11/2021	1401	BH	Black-headed gull	11	30	20				Flying	Flying E
226	4	09/11/2021	1422	BH	Black-headed gull	2	50	30				Flying	Flying N
227	4	09/11/2021	1539	BH	Black-headed gull	4	60	30				Flying	Flying N
228	4	09/11/2021	1548	BH	Black-headed gull	16	60	30				Flying	Flying W, then turned & back E
229	4	01/12/2021	1155	BH	Black-headed gull	180	60	2				Feeding	Sleeping/Feeding in field, flew up occasionally
230	4	01/12/2021	1215	BH	Black-headed gull	6	45	20				Flying	Flying E
231	4	01/12/2021	1220	BH	Black-headed gull	4	80	20				Flying	Flying E
232	4	01/12/2021	1259	BH	Black-headed gull	1	30	20				Flying	
233	4	01/12/2021	1325	BH	Black-headed gull	32	45	40				Flying	Flying E
234	4	01/12/2021	1331	BH	Black-headed gull	15	90	30	20-30			Flying	Flying NE
235	4	01/12/2021	1357	BH	Black-headed gull	50	300	30				Flying	Flew in an arc around and back S, some continuing N
236	4	01/12/2021	1425	BH	Black-headed gull	2	60	30				Flying	Flying slowly W
237	4	01/12/2021	1446	BH	Black-headed gull	16	75	20				Flying	Flying NW
238	4	07/01/2022	1302	BH	Black-headed gull	4	35	10				Flying	Flying W
239	4	07/01/2022	1310	BH	Black-headed gull	2	180	20				Flying	Flying W, flew low over fields in buffer zone
240	4	07/01/2022	1329	BH	Black-headed gull	2	68	20				Flying	Flying W
241	4	07/01/2022	1405	BH	Black-headed gull	1	17	10			Ad	Flying	Flying E
242	4	07/01/2022	1405	BH	Black-headed gull	1	10	10			Juv	Flying	Flying E
243	4	07/01/2022	1416	BH	Black-headed gull	1	52	20				Flying	Flying NE
244	4	07/01/2022	1528	BH	Black-headed gull	1	29	30				Flying	Flying E
245	4	10/01/2022	1009	BH	Black-headed gull	1	90	30			Ad	Flying	Flying SE
246	4	10/01/2022	1012	BH	Black-headed gull	1	43	30			Juv	Flying	Flying E
247	4	10/01/2022	1050	BH	Black-headed gull	4	110	20				Flying	Flying SW
248	4	10/01/2022	1108	BH	Black-headed gull	1	50	20				Flying	Flying W
249	4	10/01/2022	1114	BH	Black-headed gull	9	30	20				Flying	Flying E
250	4	10/01/2022	1128	BH	Black-headed gull	1	200	20	20-30-20			Circling	Drifting S
251	4	10/01/2022	1141	BH	Black-headed gull	1	45	10	10-5-10		Juv	Flying	Flying E
252	4	10/01/2022	1147	BH	Black-headed gull	12	90	20				Flying	Flying E
253	4	10/01/2022	1150	BH	Black-headed gull	6	210	20				Flying	Flying S
254	4	10/01/2022	1156	BH	Black-headed gull	9	90	20				Flying	Flying S

Map ID	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
255	4	10/01/2022	1159	BH	Black-headed gull	4	30	20				Flying	Flying E
256	4	02/02/2022	1414	BH	Black-headed gull	18	40	10				Flying	Flying W
257	4	07/02/2022	1158	BH	Black-headed gull	18	45	20				Flying	Flying E
258	4	07/02/2022	1203	BH	Black-headed gull	23	210	20				Flying	Flying SW
259	4	07/02/2022	1358	BH	Black-headed gull	3	28	30				Flying	Flying W
260	4	07/02/2022	1406	BH	Black-headed gull	1	52	40			Ad	Flying	Flying W
261	4	07/02/2022	1410	BH	Black-headed gull	75	240	40	20-80-20			Circling	

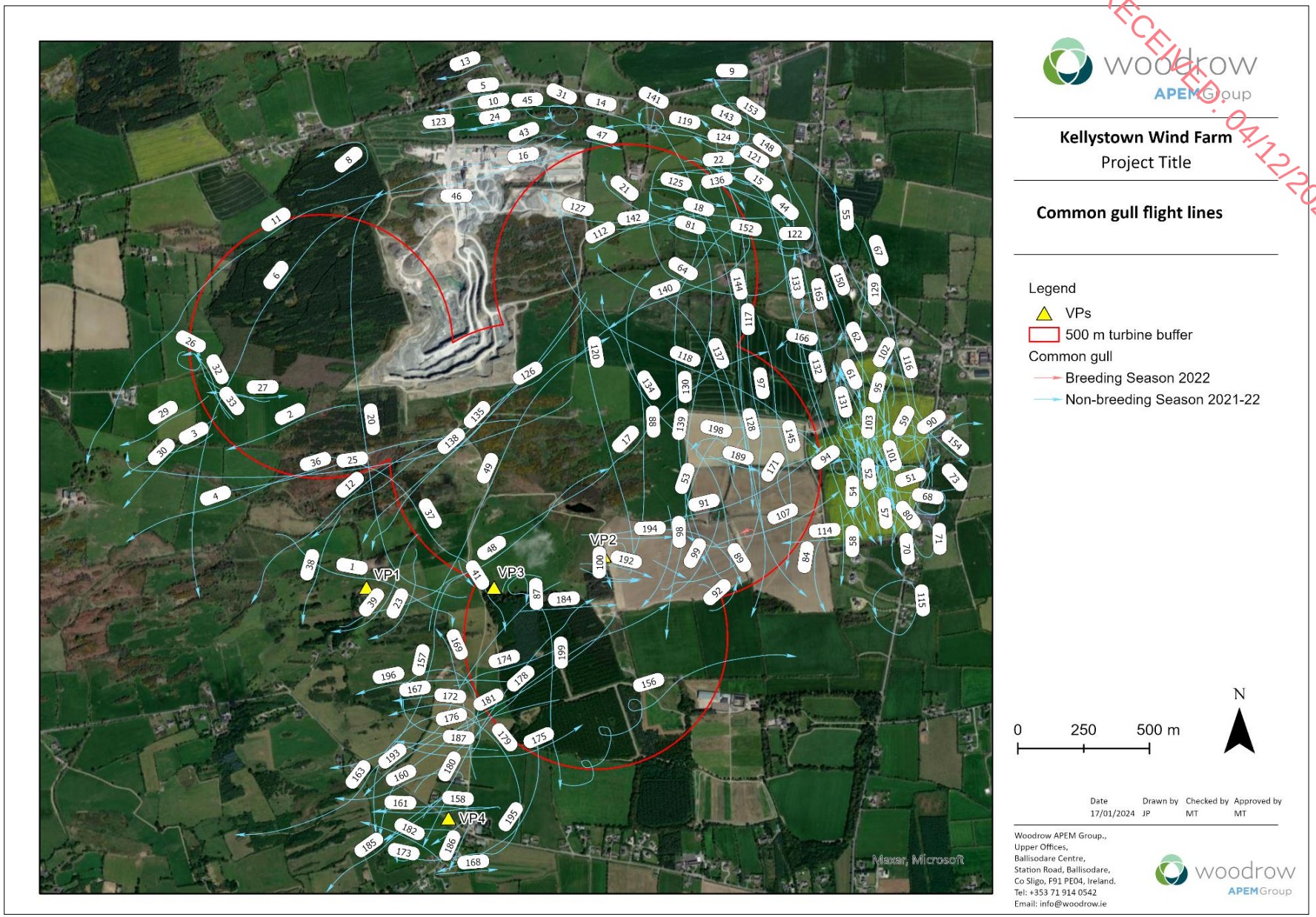

Figure A2.2: Common gull flight lines

Table A2.2: VP watch data for common gull

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	13/09/2021	1135	CM	Common gull	4	40	20	15-20			Commuting	
2	Non-breeding 2021-22	1	04/10/2021	840	CM	Common gull	1	85	30			Ad	Flying	Flying W
3	Non-breeding 2021-22	1	04/10/2021	915	CM	Common gull	10	80	30			Ad, Juv	Flying	Mixed flock with Black-headed Gulls, flying W
4	Non-breeding 2021-22	1	04/10/2021	957	CM	Common gull	1	50	40			Ad	Flying	Flying W
5	Non-breeding 2021-22	1	09/11/2021	1000	CM	Common gull	1	60	30				Flying	Regular flights along R170
6	Non-breeding 2021-22	1	09/11/2021	1025	CM	Common gull	16	490	20				Flying	Flying over quarry, then turned south
7	Non-breeding 2021-22	1	09/11/2021	1053	CM	Common gull	6	370	60	30-100			Flying	Circling and drifting E, some turned back W
8	Non-breeding 2021-22	1	09/11/2021	1106	CM	Common gull	1	60	30				Flying	Flying E, then back W again
9	Non-breeding 2021-22	1	09/11/2021	1121	CM	Common gull	4	25	20				Flying	Flying slowly, dropping
10	Non-breeding 2021-22	1	09/11/2021	1125	CM	Common gull	1	246	50				Circling	Circling, drifting E
11	Non-breeding 2021-22	1	09/11/2021	1129	CM	Common gull	14	340	30				Flying	Popped up over quarry, flying W
12	Non-breeding 2021-22	1	09/11/2021	1150	CM	Common gull	10	90	20				Flying	Flying W, turned S
13	Non-breeding 2021-22	1	09/11/2021	1226	CM	Common gull	10	160	50				Flying	Gliding W
14	Non-breeding 2021-22	1	01/12/2021	837	CM	Common gull	30	600	30				Flying	Flying about, ultimately W
15	Non-breeding 2021-22	1	01/12/2021	931	CM	Common gull	1	30	30				Flying	Flying W
16	Non-breeding 2021-22	1	01/12/2021	941	CM	Common gull	1	56	30				Flying	Flying over quarry
17	Non-breeding 2021-22	1	01/12/2021	945	CM	Common gull	1	160	40				Flying	Flying E
18	Non-breeding 2021-22	1	01/12/2021	959	CM	Common gull	1	30	30				Flying	Flying W
19	Non-breeding 2021-22	1	01/12/2021	1010	CM	Common gull	1	13	20				Flying	Flying E
20	Non-breeding 2021-22	1	01/12/2021	1039	CM	Common gull	3	156	20				Flying	Flew N
21	Non-breeding 2021-22	1	01/12/2021	1057	CM	Common gull	1	130	40				Flying	Drifting W
22	Non-breeding 2021-22	1	01/12/2021	1119	CM	Common gull	7	170	20				Flying	Flying W
23	Non-breeding 2021-22	1	07/01/2022	1048	CM	Common gull	3	50	20				Flying	Flying S
24	Non-breeding 2021-22	1	07/01/2022	1110	CM	Common gull	1	65	40				Flying	Flying W
25	Non-breeding 2021-22	1	07/01/2022	1129	CM	Common gull	2	100	20			Ad, Juv	Flying	Flying W, seemed to land into field
26	Non-breeding 2021-22	1	07/01/2022	1200	CM	Common gull	8	40	10	0-10-0			Flying	Flew up from field, circled, back down again
27	Non-breeding 2021-22	1	07/01/2022	1210	CM	Common gull	8	70	10	0-10-0			Flying	Flew from one field to another
28	Non-breeding 2021-22	1	07/01/2022	1215	CM	Common gull	8	30	5	0-5-0			Flying	Relocated field again
29	Non-breeding 2021-22	1	07/01/2022	1228	CM	Common gull	8	25	5	0-5-0			Flying	Relocating
30	Non-breeding 2021-22	1	10/01/2022	1341	CM	Common gull	2	30	5				Flying	Feeding in field, relocated to another
31	Non-breeding 2021-22	1	10/01/2022	1433	CM	Common gull	2	70	40	40-20			Circling	In distance, beyond quarry, then dropped
32	Non-breeding 2021-22	1	10/01/2022	1457	CM	Common gull	11	30	10	10-0			Flying	Flying in to feed in field
33	Non-breeding 2021-22	1	10/01/2022	1502	CM	Common gull	11	30	10	0-10-0			Flying	Flew up and relocated to another field
34	Non-breeding 2021-22	1	02/02/2022	1047	CM	Common gull	3	45	30				Flying	Flying W
35	Non-breeding 2021-22	1	02/02/2022	1324	CM	Common gull	1	100	50				Circling	Circling & drifting further away
36	Non-breeding 2021-22	1	07/02/2022	937	CM	Common gull	4	100	20				Flying	Flying W
37	Non-breeding 2021-22	1	07/02/2022	1011	CM	Common gull	1	55	30				Flying	Flying S
38	Non-breeding 2021-22	1	07/02/2022	1055	CM	Common gull	5	50	20				Flying	Flying S
39	Non-breeding 2021-22	1	07/02/2022	1103	CM	Common gull	1	50	20				Flying	Flying SW

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
40	Non-breeding 2021-22	1	07/02/2022	1108	CM	Common gull	1	14	20				Flying	Flying S
41	Non-breeding 2021-22	1	07/02/2022	1115	CM	Common gull	1	18	30	30-20			Flying	Flew up, then back down, heading S
42	Non-breeding 2021-22	1	13/03/2022	1432	CM	Common gull	1	35	30				Flying	Flying E
43	Non-breeding 2021-22	1	13/03/2022	1446	CM	Common gull	120	25	30				Flying	Moving E
44	Non-breeding 2021-22	1	13/03/2022	1504	CM	Common gull	100	75	30				Flying	Flying S
45	Non-breeding 2021-22	1	13/03/2022	1552	CM	Common gull	75	300	30				Circling	Flying W, then circled, departed E in large stream
46	Non-breeding 2021-22	1	13/03/2022	1613	CM	Common gull	13	45	20				Flying	Flying W
47	Non-breeding 2021-22	1	13/03/2022	1632	CM	Common gull	10	150	40	20-40-20			Flying	Flying about, climbing upwards, then dropping
48	Non-breeding 2021-22	1	13/03/2022	1644	CM	Common gull	2	115	60	40-60			Flying	Flying E
49	Non-breeding 2021-22	1	13/03/2022	1648	CM	Common gull	1	50	40				Flying	Flying N
50	Non-breeding 2021-22	2	04/10/2021	1118	CM	Common gull	1	15	20			Ad	Flying	Flying N
51	Non-breeding 2021-22	2	10/11/2021	1334	CM	Common gull	4	240	40	30-60			Circling	Drifting E
52	Non-breeding 2021-22	2	10/11/2021	1342	CM	Common gull	1	75	30				Flying	Flying S
53	Non-breeding 2021-22	2	10/11/2021	1402	CM	Common gull	1	210	40				Flying	Flying W, then S
54	Non-breeding 2021-22	2	10/11/2021	1414	CM	Common gull	3	30	20				Flying	Flying S
55	Non-breeding 2021-22	2	10/11/2021	1438	CM	Common gull	1	30	20				Flying	Flying S
56	Non-breeding 2021-22	2	16/11/2021	1004	CM	Common gull	17	540	40				Circling	
57	Non-breeding 2021-22	2	16/11/2021	1027	CM	Common gull	2	45	30				Flying	Flying N
58	Non-breeding 2021-22	2	16/11/2021	1030	CM	Common gull	2	165	20				Flying	Flying S
59	Non-breeding 2021-22	2	16/11/2021	1042	CM	Common gull	7	30	40				Circling	
60	Non-breeding 2021-22	2	16/11/2021	1050	CM	Common gull	10	600	30	20-60			Circling	Flew up from field, circling, drifting S
61	Non-breeding 2021-22	2	16/11/2021	1132	CM	Common gull	2	50	20				Flying	Flying S
62	Non-breeding 2021-22	2	16/11/2021	1143	CM	Common gull	5	200	30				Flying	Circling for a bit, then streaming N
63	Non-breeding 2021-22	2	16/11/2021	1152	CM	Common gull	15	480	30	20-50			Flying	Up again & flying about
64	Non-breeding 2021-22	2	16/11/2021	1203	CM	Common gull	16	180	50	20-60			Flying	Flying up, circling, drifting E, then N
65	Non-breeding 2021-22	2	16/11/2021	1220	CM	Common gull	6	120	20				Flying	Flying S
66	Non-breeding 2021-22	2	16/11/2021	1247	CM	Common gull	18	360	20				Flying	Flying about
67	Non-breeding 2021-22	2	03/12/2021	937	CM	Common gull	3	95	30				Flying	Flying S, and then joined a column of gulls
68	Non-breeding 2021-22	2	03/12/2021	939	CM	Common gull	35	330	40	20-50			Circling	Circling then headed N
69	Non-breeding 2021-22	2	03/12/2021	942	CM	Common gull	3	45	20			Juv	Circling	Circling and dropping
70	Non-breeding 2021-22	2	03/12/2021	950	CM	Common gull	250	480	30	20-40			Flying	Mass of gulls up from field, flew N then back S.
71	Non-breeding 2021-22	2	03/12/2021	1017	CM	Common gull	20	210	30	20-40			Flying	Circling & flying about, S & then back N again
72	Non-breeding 2021-22	2	03/12/2021	1047	CM	Common gull	2	24	20				Flying	Flying E
73	Non-breeding 2021-22	2	03/12/2021	1055	CM	Common gull	30	180	30	20-40			Flying	Flying & circling
74	Non-breeding 2021-22	2	03/12/2021	1127	CM	Common gull	1	40	20				Flying	Flying S
75	Non-breeding 2021-22	2	06/12/2021	1257	CM	Common gull	1	75	20				Flying	Flying N
76	Non-breeding 2021-22	2	06/12/2021	1258	CM	Common gull	5	120	30				Flying	Flying about
77	Non-breeding 2021-22	2	06/12/2021	1310	CM	Common gull	2	40	20				Flying	Flying about
78	Non-breeding 2021-22	2	06/12/2021	1312	CM	Common gull	3	15	20				Flying	Flying N
79	Non-breeding 2021-22	2	06/12/2021	1331	CM	Common gull	3	25	20				Flying	Flying N
80	Non-breeding 2021-22	2	06/12/2021	1332	CM	Common gull	3	90	20				Flying	Flying S
81	Non-breeding 2021-22	2	06/12/2021	1342	CM	Common gull	2	70	20				Flying	Flying about
82	Non-breeding 2021-22	2	06/12/2021	1350	CM	Common gull	1	35	20	40-10			Flying	Flying N

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
83	Non-breeding 2021-22	2	06/12/2021	1401	CM	Common gull	3	60	20	30-40-30			Flying	Flying N
84	Non-breeding 2021-22	2	06/12/2021	1420	CM	Common gull	1	30	30				Flying	Flying S
85	Non-breeding 2021-22	2	06/12/2021	1421	CM	Common gull	2	25	20				Flying	Flying about
86	Non-breeding 2021-22	2	06/12/2021	1424	CM	Common gull	5	50	30				Flying	Flying about
87	Non-breeding 2021-22	2	06/12/2021	1442	CM	Common gull	1	20	30				Flying	Flying N over trees
88	Non-breeding 2021-22	2	06/12/2021	1459	CM	Common gull	3	35	30	30-40-20			Flying	Flying N
89	Non-breeding 2021-22	2	06/12/2021	1505	CM	Common gull	4	95	30	20-40-30			Flying	Flew up from field and away E
90	Non-breeding 2021-22	2	06/12/2021	1522	CM	Common gull	10	75	40				Flying	Flying E
91	Non-breeding 2021-22	2	06/12/2021	1525	CM	Common gull	7	60	40				Flying	Flying E
92	Non-breeding 2021-22	2	06/12/2021	1526	CM	Common gull	8	60	40				Flying	Flying out of field and E
93	Non-breeding 2021-22	2	06/12/2021	1545	CM	Common gull	1	10	10				Flying	Flying into field
94	Non-breeding 2021-22	2	06/12/2021	1548	CM	Common gull	7	105	30				Circling	Circling
95	Non-breeding 2021-22	2	12/01/2022	1008	CM	Common gull	2	160	40				Circling	Moving slowly N
96	Non-breeding 2021-22	2	12/01/2022	1027	CM	Common gull	2	240	40				Circling	Initially circling, then moved gradually NW
97	Non-breeding 2021-22	2	12/01/2022	1119	CM	Common gull	1	67	30	40-30		Juv	Flying	Flying S
98	Non-breeding 2021-22	2	12/01/2022	1208	CM	Common gull	1	45	20			Ad	Flying	Flying S
99	Non-breeding 2021-22	2	12/01/2022	1209	CM	Common gull	4	40	20			2 Ad, 2 Juv	Flying	Flying S
100	Non-breeding 2021-22	2	12/01/2022	1210	CM	Common gull	1	15	20			Ad	Flying	Flew out, around, and back behind trees
101	Non-breeding 2021-22	2	12/01/2022	1243	CM	Common gull	1	180	40	20-40		Juv	Circling	Initially circling, moving slowly NE
102	Non-breeding 2021-22	2	12/01/2022	1251	CM	Common gull	1	20	20			Juv	Flying	Flying N
103	Non-breeding 2021-22	2	20/01/2022	1432	CM	Common gull	6	195	30				Flying	Flying S
104	Non-breeding 2021-22	2	20/01/2022	1458	CM	Common gull	11	250	40				Flying	Flying NE
105	Non-breeding 2021-22	2	04/02/2022	1412	CM	Common gull	10	250	20	20-40			Flying	Flying about, then down
106	Non-breeding 2021-22	2	04/02/2022	1425	CM	Common gull	5	270	20	20-40			Flying	Flying about, then down
107	Non-breeding 2021-22	2	04/02/2022	1428	CM	Common gull	5	80	80				Flying	Flying E
108	Non-breeding 2021-22	2	04/02/2022	1446	CM	Common gull	5	230	20				Flying	Up again
109	Non-breeding 2021-22	2	04/02/2022	1512	CM	Common gull	1	60	20				Flying	Flying about
110	Non-breeding 2021-22	2	04/02/2022	1546	CM	Common gull	1	75	50	20-50			Circling	Flew up circling, drifting away E
111	Non-breeding 2021-22	2	04/02/2022	1600	CM	Common gull	20	210	40				Circling	Flying about, circling, moving further away
112	Non-breeding 2021-22	2	04/02/2022	1641	CM	Common gull	6	50	20				Flying	Flying NE
113	Non-breeding 2021-22	2	13/03/2022	1130	CM	Common gull	15	60	20				Flying	Flying about fields E of road
114	Non-breeding 2021-22	2	13/03/2022	1145	CM	Common gull	2	20	10			Ad	Flying	Flying in from E
115	Non-breeding 2021-22	2	13/03/2022	1224	CM	Common gull	4	510	20	0-20			Flying	
116	Non-breeding 2021-22	2	13/03/2022	1255	CM	Common gull	22	180	20				Flying	Flying S
117	Non-breeding 2021-22	2	13/03/2022	132	CM	Common gull	140	660	20	30-20-20			Circling	Flew in from N, circled, attempted to land, then up
118	Non-breeding 2021-22	3	23/09/2021	1909	CM	Common gull	2	120	60	55-70			Commuting	
119	Non-breeding 2021-22	3	07/10/2021	1102	CM	Common gull	2	120	30			Juv	Flying	Flying W
120	Non-breeding 2021-22	3	10/11/2021	1029	CM	Common gull	2	210	40				Flying	Flying S
121	Non-breeding 2021-22	3	10/11/2021	1041	CM	Common gull	12	150	50	30-80			Flying	v
122	Non-breeding 2021-22	3	10/11/2021	1117	CM	Common gull	16	135	4				Flying	Drifting N
123	Non-breeding 2021-22	3	10/11/2021	1256	CM	Common gull	1	34	40				Flying	Flying E
124	Non-breeding 2021-22	3	16/11/2021	1335	CM	Common gull	1	110	30				Flying	Flying back & forth
125	Non-breeding 2021-22	3	16/11/2021	1339	CM	Common gull	1	41	20				Flying	Flying back & forth

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
126	Non-breeding 2021-22	3	16/11/2021	1458	CM	Common gull	3	253	20				Flying	Flying W, joined LB
127	Non-breeding 2021-22	3	03/12/2021	1425	CM	Common gull	30	97	20				Flying	Flying W
128	Non-breeding 2021-22	3	06/12/2021	929	CM	Common gull	26	45	20				Flying	Flying S
129	Non-breeding 2021-22	3	06/12/2021	931	CM	Common gull	7	195	30				Flying	Flying S
130	Non-breeding 2021-22	3	06/12/2021	944	CM	Common gull	1	150	30	20-30-20			Flying	Flying S
131	Non-breeding 2021-22	3	06/12/2021	946	CM	Common gull	2	90	20				Flying	Flying S
132	Non-breeding 2021-22	3	06/12/2021	952	CM	Common gull	2	130	20				Flying	Flying S
133	Non-breeding 2021-22	3	06/12/2021	1020	CM	Common gull	2	130	20				Flying	Flying S
134	Non-breeding 2021-22	3	06/12/2021	1024	CM	Common gull	10	55	20				Flying	Flew in and landed in field
135	Non-breeding 2021-22	3	06/12/2021	1030	CM	Common gull	12	180	20	0-20			Flying	Flew up from field, and away SW
136	Non-breeding 2021-22	3	06/12/2021	1117	CM	Common gull	1	63	20	20-30-20			Flying	Flying about
137	Non-breeding 2021-22	3	06/12/2021	1119	CM	Common gull	1	65	10				Flying	Flying low, N
138	Non-breeding 2021-22	3	06/12/2021	1123	CM	Common gull	1	88	20				Flying	Flying SW, presumably same bird
139	Non-breeding 2021-22	3	06/12/2021	1130	CM	Common gull	1	123	20				Flying	Flying S
140	Non-breeding 2021-22	3	06/12/2021	1134	CM	Common gull	28	75	20				Flying	Flying S
141	Non-breeding 2021-22	3	12/01/2022	1326	CM	Common gull	6	105	40			Ad	Circling	
142	Non-breeding 2021-22	3	12/01/2022	1328	CM	Common gull	2	20	40	20-40		Ad	Circling	Flew up from over the hill, circled up and drifted E
143	Non-breeding 2021-22	3	20/01/2022	1005	CM	Common gull	1	45	20				Flying	Flying E
144	Non-breeding 2021-22	3	20/01/2022	1011	CM	Common gull	5	180	50				Flying	Flying S
145	Non-breeding 2021-22	3	20/01/2022	1101	CM	Common gull	1	45	40				Flying	Flying S
146	Non-breeding 2021-22	3	20/01/2022	1118	CM	Common gull	1	28	20				Flying	Flying E, perhaps down into field
147	Non-breeding 2021-22	3	20/01/2022	1230	CM	Common gull	1	8	20	30-20			Flying	Flying down behind hill
148	Non-breeding 2021-22	3	04/02/2022	1059	CM	Common gull	4	15	20				Flying	Flying W
149	Non-breeding 2021-22	3	04/02/2022	1153	CM	Common gull	8	45	30				Flying	Flying about
150	Non-breeding 2021-22	3	04/02/2022	1216	CM	Common gull	2	40	40				Flying	Flying to flock of gulls over field
151	Non-breeding 2021-22	3	04/02/2022	1217	CM	Common gull	50	60	20				Flying	Flew about a bit, then back down to field
152	Non-breeding 2021-22	3	04/02/2022	1236	CM	Common gull	1	40	40				Flying	Flying E
153	Non-breeding 2021-22	3	04/02/2022	1300	CM	Common gull	2	165	30	30-20			Flying	Flying W
154	Non-breeding 2021-22	3	07/03/2022	947	CM	Common gull	1	40	20				Flying	Flying SE
155	Non-breeding 2021-22	3	07/03/2022	950	CM	Common gull	1	20	20				Flying	Flying E
156	Non-breeding 2021-22	4	16/09/2021	1703	CM	Common gull	2	135	30	10-40			Commuting	
157	Non-breeding 2021-22	4	07/10/2021	909	CM	Common gull	3	405	20	20-30-20		1 Ad, 2 Juv	Flying	Flying SW
158	Non-breeding 2021-22	4	02/11/2021	810	CM	Common gull	7	45	10				Flying	Flying W
159	Non-breeding 2021-22	4	02/11/2021	811	CM	Common gull	1	30	10				Flying	Flying W
160	Non-breeding 2021-22	4	02/11/2021	821	CM	Common gull	1	30	10				Flying	Flying W
161	Non-breeding 2021-22	4	02/11/2021	832	CM	Common gull	8	120	10	10-0			Feeding	Flying W, then landed
162	Non-breeding 2021-22	4	02/11/2021	926	CM	Common gull	3	45	10				Flying	Flying W
163	Non-breeding 2021-22	4	08/10/2021	814	CM	Common gull	1	230	30			Ad	Flying	Flying S
164	Non-breeding 2021-22	4	08/10/2021	1028	CM	Common gull	1	280	20	10-20		Ad	Feeding	Flew into field to feed, flew up and circled
165	Non-breeding 2021-22	4	09/11/2021	1316	CM	Common gull	13	280	80	40-80			Circling	
166	Non-breeding 2021-22	4	09/11/2021	1339	CM	Common gull	3	110	40				Circling	Circling, then dropping
167	Non-breeding 2021-22	4	09/11/2021	1347	CM	Common gull	1	20	10				Flying	Flying W
168	Non-breeding 2021-22	4	09/11/2021	1401	CM	Common gull	2	30	20				Flying	Flying E

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
169	Non-breeding 2021-22	4	09/11/2021	1501	CM	Common gull	6	54	20	20-0			Flying	Flew into land, stayed feeding in field
170	Non-breeding 2021-22	4	09/11/2021	1539	CM	Common gull	9	60	30				Flying	Flying N
171	Non-breeding 2021-22	4	09/11/2021	1548	CM	Common gull	2	60	30				Flying	Flying W, then turned & back E
172	Non-breeding 2021-22	4	01/12/2021	1155	CM	Common gull	3	80	10				Flying	Flying low W
173	Non-breeding 2021-22	4	01/12/2021	1155	CM	Common gull	71	60	2				Feeding	Sleeping/Feeding in field, flew up occasionally
174	Non-breeding 2021-22	4	01/12/2021	1215	CM	Common gull	1	45	20				Flying	Flying E
175	Non-breeding 2021-22	4	01/12/2021	1220	CM	Common gull	11	80	20				Flying	Flying E
176	Non-breeding 2021-22	4	01/12/2021	1240	CM	Common gull	5	60	20				Flying	Feeding in fields, circled a bit & landed again
177	Non-breeding 2021-22	4	01/12/2021	1325	CM	Common gull	1	45	40				Flying	Flying E
178	Non-breeding 2021-22	4	01/12/2021	1331	CM	Common gull	3	90	30	20-30			Flying	Flying NE
179	Non-breeding 2021-22	4	01/12/2021	1357	CM	Common gull	35	300	30				Flying	Flew in an arc around and back S
180	Non-breeding 2021-22	4	01/12/2021	1446	CM	Common gull	3	75	20				Flying	Flying NW
181	Non-breeding 2021-22	4	07/01/2022	1310	CM	Common gull	6	180	20	20-5-20			Flying	Flying W, flew low over fields in buffer zone
182	Non-breeding 2021-22	4	07/01/2022	1329	CM	Common gull	2	65	20				Flying	Flying W
183	Non-breeding 2021-22	4	10/01/2022	1114	CM	Common gull	23	30	20				Flying	Flying E
184	Non-breeding 2021-22	4	10/01/2022	1147	CM	Common gull	14	90	20				Flying	Flying E
185	Non-breeding 2021-22	4	10/01/2022	1150	CM	Common gull	15	210	20				Flying	Flying about, drifting S
186	Non-breeding 2021-22	4	10/01/2022	1156	CM	Common gull	13	90	20				Flying	Flying S
187	Non-breeding 2021-22	4	02/02/2022	1414	CM	Common gull	5	40	10				Flying	Flying W
188	Non-breeding 2021-22	4	02/02/2022	1418	CM	Common gull	2	60	20				Flying	Flying SW
189	Non-breeding 2021-22	4	02/02/2022	1424	CM	Common gull	1	35	20				Flying	Gliding back & forth
190	Non-breeding 2021-22	4	02/02/2022	1438	CM	Common gull	2	40	30				Flying	Flying W
191	Non-breeding 2021-22	4	02/02/2022	1530	CM	Common gull	1	20	30	30-20			Flying	Flying about
192	Non-breeding 2021-22	4	07/02/2022	1158	CM	Common gull	6	45	20				Flying	Flying E
193	Non-breeding 2021-22	4	07/02/2022	1203	CM	Common gull	6	210	20				Flying	Flying SW
194	Non-breeding 2021-22	4	07/02/2022	1307	CM	Common gull	7	60	30				Flying	Flying E
195	Non-breeding 2021-22	4	07/02/2022	1314	CM	Common gull	9	100	20				Flying	Flying S
196	Non-breeding 2021-22	4	07/02/2022	1319	CM	Common gull	1	80	20				Flying	Flying W
197	Non-breeding 2021-22	4	07/02/2022	1352	CM	Common gull	3	25	20				Flying	Flying E
198	Non-breeding 2021-22	4	07/02/2022	1410	CM	Common gull	75	240	40	20-80-20			Circling	Quite distant
199	Non-breeding 2021-22	4	07/02/2022	1435	CM	Common gull	1	135	20				Flying	Flying about, eventually heading S
200	Breeding 2022	2	21/04/2022	930	CM	Common gull	140	0	0				Forage	Feeding and loafing in ploughed field
201	Breeding 2022	3	20/04/2022	1400	CM	Common gull	1	0	0				Forage	Not counted - birds on ground in ploughed field

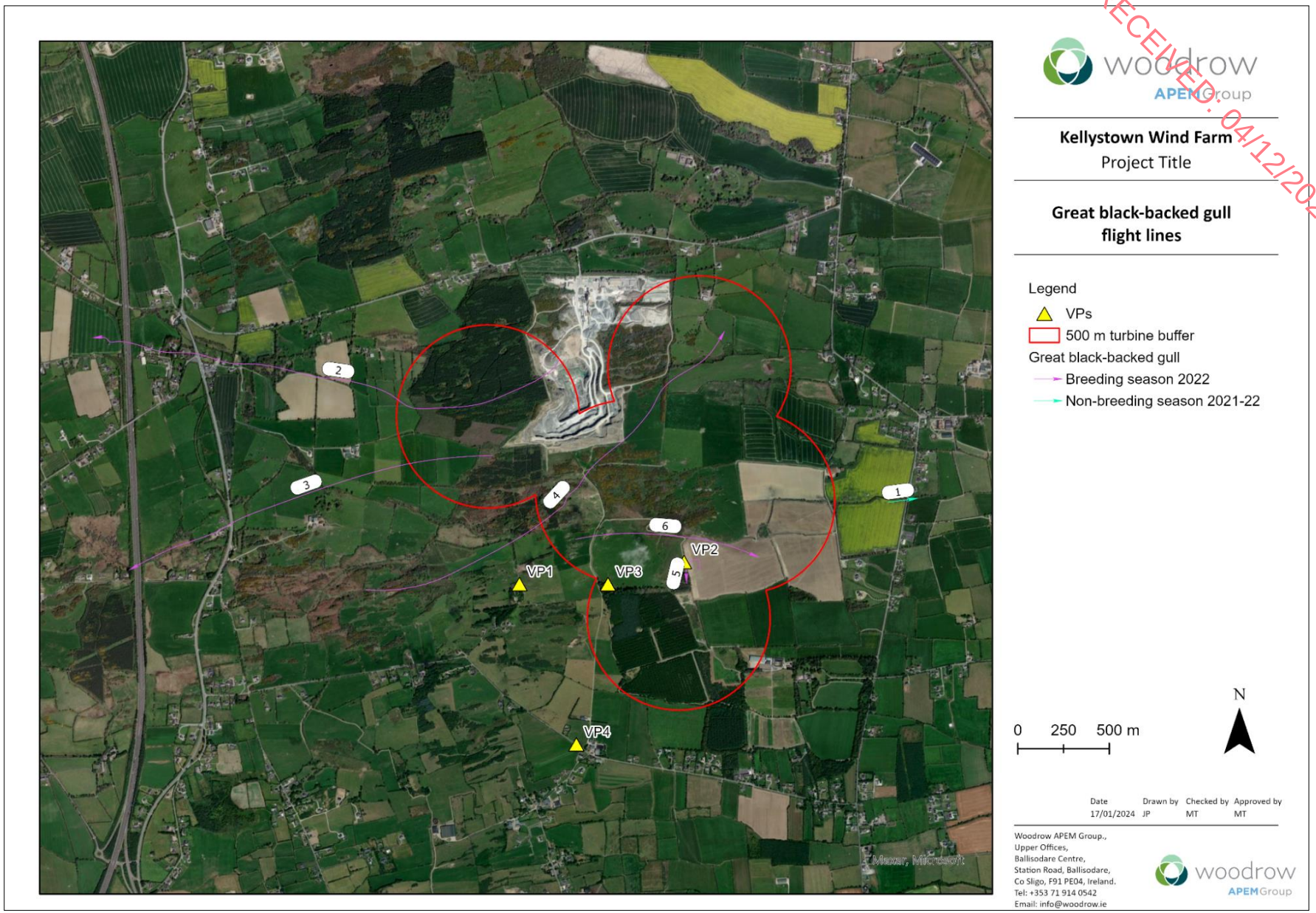

Figure A2.3: Great black-backed gull flight lines

Table A2.3: VP watch data for great black-backed gull

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	16/11/2021	1007	GB	Great black-backed gull	1	45	40				Circling	Drifting E
2	Breeding 2022	2	19/04/2022	845	GB	Great black-backed gull	2	160	60	50-60			Commuting	
3	Breeding 2022	2	19/04/2022	910	GB	Great black-backed gull	3	140	60	30-40			Commuting	
4	Breeding 2022	2	20/04/2022	715	GB	Great black-backed gull	7	190	100				Commuting	
5	Breeding 2022	2	21/04/2022	1100	GB	Great black-backed gull	1	40	80	20-80			Commuting	
6	Breeding 2022	2	19/04/2022	1435	GB	Great black-backed gull	3	60	100	200-250			Soaring	

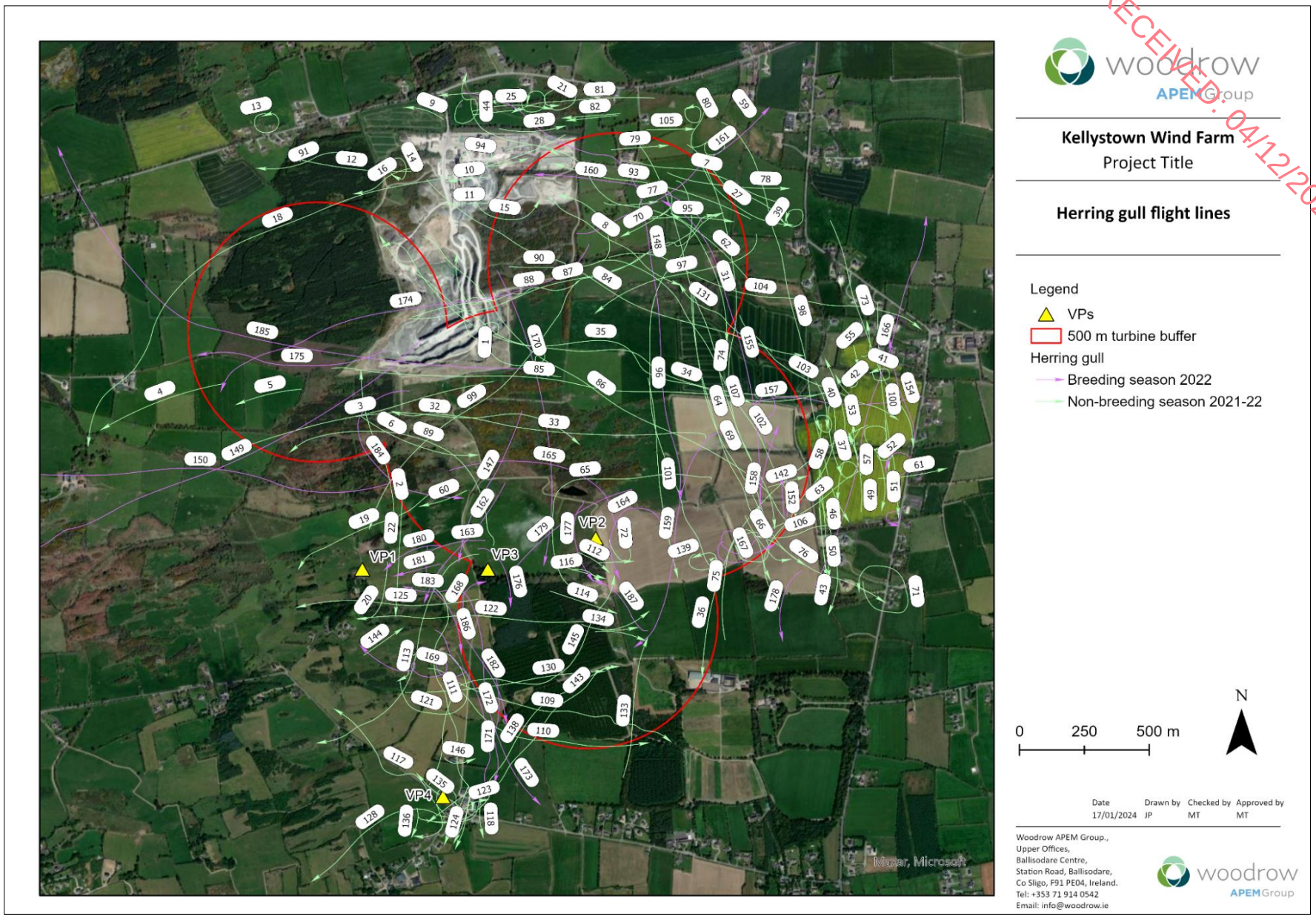

Figure A2.4: Herring gull flight lines

Table A2.4: VP watch data for herring gull

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	13/09/2021	1113	HG	Herring gull	2	50	50	40-60			Soaring	
2	Non-breeding 2021-22	1	04/10/2021	750	HG	Herring gull	2	120	40			Juv	Flying	Flying N
3	Non-breeding 2021-22	1	04/10/2021	830	HG	Herring gull	1	95	40			Juv	Flying	Flying W
4	Non-breeding 2021-22	1	04/10/2021	900	HG	Herring gull	3	48	20			Juv	Flying	Flying W
5	Non-breeding 2021-22	1	04/10/2021	914	HG	Herring gull	1	51	30	30-20		Juv	Flying	Flying W
6	Non-breeding 2021-22	1	04/10/2021	941	HG	Herring gull	1	68	40	40-30		Juv	Flying	Flying SE
7	Non-breeding 2021-22	1	04/10/2021	946	HG	Herring gull	2	110	30			Ad, Juv	Flying	Circling, then adult headed off E
8	Non-breeding 2021-22	1	04/10/2021	959	HG	Herring gull	1	160	40	20-50-40		Juv	Flying	Circling over quarry, then headed SW
9	Non-breeding 2021-22	1	04/10/2021	1020	HG	Herring gull	3	28	30			Juv	Flying	Flying W
10	Non-breeding 2021-22	1	08/10/2021	1118	HG	Herring gull	3	40	40			Juv	Flying	Flying W
11	Non-breeding 2021-22	1	08/10/2021	1132	HG	Herring gull	3	98	40			2 Juv	Flying	Flying E
12	Non-breeding 2021-22	1	08/10/2021	1157	HG	Herring gull	1	410	50	30-50-30		Juv	Circling	Drifting W
13	Non-breeding 2021-22	1	08/10/2021	1321	HG	Herring gull	8	53	50			Juv	Circling	Distant
14	Non-breeding 2021-22	1	08/10/2021	1346	HG	Herring gull	1	20	60			Juv	Circling	
15	Non-breeding 2021-22	1	08/10/2021	1348	HG	Herring gull	1	52	40	40-20		Ad	Flying	Flying E
16	Non-breeding 2021-22	1	08/10/2021	1404	HG	Herring gull	4	64	40			Ad, 3 Juv	Flying	Flying E
17	Non-breeding 2021-22	1	09/11/2021	1000	HG	Herring gull	1	60	30				Flying	Regular flights along R170
18	Non-breeding 2021-22	1	09/11/2021	1129	HG	Herring gull	1	340	30				Flying	Popped up over quarry, flying W
19	Non-breeding 2021-22	1	01/12/2021	1037	HG	Herring gull	2	110	15			Juv	Flying	Flew towards VP, then away W
20	Non-breeding 2021-22	1	07/01/2022	1117	HG	Herring gull	2	35	20			Ad, Juv	Flying	Flying S
21	Non-breeding 2021-22	1	10/01/2022	1433	HG	Herring gull	1	70	40	40-20		Juv	Circling	In distance, beyond quarry, then dropped
22	Non-breeding 2021-22	1	10/01/2022	1504	HG	Herring gull	4	50	20				Flying	Flying S, low over field to E of VP
23	Non-breeding 2021-22	1	02/02/2022	1333	HG	Herring gull	1	45	40				Flying	Flying E
24	Non-breeding 2021-22	1	07/02/2022	1015	HG	Herring gull	2	52	20	20-30-20			Flying	Circling the quarry, then fly E and drop
25	Non-breeding 2021-22	1	07/02/2022	1037	HG	Herring gull	1	30	30				Flying	Flying E
26	Non-breeding 2021-22	1	13/03/2022	1412	HG	Herring gull	1	28	20	20-30-20			Flying	Flying E
27	Non-breeding 2021-22	1	13/03/2022	1435	HG	Herring gull	3	40	30				Circling	Circling, then headed E and dropped
28	Non-breeding 2021-22	1	13/03/2022	1446	HG	Herring gull	40	25	30				Flying	Moving E
29	Non-breeding 2021-22	1	13/03/2022	1504	HG	Herring gull	10	75	30				Flying	Flying S
30	Non-breeding 2021-22	1	13/03/2022	1552	HG	Herring gull	15	300	30				Circling	Flying W, circled, departed E in stream
31	Non-breeding 2021-22	1	13/03/2022	1554	HG	Herring gull	4	300	30	50-1-30			Flying	Flying SE across site, low over field
32	Non-breeding 2021-22	1	13/03/2022	1654	HG	Herring gull	1	44	50				Flying	Flying E
33	Non-breeding 2021-22	2	16/09/2021	842	HG	Herring gull	1	175	45	40-50			Commuting	
34	Non-breeding 2021-22	2	23/09/2021	747	HG	Herring gull	2	135	25	20-30			Commuting	
35	Non-breeding 2021-22	2	23/09/2021	755	HG	Herring gull	1	95	25	20-30			Commuting	
36	Non-breeding 2021-22	2	23/09/2021	841	HG	Herring gull	1	175	35	30-40			Commuting	
37	Non-breeding 2021-22	2	04/10/2021	1120	HG	Herring gull	1	97	40			Juv	Flying	Flying S

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
38	Non-breeding 2021-22	2	04/10/2021	1135	HG	Herring gull	2	140	30			Juv	Flying	Flying S
39	Non-breeding 2021-22	2	04/10/2021	1141	HG	Herring gull	2	20	30			Ad, Juv	Circling	
40	Non-breeding 2021-22	2	04/10/2021	1219	HG	Herring gull	1	29	20			Ad	Flying	Flying S
41	Non-breeding 2021-22	2	04/10/2021	1245	HG	Herring gull	5	190	40			2 Ad,3 Juv	Circling	
42	Non-breeding 2021-22	2	04/10/2021	1312	HG	Herring gull	1	30	40			Ad	Circling	
43	Non-breeding 2021-22	2	07/10/2021	1439	HG	Herring gull	1	72	30			Juv	Flying	Flying S
44	Non-breeding 2021-22	2	07/10/2021	1506	HG	Herring gull	5	110	60			3 Ad, 2 Juv	Circling	Getting more distant
45	Non-breeding 2021-22	2	07/10/2021	1513	HG	Herring gull	1	80	30			Juv	Flying	Flying S
46	Non-breeding 2021-22	2	07/10/2021	1601	HG	Herring gull	1	16	30			Juv	Flying	Flying S
47	Non-breeding 2021-22	2	07/10/2021	1621	HG	Herring gull	1	15	30			Juv	Flying	Flying N
48	Non-breeding 2021-22	2	07/10/2021	1630	HG	Herring gull	5	50	30			3 Ad, 1 Juv	Flying	Flying back & forth
49	Non-breeding 2021-22	2	16/11/2021	1009	HG	Herring gull	2	45	30				Flying	Flying N
50	Non-breeding 2021-22	2	16/11/2021	1045	HG	Herring gull	1	115	20				Flying	Flying S
51	Non-breeding 2021-22	2	16/11/2021	1050	HG	Herring gull	2	120	30				Circling	Flew up from field, circling, drifting S
52	Non-breeding 2021-22	2	16/11/2021	1124	HG	Herring gull	1	126	50	50-20			Flying	Gliding S
53	Non-breeding 2021-22	2	06/12/2021	1312	HG	Herring gull	1	42	20			Juv	Flying	Flying N
54	Non-breeding 2021-22	2	06/12/2021	1358	HG	Herring gull	1	125	50				Circling	
55	Non-breeding 2021-22	2	12/01/2022	1023	HG	Herring gull	1	30	30			Juv	Flying	Flying N
56	Non-breeding 2021-22	2	12/01/2022	1027	HG	Herring gull	1	240	40			Juv	Circling	Circling for a while, then moved NW
57	Non-breeding 2021-22	2	12/01/2022	1031	HG	Herring gull	5	165	40	20-40		Juv	Flying	Flew slowly, no initial circling
58	Non-breeding 2021-22	2	12/01/2022	1144	HG	Herring gull	2	68	20			Ad, Juv	Flying	Flying S
59	Non-breeding 2021-22	2	12/01/2022	1145	HG	Herring gull	1	195	60	30-60-20		Ad	Circling	Circling slowly E, then turned N and drop
60	Non-breeding 2021-22	2	12/01/2022	1216	HG	Herring gull	2	32	20			Ad	Flying	Flying W
61	Non-breeding 2021-22	2	20/01/2022	1531	HG	Herring gull	4	80	40				Flying	Flying E
62	Non-breeding 2021-22	2	13/03/2022	1040	HG	Herring gull	89	21	10			Juv	Flying	Flying low, W
63	Non-breeding 2021-22	2	13/03/2022	1044	HG	Herring gull	6	105	20	20-0			Flying	Coming back into burnt field from E
64	Non-breeding 2021-22	2	13/03/2022	1050	HG	Herring gull	1	90	20	20-30-0			Flying	Coming back into burnt field from N
65	Non-breeding 2021-22	2	13/03/2022	1053	HG	Herring gull	1	130	20	20-30-20		Juv	Flying	Flying W, then turning S
66	Non-breeding 2021-22	2	13/03/2022	1128	HG	Herring gull	95	105	10	0-10-0			Flying	Flew up, circled, landed again
67	Non-breeding 2021-22	2	13/03/2022	1130	HG	Herring gull	30	60	20				Flying	Flying about fields E of road
68	Non-breeding 2021-22	2	13/03/2022	1142	HG	Herring gull	5	100	10				Flying	Flying E
69	Non-breeding 2021-22	2	13/03/2022	1148	HG	Herring gull	8	110	40	40-50-0			Flying	Flying in from N
70	Non-breeding 2021-22	2	13/03/2022	1156	HG	Herring gull	11	75	20				Flying	Drifting about, then land in beyond hill
71	Non-breeding 2021-22	2	13/03/2022	1224	HG	Herring gull	150	510	20	0-20			Flying	Flew up from earlier
72	Non-breeding 2021-22	2	13/03/2022	1224	HG	Herring gull	1	40	20			Juv	Flying	
73	Non-breeding 2021-22	2	13/03/2022	1255	HG	Herring gull	6	180	20				Flying	Flying S
74	Non-breeding 2021-22	2	13/03/2022	1312	HG	Herring gull	10	660	20	30-20-1-20			Circling	Flew in from N, circled, attempted to land,
75	Non-breeding 2021-22	2	13/03/2022	1316	HG	Herring gull	60	420	20	20-0-20			Flying	Flew in from S, landed, then up again
76	Non-breeding 2021-22	2	13/03/2022	1025	HG	Herring gull	2	390	30	0-30		Im, SubAd	Flying	On ground in burnt field, flew up and circled
77	Non-breeding 2021-22	3	04/10/2021	1431	HG	Herring gull	3	275	100	30-100		1 Ad, 2 Juv	Circling	Circling upwards
78	Non-breeding 2021-22	3	04/10/2021	1531	HG	Herring gull	1	90	40			Juv	Circling	Flying E
79	Non-breeding 2021-22	3	04/10/2021	1554	HG	Herring gull	1	30	30			Juv	Flying	Flying W
80	Non-breeding 2021-22	3	04/10/2021	1622	HG	Herring gull	1	50	40			Juv	Circling	

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
81	Non-breeding 2021-22	3	04/10/2021	1651	HG	Herring gull	1	105	30			Ad	Flying	Flying W
82	Non-breeding 2021-22	3	04/10/2021	1702	HG	Herring gull	2	73	30			Ad	Flying	Flying E
83	Non-breeding 2021-22	3	04/10/2021	1712	HG	Herring gull	1	41	30	30-20		Juv	Flying	Flying W
84	Non-breeding 2021-22	3	16/09/2021	1411	HG	Herring gull	1	160	40	35-50			Commuting	
85	Non-breeding 2021-22	3	23/09/2021	1711	HG	Herring gull	1	125	40	35-45			Commuting	
86	Non-breeding 2021-22	3	23/09/2021	1817	HG	Herring gull	9	160	40	35-45			Commuting	
87	Non-breeding 2021-22	3	23/09/2021	1820	HG	Herring gull	3	110	45	40-50			Commuting	
88	Non-breeding 2021-22	3	23/09/2021	1827	HG	Herring gull	1	95	50				Commuting	
89	Non-breeding 2021-22	3	07/10/2021	1050	HG	Herring gull	1	70	30			Juv	Flying	Flying W
90	Non-breeding 2021-22	3	07/10/2021	1121	HG	Herring gull	1	58	30			Juv	Flying	Flying E, then back
91	Non-breeding 2021-22	3	07/10/2021	1137	HG	Herring gull	1	10	30			Ad	Flying	Flying W
92	Non-breeding 2021-22	3	07/10/2021	1153	HG	Herring gull	2	100	50			Ad	Circling	
93	Non-breeding 2021-22	3	07/10/2021	1306	HG	Herring gull	1	55	30			Juv	Flying	Flying W
94	Non-breeding 2021-22	3	07/10/2021	1334	HG	Herring gull	1	15	40				Circling	
95	Non-breeding 2021-22	3	07/10/2021	1345	HG	Herring gull	1	21	30				Flying	Flying E
96	Non-breeding 2021-22	3	06/12/2021	959	HG	Herring gull	24	120	30				Flying	Flying S
97	Non-breeding 2021-22	3	06/12/2021	1001	HG	Herring gull	7	45	20	20-0			Flying	Flew in and landed in field
98	Non-breeding 2021-22	3	06/12/2021	1020	HG	Herring gull	1	130	20				Flying	Flying S
99	Non-breeding 2021-22	3	06/12/2021	1030	HG	Herring gull	8	180	20	0-20			Flying	Flew up from field, and away SW
100	Non-breeding 2021-22	3	06/12/2021	1214	HG	Herring gull	2	100	30				Flying	Flying W
101	Non-breeding 2021-22	3	06/12/2021	1217	HG	Herring gull	1	38	20				Flying	Flying S
102	Non-breeding 2021-22	3	07/03/2022	921	HG	Herring gull	11	195	30	10-30		Juv	Flying	Flying SE
103	Non-breeding 2021-22	3	07/03/2022	946	HG	Herring gull	4	105	30				Flying	Flying SE
104	Non-breeding 2021-22	3	07/03/2022	951	HG	Herring gull	6	250	20	10-20			Flying	Flying E
105	Non-breeding 2021-22	3	07/03/2022	1115	HG	Herring gull	2	15	20			1 Ad, 1 Juv	Flying	Flying E
106	Non-breeding 2021-22	3	07/03/2022	1149	HG	Herring gull	15	20	10	10-0			Flying	Flying in to feed in field
107	Non-breeding 2021-22	3	07/03/2022	1203	HG	Herring gull	2	125	30	20-30-10		Juv	Flying	Flying down to field
108	Non-breeding 2021-22	3	07/03/2022	1212	HG	Herring gull	32	30	5	0-5-0		Im	Flying	Flew up, around and back down again
109	Non-breeding 2021-22	4	16/09/2021	1758	HG	Herring gull	3	115	25	20-35			Commuting	
110	Non-breeding 2021-22	4	21/09/2021	931	HG	Herring gull	6	100	25	15-30			Commuting	
111	Non-breeding 2021-22	4	21/09/2021	1052	HG	Herring gull	1	80	15	1-10-15		Juv	Commuting	
112	Non-breeding 2021-22	4	07/10/2021	808	HG	Herring gull	8	40	30			3 Ad, 5 Juv	Flying	Flying E
113	Non-breeding 2021-22	4	07/10/2021	909	HG	Herring gull	11	405	20	20-30-20		Juv	Flying	Flying SW
114	Non-breeding 2021-22	4	08/10/2021	801	HG	Herring gull	2	31	30			Juv	Flying	Flying E
115	Non-breeding 2021-22	4	08/10/2021	814	HG	Herring gull	2	15	30			Ad, 11 Juv	Flying	Flying E
116	Non-breeding 2021-22	4	08/10/2021	827	HG	Herring gull	3	10	30			Ad	Flying	Appeared briefly above trees, flying E
117	Non-breeding 2021-22	4	08/10/2021	949	HG	Herring gull	2	190	30			1 Juv,	Flying	Flying W
118	Non-breeding 2021-22	4	08/10/2021	952	HG	Herring gull	1	8	20			SubAd	Flying	Flying S
119	Non-breeding 2021-22	4	08/10/2021	1014	HG	Herring gull	1	225	20			SubAd	Flying	Flying S
120	Non-breeding 2021-22	4	08/10/2021	1028	HG	Herring gull	3	280	20	10-100		2 Juv	Feeding	Flew in field to feed; flew up and circled
121	Non-breeding 2021-22	4	01/12/2021	1240	HG	Herring gull	1	60	20				Flying	Feeding in fields, circled, landed again
122	Non-breeding 2021-22	4	10/01/2022	938	HG	Herring gull	1	40	40	40-30-40		Juv	Flying	Flying E
123	Non-breeding 2021-22	4	10/01/2022	959	HG	Herring gull	1	7	10			Ad	Flying	Flying E

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
124	Non-breeding 2021-22	4	10/01/2022	1003	HG	Herring gull	1	95	10			Ad	Flying	Flying S
125	Non-breeding 2021-22	4	10/01/2022	1030	HG	Herring gull	1	75	40			Juv	Circling	Drifting W
126	Non-breeding 2021-22	4	10/01/2022	1114	HG	Herring gull	5	30	20				Flying	Flying E
127	Non-breeding 2021-22	4	10/01/2022	1128	HG	Herring gull	6	200	20	20-30-20			Circling	Drifting S
128	Non-breeding 2021-22	4	10/01/2022	1150	HG	Herring gull	14	210	20				Flying	Flying about, drifting S
129	Non-breeding 2021-22	4	10/01/2022	1156	HG	Herring gull	4	90	20				Flying	Flying S
130	Non-breeding 2021-22	4	10/01/2022	1201	HG	Herring gull	1	40	40				Flying	Flying E
131	Non-breeding 2021-22	4	02/02/2022	1427	HG	Herring gull	2	140	30				Flying	Flying NW
132	Non-breeding 2021-22	4	02/02/2022	1437	HG	Herring gull	4	12	20				Flying	Flying E
133	Non-breeding 2021-22	4	02/02/2022	1549	HG	Herring gull	6	80	80				Flying	Flying N
134	Non-breeding 2021-22	4	07/02/2022	1210	HG	Herring gull	1	30	20			Ad	Flying	Flying E
135	Non-breeding 2021-22	4	07/02/2022	1242	HG	Herring gull	1	41	20				Flying	Flying NW
136	Non-breeding 2021-22	4	07/02/2022	1257	HG	Herring gull	1	30	10			Ad	Flying	Flying S
137	Non-breeding 2021-22	4	07/02/2022	1427	HG	Herring gull	1	65	20			Juv	Flying	Flying S
138	Non-breeding 2021-22	4	07/03/2022	1302	HG	Herring gull	2	45	20				Flying	Flew past VP, then E
139	Non-breeding 2021-22	4	07/03/2022	1324	HG	Herring gull	25	0	20				Flying	Up briefly, flying about, then down
140	Non-breeding 2021-22	4	07/03/2022	1353	HG	Herring gull	45	25	20				Flying	Flying E
141	Non-breeding 2021-22	4	07/03/2022	1418	HG	Herring gull	14	230	50	20-50-20			Flying	Flew up and around for a bit
142	Non-breeding 2021-22	4	07/03/2022	1442	HG	Herring gull	1	25	30			Juv	Flying	Flying E
143	Non-breeding 2021-22	4	07/03/2022	1457	HG	Herring gull	135	200	30	20-30			Flying	Flew in from behind, heading NE
144	Non-breeding 2021-22	4	07/03/2022	1513	HG	Herring gull	1	15	5				Flying	Flying low
145	Non-breeding 2021-22	4	07/03/2022	1520	HG	Herring gull	140	20	40	20-40			Flying	Flew low over field, then up and away
146	Non-breeding 2021-22	4	07/03/2022	1544	HG	Herring gull	150	15	20				Flying	Flying E
147	Breeding 2022	1	28/03/2022	1711	HG	Herring gull	1	55	30			Juv	Flying	Flying S
148	Breeding 2022	1	28/03/2022	1821	HG	Herring gull	11	260	20			Ad, 10 Juv	Flying	Flying over quarry and south over site
149	Breeding 2022	1	17/04/2022	840	HG	Herring gull	23	160	50				Flying	Being harassed by HC
150	Breeding 2022	1	20/04/2022	805	HG	Herring gull	1	125	100				Perched	Perched on gravel heap 9:00-9:45
151	Breeding 2022	2	24/03/2022	703	HG	Herring gull	6	10	5				Flying	Flying into land in field
152	Breeding 2022	2	24/03/2022	715	HG	Herring gull	10	8	5				Flying	Flew into field
153	Breeding 2022	2	24/03/2022	740	HG	Herring gull	3	75	30				Flying	Circling above fields, then heading north
154	Breeding 2022	2	24/03/2022	829	HG	Herring gull	8	50	30				Flying	Flying N
155	Breeding 2022	2	24/03/2022	840	HG	Herring gull	1	80	30				Flying	Flying N, presumably from field
156	Breeding 2022	2	24/03/2022	913	HG	Herring gull	2	75	30	20-30			Flying	Flying away from field
157	Breeding 2022	2	24/03/2022	925	HG	Herring gull	4	130	30	10-40-30			Flying	Flew up, circled for a bit, then headed E
158	Breeding 2022	2	24/03/2022	939	HG	Herring gull	11	20	5				Flying	Relocating
159	Breeding 2022	2	24/03/2022	946	HG	Herring gull	1	105	30				Flying	Flying S
160	Breeding 2022	3	23/03/2022	1552	HG	Herring gull	4	140	40			2 Ad, 2 Juv	Flying	Flying W, circling on occasion
161	Breeding 2022	3	23/03/2022	1553	HG	Herring gull	10	60	30				Flying	Flying NE
162	Breeding 2022	3	23/03/2022	1619	HG	Herring gull	3	35	30			Ad, Juv	Flying	Flying SW
163	Breeding 2022	3	23/03/2022	1628	HG	Herring gull	1	25	40			Juv	Flying	Flying SW
164	Breeding 2022	3	23/03/2022	1635	HG	Herring gull	4	150	40	30-40		Juv	Circling	Circled out over fields, then back south
165	Breeding 2022	3	23/03/2022	1636	HG	Herring gull	1	130	30			Juv	Flying	Flying to circling gulls, then S
166	Breeding 2022	3	23/03/2022	1803	HG	Herring gull	12	110	40				Flying	Flying north

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
167	Breeding 2022	4	28/03/2022	1347	HG	Herring gull	13	45	50	20-60-30-5			Circling	Quite distant, circling and moving slowly E
168	Breeding 2022	4	21/04/2022	645	HG	Herring gull	1	30	80	30-40			Commuting	
169	Breeding 2022	4	24/04/2022	615	HG	Herring gull	1	40	80	30-80			Commuting	
170	Breeding 2022	1	18/05/2022	1425	HG	Herring gull	3	80	80	50-80		SubAd	Commuting	
171	Breeding 2022	4	22/05/2022	600	HG	Herring gull	4	35	40	20-100		SubAd	Commuting	
172	Breeding 2022	4	22/05/2022	640	HG	Herring gull	1	40	40			Im	Commuting	
173	Breeding 2022	4	29/05/2022	645	HG	Herring gull	7	65	40	30-40			Flying	
174	Breeding 2022	3	08/06/2022	1620	HG	Herring gull	9	140	40	25-40		SubAd, Im	Commuting	
175	Breeding 2022	3	08/06/2022	1645	HG	Herring gull	5	76	20	15-20		Im	Commuting	
176	Breeding 2022	3	08/06/2022	1655	HG	Herring gull	1	8	50			Im	Commuting	
177	Breeding 2022	2	17/06/2022	1150	HG	Herring gull	1	25	30	25-30		Ad	Commuting	
178	Breeding 2022	2	17/06/2022	1220	HG	Herring gull	3	55	40			Im	Commuting	
179	Breeding 2022	2	17/06/2022	1355	HG	Herring gull	1	50	50			SubAd	Commuting	
180	Breeding 2022	4	19/06/2022	735	HG	Herring gull	3	30	40				Commuting	
181	Breeding 2022	4	19/06/2022	740	HG	Herring gull	2	35	40	30-40			Commuting	
182	Breeding 2022	4	19/06/2022	825	HG	Herring gull	1	65	35				Commuting	
183	Breeding 2022	4	19/06/2022	920	HG	Herring gull	4	30	40	30-40			Commuting	
184	Breeding 2022	1	28/06/2022	1140	HG	Herring gull	1	46	40	30-40		Ad	Commuting	
185	Breeding 2022	1	29/06/2022	1325	HG	Herring gull	1	40	40	30-40		Im	Commuting	
186	Breeding 2022	1	03/08/2022	1100	HG	Herring gull	1	29	50	40-50		Juv, SubAd	Flying	Lost over hill.
187	Breeding 2022	2	15/08/2022	955	HG	Herring gull	2	18	30			Juv, SubAd	Commuting	Went behind conifers

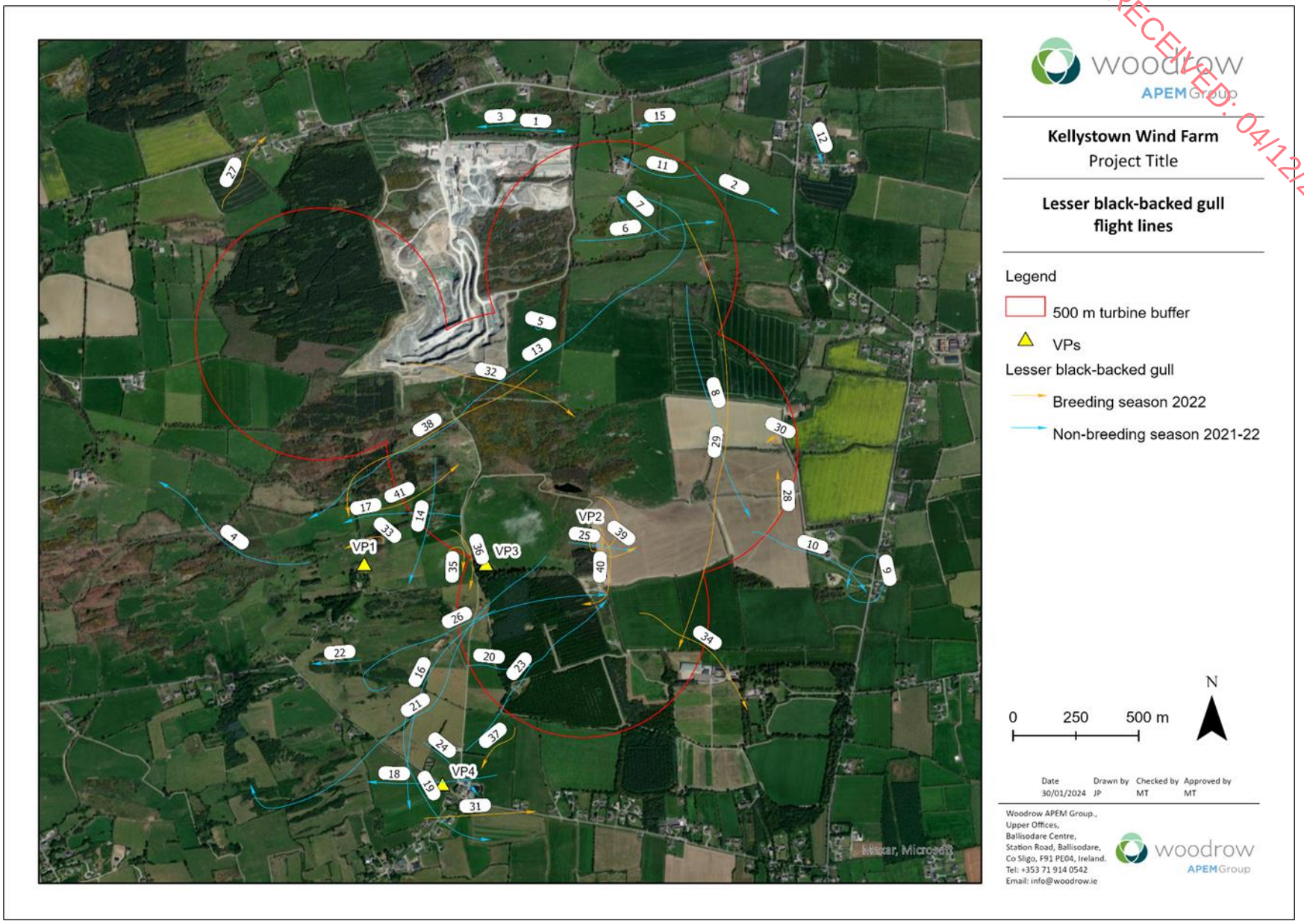

Figure A2.5: Lesser black-back gull flight lines

Table A2.5: VP watch data for lesser black-backed gull

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	13/03/2022	1406	LB	Lesser black-backed gull	1	10	20				Flying	Flying W
2	Non-breeding 2021-22	1	13/03/2022	1435	LB	Lesser black-backed gull	1	40	30				Circling	Circling, then headed E and dropped
3	Non-breeding 2021-22	1	13/03/2022	1543	LB	Lesser black-backed gull	1	50	30				Flying	Flying W
4	Non-breeding 2021-22	1	13/03/2022	1654	LB	Lesser black-backed gull	1	84	30				Flying	Flying W
5	Non-breeding 2021-22	2	03/12/2021	-	LB	Lesser black-backed gull	1	0	0				Feeding	In a field with cows, didn't see it fly
6	Non-breeding 2021-22	2	20/01/2022	1357	LB	Lesser black-backed gull	1	56	30				Flying	Flying E
7	Non-breeding 2021-22	2	04/02/2022	1456	LB	Lesser black-backed gull	1	25	30				Flying	Flying NW
8	Non-breeding 2021-22	2	13/03/2022	1050	LB	Lesser black-backed gull	1	90	20	20-30-0			Flying	Coming back into burnt field from N
9	Non-breeding 2021-22	2	13/03/2022	1224	LB	Lesser black-backed gull	1	510	20	0-20			Flying	Flew up from earlier, similar to 10:25
10	Non-breeding 2021-22	2	13/03/2022	1025	LB	Lesser black-backed gull	1	390	30	0-30		Ad	Flying	In with Herring Gulls
11	Non-breeding 2021-22	3	07/10/2021	1322	LB	Lesser black-backed gull	1	110	40			Juv	Flying	Flying W
12	Non-breeding 2021-22	3	10/11/2021	1150	LB	Lesser black-backed gull	1	35	30	30-20			Flying	Flying S, dropping
13	Non-breeding 2021-22	3	16/11/2021	1457	LB	Lesser black-backed gull	1	333	20				Flying	Flew in over fields, then W
14	Non-breeding 2021-22	3	03/12/2021	1358	LB	Lesser black-backed gull	1	29	20			Juv	Flying	Flying S
15	Non-breeding 2021-22	3	07/03/2022	1115	LB	Lesser black-backed gull	1	35	30			Ad	Flying	Flying W
16	Non-breeding 2021-22	4	07/10/2021	750	LB	Lesser black-backed gull	11	140	20			5 Ad/6 Juv	Flying	Flying S
17	Non-breeding 2021-22	4	07/10/2021	755	LB	Lesser black-backed gull	1	52	30			Juv	Flying	Flying W
18	Non-breeding 2021-22	4	02/11/2021	832	LB	Lesser black-backed gull	1	120	10	10-0		Imm	Feeding	Flying W, then landed
19	Non-breeding 2021-22	4	02/11/2021	930	LB	Lesser black-backed gull	1	20	10				Flying	Flying S
20	Non-breeding 2021-22	4	02/11/2021	1040	LB	Lesser black-backed gull	2	30	30				Flying	Flying E
21	Non-breeding 2021-22	4	08/10/2021	814	LB	Lesser black-backed gull	10	230	30			7 Ad, 3 Juv	Flying	Flying S
22	Non-breeding 2021-22	4	07/01/2022	1302	LB	Lesser black-backed gull	1	35	10				Flying	Flying W
23	Non-breeding 2021-22	4	07/01/2022	1320	LB	Lesser black-backed gull	1	50	20				Flying	Flying W
24	Non-breeding 2021-22	4	07/01/2022	1538	LB	Lesser black-backed gull	1	19	20			Juv	Flying	Flying E
25	Non-breeding 2021-22	4	07/02/2022	1158	LB	Lesser black-backed gull	1	45	20			Ad	Flying	Flying E
26	Non-breeding 2021-22	4	07/02/2022	1235	LB	Lesser black-backed gull	1	100	20	20-10		Juv	Flying	Flying E
27	Breeding 2022	1	28/03/2022	1800	LB	Lesser black-backed gull	2	70	40				Flying	Flying NE
28	Breeding 2022	2	24/03/2022	715	LB	Lesser black-backed gull	1	8	5	5-0			Flying	Flying into the field
29	Breeding 2022	3	23/03/2022	1720	LB	Lesser black-backed gull	1	130	30			Ad	Flying	Flying south
30	Breeding 2022	3	20/04/2022	1400	LB	Lesser black-backed gull	1	0	0	1-5			Feeding	Feeding through the entire VP watch
31	Breeding 2022	4	28/03/2022	1459	LB	Lesser black-backed gull	5	65	30				Flying	Circling, calling, headed E
32	Breeding 2022	1	18/05/2022	1615	LB	Lesser black-backed gull	1	45	40	10-40			Flying	Left it after spotting BZ hovering
33	Breeding 2022	1	26/05/2022	1755	LB	Lesser black-backed gull	1	5	15				Commuting	
34	Breeding 2022	2	17/05/2022	1025	LB	Lesser black-backed gull	1	35	40			Ad	Commuting	
35	Breeding 2022	3	17/05/2022	1315	LB	Lesser black-backed gull	1	20	50				Commuting	
36	Breeding 2022	3	17/05/2022	1415	LB	Lesser black-backed gull	2	25	40				Commuting	
37	Breeding 2022	4	05/06/2022	825	LB	Lesser black-backed gull	2	35	30			SubAd	Commuting	
38	Breeding 2022	3	08/06/2022	1540	LB	Lesser black-backed gull	11	220	50	30-50		SubAd, Imm	Commuting	
39	Breeding 2022	3	20/06/2022	1820	LB	Lesser black-backed gull	2	30	80	70-80		SubAd	Flying	

40	Breeding 2022	2	27/06/2022	1305	LB	Lesser black-backed gull	1	30	0			Ad	Circling	
41	Breeding 2022	1	28/06/2022	1305	LB	Lesser black-backed gull	1	23	25	15-25		Imm	Commuting	

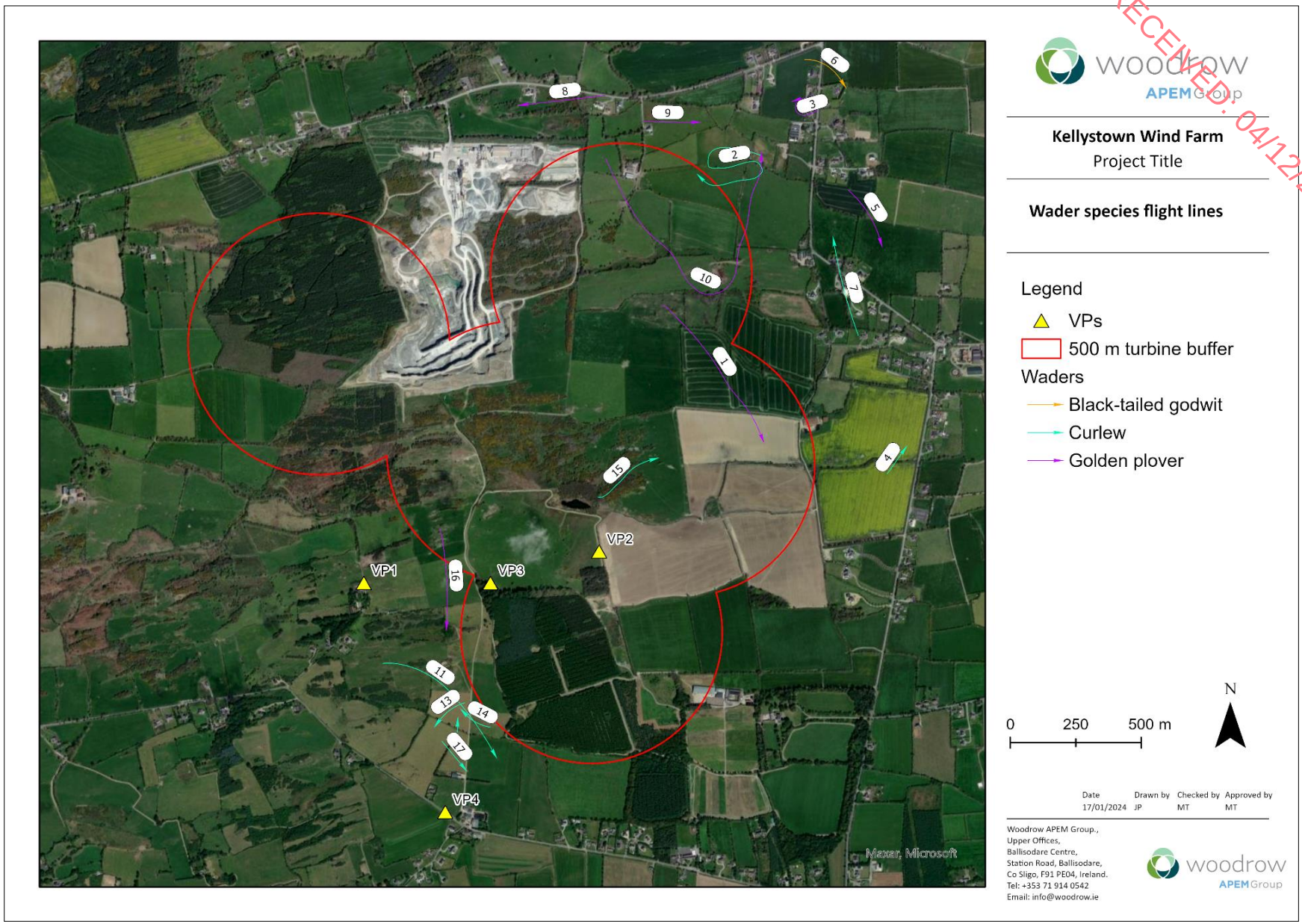

Figure A2.6: Wader species flight lines

Table A2.6: VP watch data for wader species

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	04/10/2021	1003	GP	Golden plover	1	130	60	40-60			Flying	Flying SE, quite distant
2	Non-breeding 2021-22	1	09/11/2021	1236	CU	Curlew	10	208	40	30-50-30-10			Flying	Flying back and forth, then down
3	Non-breeding 2021-22	1	13/03/2022	1504	GP	Golden plover	1000	150	60				Flying	Flying about, quite distant
4	Non-breeding 2021-22	2	16/11/2021	1105	CU	Curlew	26	105	50	30-50			Flying	Flew up from field amongst gulls, headed E
5	Non-breeding 2021-22	2	13/03/2022	1212	GP	Golden plover	500	180	50				Flying	Flying S, distant
6	Non-breeding 2021-22	3	07/10/2021	1254	BW	Black-tailed godwit	90	230	60				Flying	Quite distant
7	Non-breeding 2021-22	3	06/12/2021	931	CU	Curlew	28	30	20				Flying	Flying N
8	Non-breeding 2021-22	3	07/03/2022	1005	GP	Golden plover	100	60	40				Flying	Quite distant, flying W
9	Non-breeding 2021-22	3	07/03/2022	1012	GP	Golden plover	21	20	30				Flying	Flying E
10	Non-breeding 2021-22	3	07/03/2022	1012	GP	Golden plover	12	225	20	30-20-10-1-10-30			Flying	Flew over site, back up and away N
11	Non-breeding 2021-22	4	02/11/2021	931	CU	Curlew	1	42	15	10-0			Flying	Flying E
12	Non-breeding 2021-22	4	02/11/2021	952	CU	Curlew	1	1	5				Flying	Flew up from field over hedge and back down again
13	Non-breeding 2021-22	4	08/10/2021	819	CU	Curlew	1	14	10				Flying	Flying in low over field, seemed to land in
14	Non-breeding 2021-22	4	01/12/2021	1356	CU	Curlew	2	20	10				Flying	Flying between fields, presumably scared up by Peregrine
15	Non-breeding 2021-22	4	07/02/2022	1309	CU	Curlew	11	75	40				Flying	Flying NE
16	Breeding 2022	1	28/03/2022	1942	GP	Golden plover	5	45	30	20-10-30		Ad	Flying	
17	Breeding 2022	4	14/08/2022	815	CU	Curlew	1	15	10				Flying	

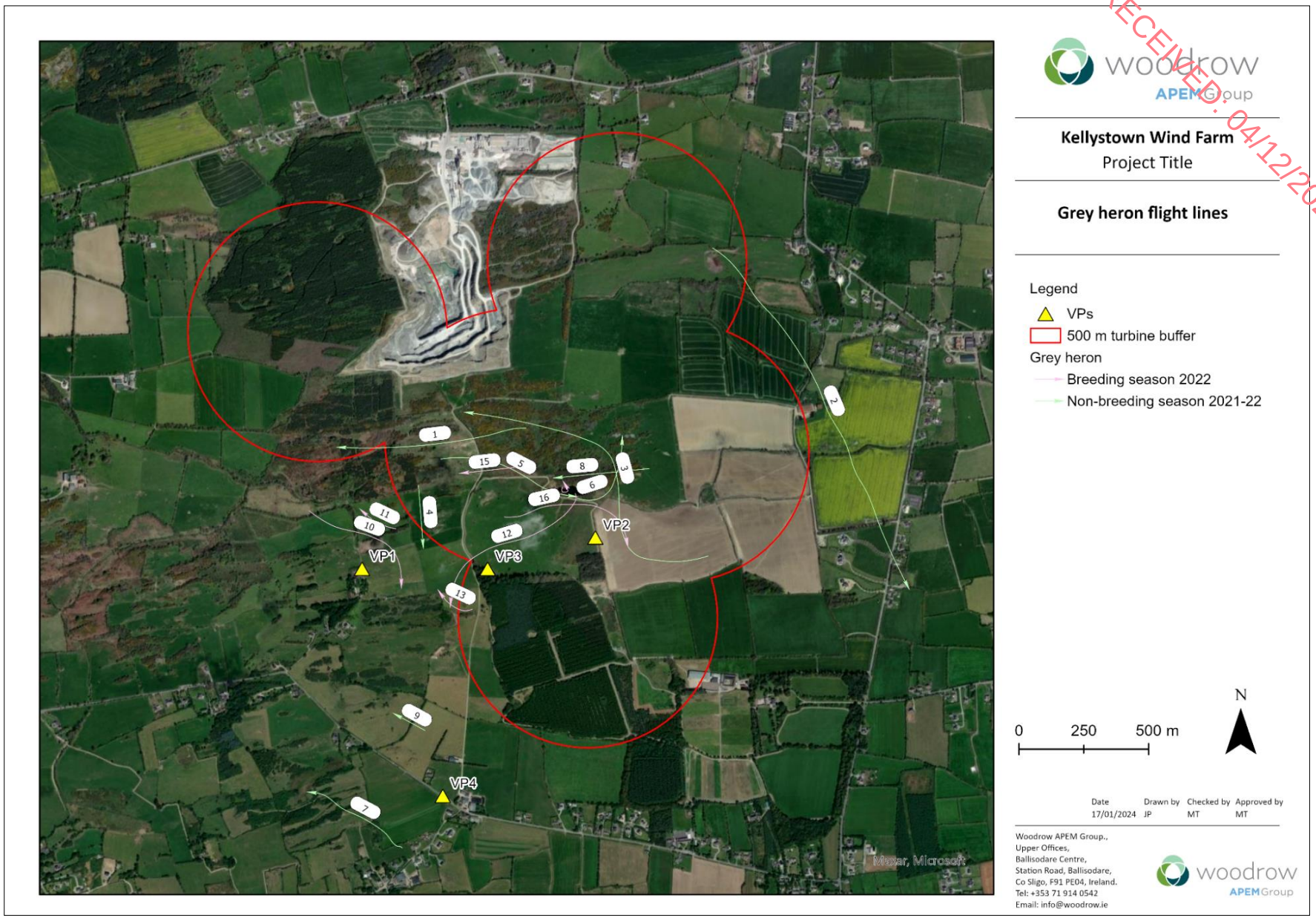

Figure A2.7: Grey heron flight lines

Table A2.7: VP watch data for grey heron

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	02/02/2022	1234	H	Grey heron	1	35	20				Flying	Flying W, then down
2	Non-breeding 2021-22	2	04/02/2022	1630	H	Grey heron	1	210	80	20-80-40			Flying	Flying S, rose quite high before dropping again
3	Non-breeding 2021-22	2	04/02/2022	1703	H	Grey heron	1	225	40	40-30-40			Flying	Flying W
4	Non-breeding 2021-22	3	12/01/2022	1618	H	Grey heron	1	10	5				Flying	Flying low over the field and down
5	Non-breeding 2021-22	3	07/03/2022	1051	H	Grey heron	1	40	10	10-0			Flying	Flying into land
6	Non-breeding 2021-22	3	07/03/2022	1106	H	Grey heron	1	75	10	0-10-0			Flying	Flew up, and down again behind trees
7	Non-breeding 2021-22	4	02/02/2022	1518	H	Grey heron	1	75	20	20-30			Flying	Flying W
8	Non-breeding 2021-22	4	07/02/2022	1255	H	Grey heron	1	95	50	50-30			Flying	Flying W
9	Non-breeding 2021-22	4	07/03/2022	1435	H	Grey heron	1	10	10				Flying	Flying low
10	Breeding 2022	1	17/04/2022	1000	H	Grey heron	1	40	6				Flying	Flying around quarry banks 8:30-9:45
11	Breeding 2022	1	19/04/2022	855	H	Grey heron	1	15	10	60-300			Soaring	5 birds together soaring at different heights
12	Breeding 2022	3	23/03/2022	1610	H	Grey heron	1	55	10	0-10			Flying	Flew up from beside the pond, calling. Flew towards VP
13	Breeding 2022	4	05/06/2022	740	H	Grey heron	1	10	15				Commuting	
14	Breeding 2022	3	08/06/2022	1600	H	Grey heron	1	0	0				Hunting	At the pond within the buffer
15	Breeding 2022	3	08/06/2022	1730	H	Grey heron	1	30	5				Commuting	
16	Breeding 2022	3	17/06/2022	1710	H	Grey heron	1	38	50				Commuting	Commuting/called

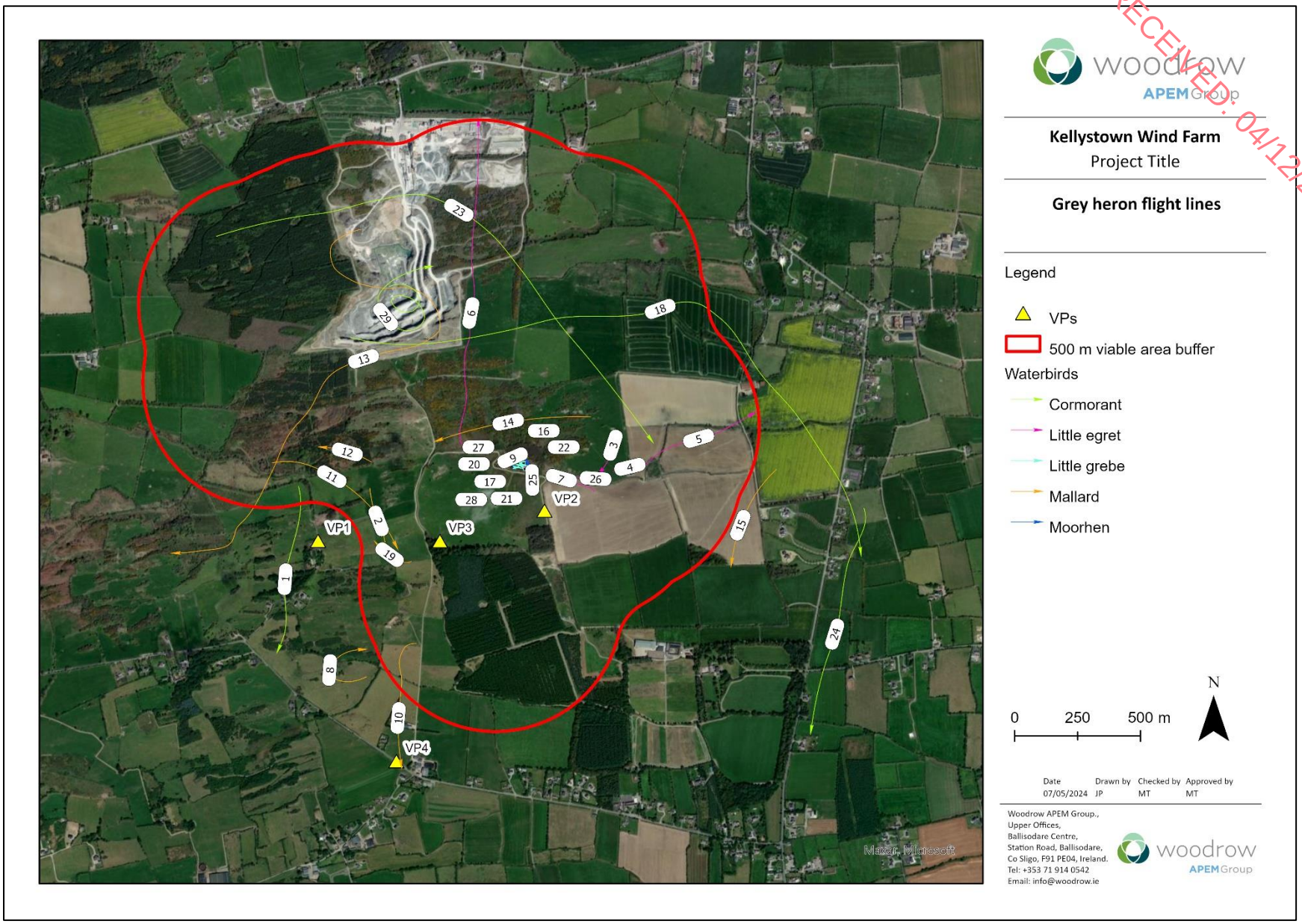

Figure A2.8: Other waterbirds flight lines

Table A2.8: VP watch data for other waterbirds

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	02/02/2022	1215	CA	Cormorant	1	60	70				Flying	Flying S
2	Non-breeding 2021-22	1	13/03/2022	1527	MA	Mallard	1	15	30		M		Flying	Flying S
3	Non-breeding 2021-22	2	06/12/2021	1321	ET	Little egret	1	18	2				Perched	Flew from one field to another
4	Non-breeding 2021-22	2	06/12/2021	1509	ET	Little egret	1	15	1				Perched	Relocating
5	Non-breeding 2021-22	2	06/12/2021	1526	ET	Little egret	1	20	40	0-40			Flying	Flying away E
6	Non-breeding 2021-22	3	07/10/2021	1155	ET	Little egret	1	170	60				Flying	Initially seen flying low, then rose and headed away N
7	Non-breeding 2021-22	3	06/12/2021	1053	ET	Little egret	1	12	2				Perched	Was perched in field, flew to another spot
8	Non-breeding 2021-22	4	07/03/2022	1400	MA	Mallard	2	16	5		M,F		Flying	Flying into land
9	Breeding 2022	3	19/04/2022	1445	LG	Little grebe	3	0	0				Perched	Perched in hedgerow within buffer. Not there at 15:55
10	Breeding 2022	4	24/04/2022	740	MA	Mallard	1	10	30	20-			Commuting	
11	Breeding 2022	1	18/05/2022	1410	MA	Mallard	1	22	30	20-30	M		Commuting	
12	Breeding 2022	1	18/05/2022	1530	MA	Mallard	1	3	30	20-30			Commuting	May have landed in bog among the trees/scrub
13	Breeding 2022	1	18/05/2022	1605	MA	Mallard	3	60	60	1-10-60			Commuting	Lost into scrub
14	Breeding 2022	2	16/05/2022	1050	MA	Mallard	3	19	15	01-15			Commuting	
15	Breeding 2022	2	16/05/2022	1240	MA	Mallard	1	8	20	15-20			Commuting	
16	Breeding 2022	2	16/05/2022	1320	LG	Little grebe	1	0	0				Present	On the pond below VP 2 within the buffer
17	Breeding 2022	2	16/05/2022	1320	MH	Moorhen	1	0	0				Present	On the pond below VP 2 within the buffer
18	Breeding 2022	3	17/05/2022	1255	CA	Cormorant	1	160	60	40-60			Commuting	
19	Breeding 2022	4	22/05/2022	655	MA	Mallard	2	10	30	1-30			Commuting	
20	Breeding 2022	3	20/06/2022	1830	MH	Moorhen	1	0	0				Feeding	On the pond within buffer
21	Breeding 2022	3	20/06/2022	1835	LG	Little grebe	1	0	0				Feeding	On the pond within buffer
22	Breeding 2022	2	27/06/2022	1525	LG	Little grebe	4	0	0				Feeding	Pair feeding 2 young on pond below VP 2
23	Breeding 2022	1	11/07/2022	1230	CA	Cormorant	1	112	100				Commuting	
24	Breeding 2022	2	15/08/2022	1020	CA	Cormorant	1	55	60	20-60			Commuting	
25	Breeding 2022	3	11/07/2022	1350	ET	Little egret	1	4	2				Flying	Flew in and landed at pond. Only seen very briefly
26	Breeding 2022	3	11/07/2022	1500	ET	Little egret	1	7	2				Flying	Landed in drain. Maybe ID 4
27	Breeding 2022	3	04/08/2022	1540	LG	Little grebe	2	0	0			Ad, Juv	Hunting	On pond
28	Breeding 2022	3	16/08/2022	1705	LG	Little grebe	1	0	0				Swimming	On pond
29	Breeding 2022	1	29/06/2022	1345	CA	Cormorant	1	60	80	20-80			Commuting	

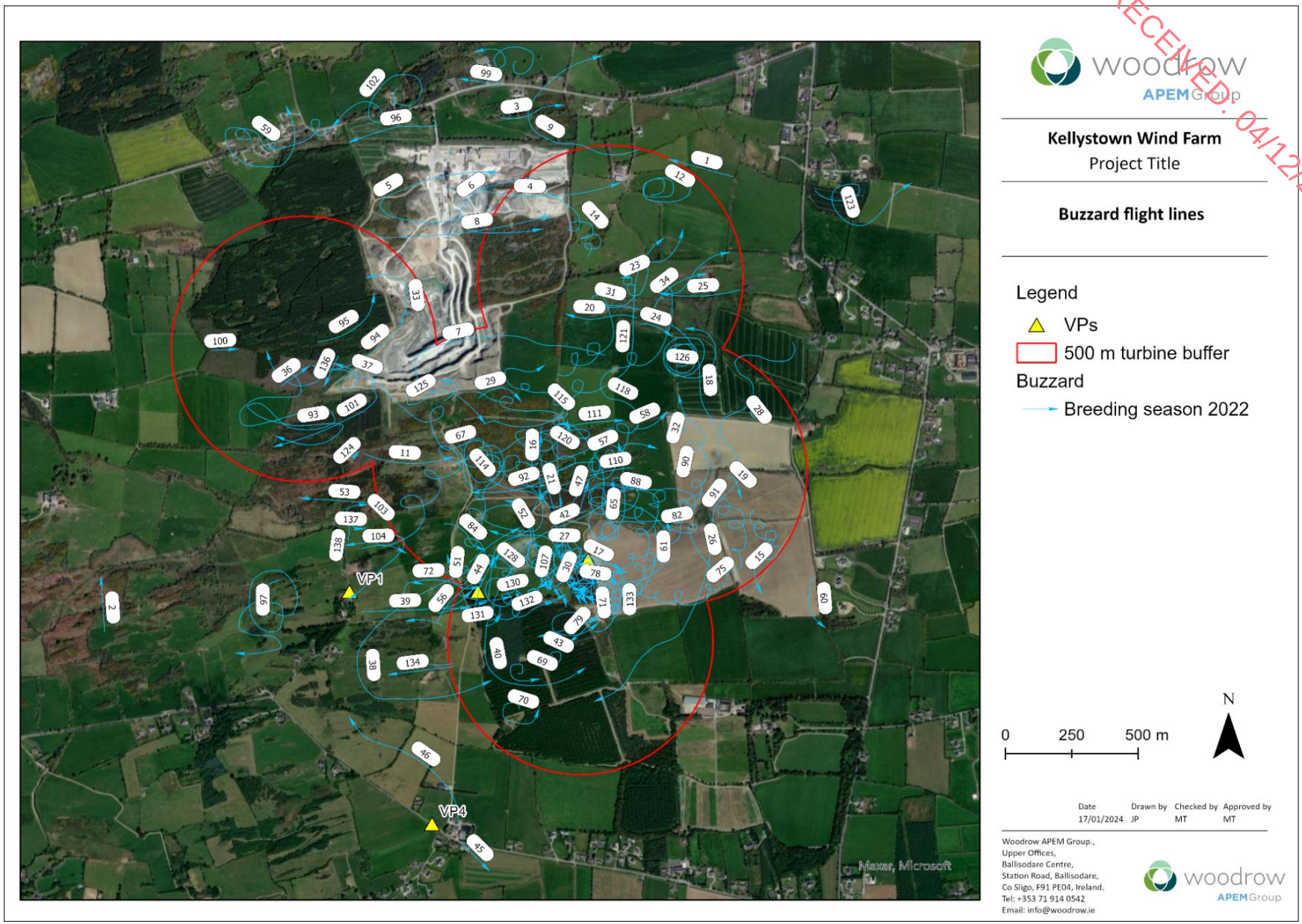

Figure A2.9: Buzzard, 2022 breeding season flight lines

Table A2.9: VP watch data for buzzard (breeding 2022)

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
24	Breeding 2022	3	23/03/2022	1532	BZ	Buzzard	1	8	15	15-0	M.F		Breeding/territorial	In tree, flapping. One flew to ground immediately
25	Breeding 2022	3	23/03/2022	1707	BZ	Buzzard	1	20	5				Flying	Flying low along and behind hedgerow
18	Breeding 2022	2	24/03/2022	800	BZ	Buzzard	1	44	5			Ad	Flying	Perched in tree, HC chased it off and continued with it
19	Breeding 2022	2	24/03/2022	848	BZ	Buzzard	1	10	1				Flying	Flew from tree to a stick protruding from a bonfire pile
20	Breeding 2022	2	24/03/2022	906	BZ	Buzzard	1	24	5		M,F	Ad	Breeding/territorial	Two birds mating. Male then flew off and female perched
1	Breeding 2022	1	28/03/2022	1615	BZ	Buzzard	2	240	60	40-60			Circling	Rising, moving W, distant
2	Breeding 2022	1	28/03/2022	1624	BZ	Buzzard	1	50	30	30-20			Flying	Gliding N, then mobbed by HC and descended
3	Breeding 2022	1	28/03/2022	1646	BZ	Buzzard	1	136	40				Flying	Flying E, quite distant
4	Breeding 2022	1	28/03/2022	1652	BZ	Buzzard	1	265	30				Flying	Flying in over quarry and down
5	Breeding 2022	1	28/03/2022	1659	BZ	Buzzard	3	90	40	40-20			Flying	Two birds chasing off a third bird, then returned to near quarry
6	Breeding 2022	1	28/03/2022	1701	BZ	Buzzard	1	180	80	20-80-20			Circling	Circling upwards, then descending quickly
7	Breeding 2022	1	28/03/2022	1709	BZ	Buzzard	1	235	60	40-60-20			Hunting	Gliding about, bit of hovering, then descended to tree in gorse
8	Breeding 2022	1	28/03/2022	1716	BZ	Buzzard	1	420	100	60-100-20			Flying	Gliding & circling, then descended behind hill
9	Breeding 2022	1	28/03/2022	1731	BZ	Buzzard	3	510	100	60-100			Flying	Gliding and circling, drifting further away
38	Breeding 2022	4	28/03/2022	1312	BZ	Buzzard	1	180	20				Flying	Drifting W
39	Breeding 2022	4	28/03/2022	1314	BZ	Buzzard	1	140	30	20-30-20			Flying	Drifting E, circling a bit over woods, then dropped
40	Breeding 2022	4	28/03/2022	1336	BZ	Buzzard	1	105	50	20-50			Flying	Up from near forest, then rose and headed NW
41	Breeding 2022	4	28/03/2022	1356	BZ	Buzzard	2	445	60	20-40			Displaying	Two birds up, circling. One plunged, the other drifted W
42	Breeding 2022	4	28/03/2022	1410	BZ	Buzzard	2	145	40	20-100-20	M,F		Flying	One bird up circling
43	Breeding 2022	4	28/03/2022	415	BZ	Buzzard	2	315	100		M,F	Ad	Displaying	Pair up, circling. Male did a few swoops, rising back up again.
44	Breeding 2022	4	28/03/2022	1440	BZ	Buzzard	2	190	40			Juv	Flying	Circling & drifting away
45	Breeding 2022	4	28/03/2022	1449	BZ	Buzzard	2	120	40	40-30		Juv	Flying	Three birds, 2 headed S
46	Breeding 2022	4	28/03/2022	1449	BZ	Buzzard	1	120	40				Flying	The third bird headed W
47	Breeding 2022	4	28/03/2022	1518	BZ	Buzzard	1	35	30				Flying	Distant, drifting away
48	Breeding 2022	4	28/03/2022	1520	BZ	Buzzard	1	5	10				Flying	Flying into tree
49	Breeding 2022	4	28/03/2022	1524	BZ	Buzzard	1	45	20				Flying	Flew out of tree, headed N
50	Breeding 2022	4	28/03/2022	1526	BZ	Buzzard	2	35	20				Circling	Flying N, soon dropped out of view
51	Breeding 2022	4	28/03/2022	1529	BZ	Buzzard	1	90	20		F		Flying	Presumably one of previous birds. Circling again for a bit
52	Breeding 2022	4	28/03/2022	1535	BZ	Buzzard	1	105	40	40-20			Flying	Drifting E, then back W and descended
53	Breeding 2022	4	28/03/2022	1539	BZ	Buzzard	4	285	50	30-50-30			Flying	Quite distant, drifting W
10	Breeding 2022	1	19/04/2022	820	BZ	Buzzard	1	25	15	50-60			Commuting	
12	Breeding 2022	2	19/04/2022	1025	BZ	Buzzard	5	220	300				Flying	Circling low. Disappeared behind hill
13	Breeding 2022	2	19/04/2022	1050	BZ	Buzzard	1	45	40	30-40			Flying	Circling low
14	Breeding 2022	2	19/04/2022	1135	BZ	Buzzard	1	180	40	20-30			Commuting	
15	Breeding 2022	2	19/04/2022	1140	BZ	Buzzard	1	160	30				Present	
16	Breeding 2022	2	19/04/2022	1155	BZ	Buzzard	1	45	30	0-30			Feeding	
17	Breeding 2022	2	19/04/2022	1230	BZ	Buzzard	2	30	30	100-200			Soaring	While on tea break
26	Breeding 2022	3	19/04/2022	1425	BZ	Buzzard	4	230	200				Present	On a pond within buffer at 14:45. Seen on and off till 16:35
27	Breeding 2022	3	19/04/2022	1450	BZ	Buzzard	3	100	250				Commuting	Really good view

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
28	Breeding 2022	3	19/04/2022	1545	BZ	Buzzard	1	0	0				Perched	
29	Breeding 2022	3	19/04/2022	1650	BZ	Buzzard	1	60	10	5-10			Hunting	
11	Breeding 2022	1	20/04/2022	745	BZ	Buzzard	1	40	10	30-50			Commuting	
30	Breeding 2022	3	20/04/2022	1410	BZ	Buzzard	1	15	8				Present	Standing in ploughed field within buffer
31	Breeding 2022	3	20/04/2022	1445	BZ	Buzzard	2	180	100				Present	On ploughed fields within buffer between 14:00 and 17:00
32	Breeding 2022	3	20/04/2022	1455	BZ	Buzzard	1	0	0				Present	On ploughed fields within buffer between 14:00 and 17:00
33	Breeding 2022	3	20/04/2022	1520	BZ	Buzzard	2	30	20				Perched	Perched on scrub within buffer. Didn't see it leave.
34	Breeding 2022	3	20/04/2022	1550	BZ	Buzzard	1	30	5				Flying	Flying. Then landed in conifer
35	Breeding 2022	3	20/04/2022	1555	BZ	Buzzard	1	0	0				Perched	Perched on a scrub. I didn´t see it leave.
36	Breeding 2022	3	20/04/2022	1630	BZ	Buzzard	1	10	5				Feeding	Feeding and resting in ploughed fields within buffer
37	Breeding 2022	3	20/04/2022	1645	BZ	Buzzard	1	10	10				Flying	Low and direct flight into conifers
21	Breeding 2022	2	21/04/2022	1040	BZ	Buzzard	1	130	50	20-50			Flying	Drifted behind conifers
22	Breeding 2022	2	21/04/2022	1055	BZ	Buzzard	1	10	5				Present	Standing in field within buffer
23	Breeding 2022	2	21/04/2022	1135	BZ	Buzzard	1	0	0				Present	Standing in field
54	Breeding 2022	4	21/04/2022	720	BZ	Buzzard	1	20	60	20-60			Commuting	
55	Breeding 2022	4	21/04/2022	815	BZ	Buzzard	1	15	40	60-80			Present	
56	Breeding 2022	4	24/04/2022	700	BZ	Buzzard	1	25	30				Commuting	
60	Breeding 2022	2	16/05/2022	1205	BZ	Buzzard	1	6	30	25-30			Gliding	
61	Breeding 2022	2	16/05/2022	1215	BZ	Buzzard	1	27	40	30-40			Commuting	
67	Breeding 2022	3	16/05/2022	1420	BZ	Buzzard	1	168	80	40-80			Mobbed	Mobbed by HC
62	Breeding 2022	2	17/05/2022	1000	BZ	Buzzard	1	5	20				Flying	
68	Breeding 2022	3	17/05/2022	1330	BZ	Buzzard	1	180	30	10-30			Hunting	Flying slowly along edge of scrub
57	Breeding 2022	1	18/05/2022	1615	BZ	Buzzard	1	30	20	10-20			Hunting	Along the gorse. Lost behind hedge
58	Breeding 2022	1	18/05/2022	1630	BZ	Buzzard	1	60	60	50-60			Hunting	Hovering over the same spot for 60s. Still there when I left
63	Breeding 2022	2	18/05/2022	1740	BZ	Buzzard	1	8	30	25-30			Flying	Flew into conifers. Carrying what looked like a worm in its beak
64	Breeding 2022	2	18/05/2022	1810	BZ	Buzzard	1	30	8				Hunting	Flying low to ground
65	Breeding 2022	2	18/05/2022	1855	BZ	Buzzard	1	15	8				Flying	Flying low into scrub. Lost in scrub
66	Breeding 2022	2	18/05/2022	1925	BZ	Buzzard	1	0	0				Perched	
69	Breeding 2022	4	22/05/2022	825	BZ	Buzzard	1	55	60	50-60			Circling	Circling above conifers
70	Breeding 2022	4	22/05/2022	830	BZ	Buzzard	1	30	50				Circling	Circling above conifers
59	Breeding 2022	1	26/05/2022	1755	BZ	Buzzard	1	94	60	30-60			Soaring	
71	Breeding 2022	4	29/05/2022	850	BZ	Buzzard	1	80	50	30-50			Flying	
72	Breeding 2022	4	29/05/2022	920	BZ	Buzzard	1	35	20				Flying	
73	Breeding 2022	4	05/06/2022	705	BZ	Buzzard	1	40	40				Circling	Circling just above conifers
74	Breeding 2022	4	05/06/2022	835	BZ	Buzzard	1	15	25				Commuting	
75	Breeding 2022	3	08/06/2022	1635	BZ	Buzzard	2	84	20	10-20			Hunting	Low over scrub and along ditches
76	Breeding 2022	3	08/06/2022	1715	BZ	Buzzard	1	263	80	10-80			Circling	
77	Breeding 2022	2	17/06/2022	1230	BZ	Buzzard	1	15	40	20-40			Flying	Landed for 10s in tree
78	Breeding 2022	2	17/06/2022	1230	BZ	Buzzard	1	8	40	15-40			Calling	
79	Breeding 2022	2	17/06/2022	1340	BZ	Buzzard	1	25	30				Calling	
80	Breeding 2022	2	17/06/2022	1410	BZ	Buzzard	1	0	0				Calling	
81	Breeding 2022	3	17/06/2022	1445	BZ	Buzzard	1	10	20				Flying	Appeared to land in trees
82	Breeding 2022	3	17/06/2022	1630	BZ	Buzzard	1	0	0				Perched	On a post within buffer.

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
83	Breeding 2022	3	17/06/2022	1705	BZ	Buzzard	1	7	10				Flying	Flew from conifer tree.
84	Breeding 2022	4	19/06/2022	820	BZ	Buzzard	1	45	60	40-60			Hunting	
85	Breeding 2022	4	19/06/2022	845	BZ	Buzzard	1	10	50	40-50			Gliding	Just above trees
86	Breeding 2022	3	20/06/2022	1900	BZ	Buzzard	2	0	0			Ad	Perched	Adult BZ and chick within buffer
87	Breeding 2022	2	27/06/2022	1220	BZ	Buzzard	1	0	0			Juv	Perched	
88	Breeding 2022	2	27/06/2022	1325	BZ	Buzzard	1	144	40	10-40		Ad	Circling	Landed in conifer
89	Breeding 2022	2	27/06/2022	1330	BZ	Buzzard	1	11	30	20-30			Flying	Flew from conifer to broadleaf trees. Dive bombed by SH
90	Breeding 2022	2	27/06/2022	1340	BZ	Buzzard	1	98	80	15-80			Soaring	Dropped behind hill.
91	Breeding 2022	2	27/06/2022	1410	BZ	Buzzard	1	176	150	100-150			Soaring	
92	Breeding 2022	2	27/06/2022	1455	BZ	Buzzard	1	50	20	10-20			Hunting	
93	Breeding 2022	1	28/06/2022	1335	BZ	Buzzard	1	287	80	10-80			Flying	Drifting over trees. Lost in trees
94	Breeding 2022	1	28/06/2022	1400	BZ	Buzzard	1	27	30	10-30			Flying	Went into trees
95	Breeding 2022	1	28/06/2022	1405	BZ	Buzzard	2	16	30	20-30			Flying	Drifted behind conifers
96	Breeding 2022	1	29/06/2022	1240	BZ	Buzzard	1	6	50				Commuting	Lost behind conifers
97	Breeding 2022	1	29/06/2022	1340	BZ	Buzzard	2	65	60	40-60			Circling	
98	Breeding 2022	1	29/06/2022	1400	BZ	Buzzard	1	42	50	30-50			Circling	Lost in trees
99	Breeding 2022	1	29/06/2022	1425	BZ	Buzzard	1	29	40	15-40			Flying	Appeared to land in trees
100	Breeding 2022	1	11/07/2022	1240	BZ	Buzzard	1	69	50				Hunting	Dropped behind trees
112	Breeding 2022	3	11/07/2022	1330	BZ	Buzzard	1	0	0			Juv	Perched	Perched on dead tree within buffer
113	Breeding 2022	3	11/07/2022	1335	BZ	Buzzard	1	0	0			Juv	Perched	On post close to pond within buffer
114	Breeding 2022	3	11/07/2022	1345	BZ	Buzzard	1	175	150				Flying	Flew from perch
115	Breeding 2022	3	11/07/2022	1415	BZ	Buzzard	1	375	60				Hunting	Lost over hill
116	Breeding 2022	3	11/07/2022	1430	BZ	Buzzard	1	3	3				Flying	Flew into corpse. Only seen briefly.
117	Breeding 2022	3	11/07/2022	1435	BZ	Buzzard	1	0	0				Perched	Perched in conifer tree within buffer
118	Breeding 2022	3	11/07/2022	1510	BZ	Buzzard	1	240	50				Flying	Lost behind trees
119	Breeding 2022	3	11/07/2022	1535	BZ	Buzzard	2	170	120				Circling	One flew out from trees and joined a second
120	Breeding 2022	3	11/07/2022	1515	BZ	Buzzard	1	12	10				Flying	Flying low going into trees
121	Breeding 2022	3	11/07/2022	1605	BZ	Buzzard	1	90	40				Hunting	Lost behind hedge/tree line
122	Breeding 2022	3	11/07/2022	1610	BZ	Buzzard	1	0	0				Perched	On post close to pond within buffer
123	Breeding 2022	3	11/07/2022	1620	BZ	Buzzard	1	30	40				Circling	Circling around trees. Lost behind trees
129	Breeding 2022	4	17/07/2022	845	BZ	Buzzard	1	25	20				Present	
101	Breeding 2022	1	18/07/2022	1050	BZ	Buzzard	1	45	30				Present	
102	Breeding 2022	1	18/07/2022	1330	BZ	Buzzard	1	23	50				Present	
136	Breeding 2022	1	18/07/2022	1115	BZ	Buzzard	1	8	10				Present	
137	Breeding 2022	1	18/07/2022	1245	BZ	Buzzard	1	0	0				Present	
106	Breeding 2022	2	20/07/2022	1135	BZ	Buzzard	1	0	0				Present	
107	Breeding 2022	2	21/07/2022	1150	BZ	Buzzard	1	88	50				Present	
108	Breeding 2022	2	21/07/2022	1215	BZ	Buzzard	1	57	70				Present	
109	Breeding 2022	2	21/07/2022	1350	BZ	Buzzard	1	0	0				Present	
135	Breeding 2022	2	21/07/2022	1355	BZ	Buzzard	1	16	20				Present	
124	Breeding 2022	3	22/07/2022	1050	BZ	Buzzard	1	0	0				Present	
125	Breeding 2022	3	22/07/2022	1120	BZ	Buzzard	1	31	20				Present	
126	Breeding 2022	3	22/07/2022	1140	BZ	Buzzard	1	118	100				Present	

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
127	Breeding 2022	3	22/07/2022	1142	BZ	Buzzard	1	49	20				Present	
128	Breeding 2022	3	22/07/2022	1250	BZ	Buzzard	1	73	80				Present	
130	Breeding 2022	4	24/07/2022	835	BZ	Buzzard	1	45	60				Present	
131	Breeding 2022	4	24/07/2022	850	BZ	Buzzard	1	12	40				Present	
132	Breeding 2022	4	31/07/2022	810	BZ	Buzzard	1	28	50				Present	
133	Breeding 2022	4	31/07/2022	915	BZ	Buzzard	1	23	40				Present	
103	Breeding 2022	1	03/08/2022	1125	BZ	Buzzard	1	11	40	25-40			Gliding	Lost into conifer
104	Breeding 2022	1	03/08/2022	1320	BZ	Buzzard	1	195	10	1-10			Flying	Landed on post
105	Breeding 2022	1	03/08/2022	1515	BZ	Buzzard	1	8	15	1-15			Flying	On telegraph pole
138	Breeding 2022	1	03/08/2022	1518	BZ	Buzzard	1	7	15	01/05/2015			Flying	Lost in trees/scrub.
110	Breeding 2022	2	04/08/2022	1105	BZ	Buzzard	1	47	25	20-25			Flying	Went behind conifers
111	Breeding 2022	2	15/08/2022	950	BZ	Buzzard	1	33	10	5-10			Hunting	Along gorse scrub
134	Breeding 2022	4	21/08/2022	1025	BZ	Buzzard	1	24	25	20-25			Flying	

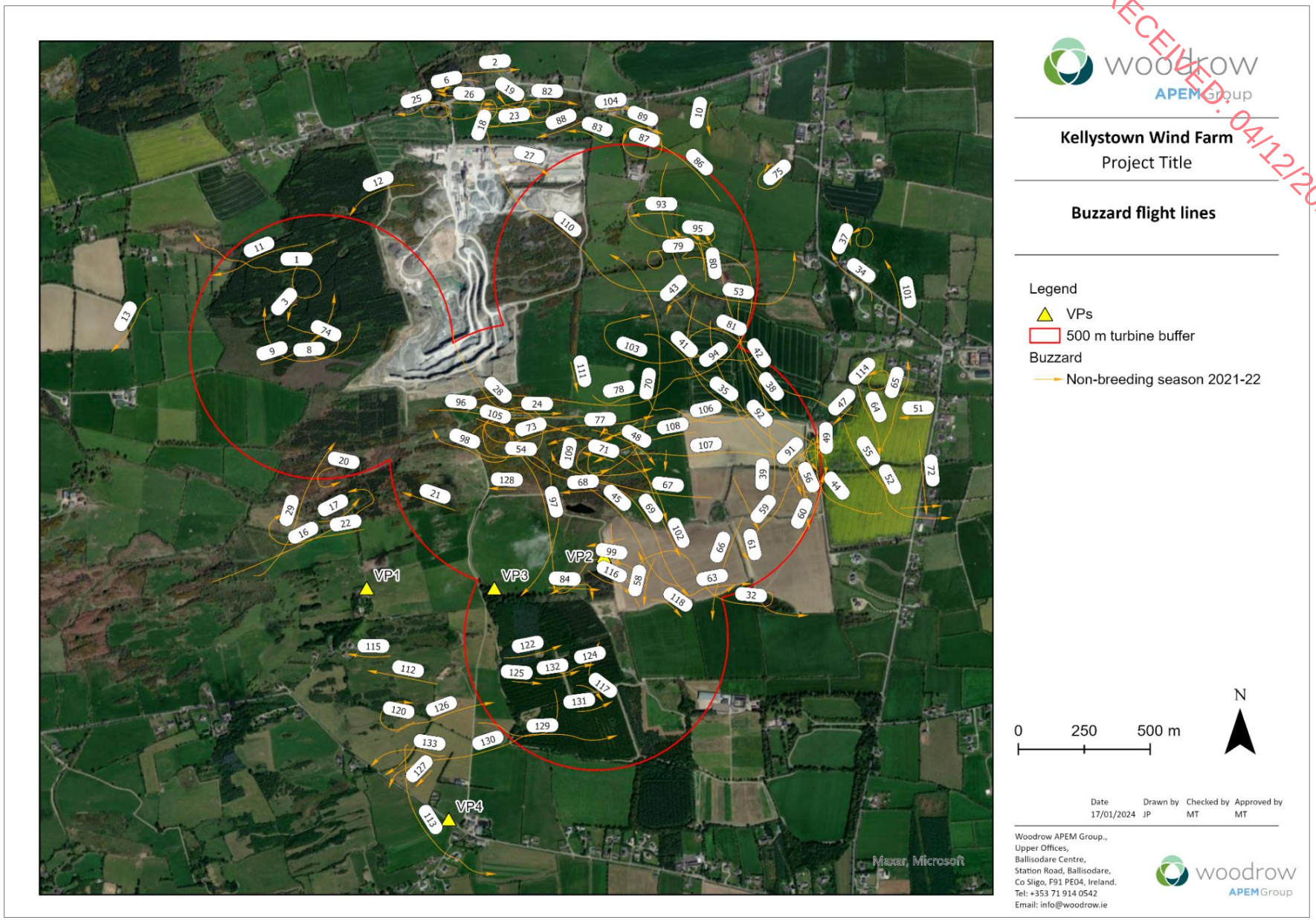

Figure A2.10: Buzzard, 2021-22 non-breeding season flight lines

Table A2.10: VP watch data for buzzard (non-breeding 2021-22)

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	VP No	Season	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	1	Non-breeding 2021-22	21/09/2021	1337	BZ	Buzzard	1	140	20	15-25			Soaring	Dropped out of view
2	1	Non-breeding 2021-22	08/10/2021	1133	BZ	Buzzard	2	390	150	150-80			Circling	Drifting E, descending, being mobbed occasionally
3	1	Non-breeding 2021-22	08/10/2021	1225	BZ	Buzzard	1	22	30				Hunting	Hanging above trees before dropping
4	1	Non-breeding 2021-22	08/10/2021	1234	BZ	Buzzard	1	88	50				Hunting	Presumably same bird, moving E over trees
5	1	Non-breeding 2021-22	08/10/2021	1246	BZ	Buzzard	1	74	100	100-60			Circling	Drifting gradually W & down
6	1	Non-breeding 2021-22	08/10/2021	1254	BZ	Buzzard	1	100	100	100-20			Circling	Drifting gradually W & down. Landed in distant tree
7	1	Non-breeding 2021-22	08/10/2021	1259	BZ	Buzzard	1	150	100				Circling	Up again, being mobbed
8	1	Non-breeding 2021-22	08/10/2021	1303	BZ	Buzzard	1	290	30				hunting	Being mobbed by HC, then began hanging and scouting, drifting W
9	1	Non-breeding 2021-22	08/10/2021	1322	BZ	Buzzard	1	147	40	40-50-20			hunting	Hanging in the air, drifting over trees, stopping occasionally, then down
10	1	Non-breeding 2021-22	08/10/2021	1342	BZ	Buzzard	1	12	80	80-40			Gliding	Gliding down and being mobbed, distant
11	1	Non-breeding 2021-22	08/10/2021	1354	BZ	Buzzard	1	320	40	40-20		Ad	hunting	Drifting over trees, then landed
12	1	Non-breeding 2021-22	08/10/2021	1405	BZ	Buzzard	2	163	50	30-50-30		Ad	Circling	Circling, then drifted W and down. One brief interaction between them.
13	1	Non-breeding 2021-22	09/11/2021	1233	BZ	Buzzard	1	64	20				Hunting	Initially hanging in the air, then drifted W
14	1	Non-breeding 2021-22	01/12/2021	932	BZ	Buzzard	1	5	10				Flying	Flew up briefly, then dropped again
15	1	Non-breeding 2021-22	10/01/2022	1528	BZ	Buzzard	1	45	40				Circling	Quite distant
16	1	Non-breeding 2021-22	02/02/2022	1142	BZ	Buzzard	1	105	40				Circling	Circling towards trees, then joined 2nd bird and circled above it and drop
17	1	Non-breeding 2021-22	02/02/2022	1143	BZ	Buzzard	1	30	20				Circling	Below previous bird, descended into trees
18	1	Non-breeding 2021-22	02/02/2022	1224	BZ	Buzzard	1	30	50	50-20			Circling	Circling for a bit before dropping, quite distant
19	1	Non-breeding 2021-22	02/02/2022	1229	BZ	Buzzard	1	35	50	50-20			Circling	Presumably same bird as above. More distant now, being mobbed by HC
20	1	Non-breeding 2021-22	02/02/2022	1237	BZ	Buzzard	1	40	30				Hunting	Gliding, hovered for a bit, then drifted down
21	1	Non-breeding 2021-22	02/02/2022	1334	BZ	Buzzard	1	20	10				Flying	Gliding low, lost behind bushes
22	1	Non-breeding 2021-22	07/02/2022	1003	BZ	Buzzard	1	20	5				Flying	Flying low along trees
23	1	Non-breeding 2021-22	07/02/2022	1028	BZ	Buzzard	3	210	20	20-40-20			Flying	Moving E, calling. Two more birds joined then, rising & dropping
24	1	Non-breeding 2021-22	07/02/2022	1040	BZ	Buzzard	1	50	10				Flying	Flying low along vegetation in front of quarry, then mobbed by PE
25	1	Non-breeding 2021-22	13/03/2022	1423	BZ	Buzzard	1	390	50	30-50			Circling	Initially circling upwards, then headed W and dropped
26	1	Non-breeding 2021-22	13/03/2022	1429	BZ	Buzzard	4	450	60	40-80			Circling	Immediately saw 4 more birds circling initial area where ID4 had been
27	1	Non-breeding 2021-22	13/03/2022	1450	BZ	Buzzard	1	35	20	20-30-10			Flying	Rising and dropping, then disappeared behind hill
28	1	Non-breeding 2021-22	13/03/2022	1456	BZ	Buzzard	1	145	30				Flying	Moving S
29	1	Non-breeding 2021-22	13/03/2022	1458	BZ	Buzzard	1	80	20				Flying	Flying N towards plantation
30	1	Non-breeding 2021-22	13/03/2022	1544	BZ	Buzzard	1	75	30	50-30-20			Circling	Circling initially, then flew down and E
31	1	Non-breeding 2021-22	13/03/2022	1555	BZ	Buzzard	1	90	10				Hunting	Scouring fields to E
32	2	Non-breeding 2021-22	16/09/2021	1108	BZ	Buzzard	1	80	15				Soaring	
33	2	Non-breeding 2021-22	04/10/2021	1129	BZ	Buzzard	1	65	40				Circling	Drifting away
34	2	Non-breeding 2021-22	04/10/2021	1153	BZ	Buzzard	1	195	40				Circling	Circling & moving N
35	2	Non-breeding 2021-22	04/10/2021	1156	BZ	Buzzard	2	420	80	20-80-10		Juv	Hunting	Initially mobbed by HC, rose high with 2nd bird, landed on telegraph pole
36	2	Non-breeding 2021-22	04/10/2021	1222	BZ	Buzzard	1	45	20				Hunting	Hovering, then dropped
37	2	Non-breeding 2021-22	04/10/2021	1245	BZ	Buzzard	1	55	50				Circling	
38	2	Non-breeding 2021-22	07/10/2021	1422	BZ	Buzzard	2	750	30	30-50	M,F	Ad	Hunting	Hunting together, hanging in the air, drifted upwards
39	2	Non-breeding 2021-22	07/10/2021	1448	BZ	Buzzard	2	326	30		M,F	Ad	Hunting	Drifting S, scouting

Map ID	VP No	Season	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
40	2	Non-breeding 2021-22	07/10/2021	1521	BZ	Buzzard	1	2	5			Ad	Flying	Flying up into bush
41	2	Non-breeding 2021-22	07/10/2021	1531	BZ	Buzzard	1	350	40	20-40		Ad	Hunting	Initially hanging over field, then rose and drifted over fields
42	2	Non-breeding 2021-22	07/10/2021	1550	BZ	Buzzard	1	172	20			Ad	Hunting	Flying in low through trees, bit of hovering
43	2	Non-breeding 2021-22	07/10/2021	1557	BZ	Buzzard	1	18	20			Ad	Hunting	Hovering, then flew into tree
44	2	Non-breeding 2021-22	07/10/2021	1604	BZ	Buzzard	2	170	20	30-20-10	M,F	Ad	Hunting	First one bird flying in slowly, joined another bird and headed off over fields
45	2	Non-breeding 2021-22	07/10/2021	1645	BZ	Buzzard	1	290	40	10-50		Ad	Hunting	Flew across field, mobbed by HC, then dropped into tree
46	2	Non-breeding 2021-22	07/10/2021	1711	BZ	Buzzard	1	30	10			Ad	Hunting	Flying low along field
47	2	Non-breeding 2021-22	10/11/2021	1455	BZ	Buzzard	1	5	10				Flying	Flew from tree to telegraph pole. Missed it flying onwards
48	2	Non-breeding 2021-22	10/11/2021	1507	BZ	Buzzard	1	44	5				Flying	Perched on bush, then flew low to another bush, being mobbed by a HC
49	2	Non-breeding 2021-22	10/11/2021	1528	BZ	Buzzard	1	7	5				Flying	Flying low towards barn
50	2	Non-breeding 2021-22	10/11/2021	1627	BZ	Buzzard	1	20	20				Flying	Flew across field towards scrub
51	2	Non-breeding 2021-22	16/11/2021	1024	BZ	Buzzard	1	13	20				Flying	Being mobbed, dropped
52	2	Non-breeding 2021-22	16/11/2021	1107	BZ	Buzzard	1	165	40	40-20			Circling	Circling, then dropped
53	2	Non-breeding 2021-22	16/11/2021	1209	BZ	Buzzard	2	490	40	40-20			Flying	Gliding about, eventually flew down into woods
54	2	Non-breeding 2021-22	16/11/2021	1220	BZ	Buzzard	1	230	20				Flying	Gliding about, then headed S
55	2	Non-breeding 2021-22	16/11/2021	1236	BZ	Buzzard	3	52	20				Flying	Gliding low above trees, two birds grabbed out at each other
56	2	Non-breeding 2021-22	06/12/2021	1317	BZ	Buzzard	1	160	10				Flying	Gliding low, scouting
57	2	Non-breeding 2021-22	06/12/2021	1351	BZ	Buzzard	1	30	40	20-50-20		Juv	Flying	Hovering above gorse, dropped
58	2	Non-breeding 2021-22	06/12/2021	1448	BZ	Buzzard	1	20	1				Flying	Flying low over fields
59	2	Non-breeding 2021-22	06/12/2021	1507	BZ	Buzzard	1	70	40	20-40-20			Circling	Circled trees for a bit, then flew across field and down behind trees
60	2	Non-breeding 2021-22	06/12/2021	1509	BZ	Buzzard	1	21	10				Flying	Flying low over field, landed in tree
61	2	Non-breeding 2021-22	06/12/2021	1526	BZ	Buzzard	1	100	20				Circling	Circling low over field, drifting E
62	2	Non-breeding 2021-22	06/12/2021	1526	BZ	Buzzard	3	5	15				Flying	Flying along top of hedgerow towards corpse
63	2	Non-breeding 2021-22	12/01/2022	1058	BZ	Buzzard	2	20	10				Flying	Flying along hedgerow calling.
64	2	Non-breeding 2021-22	20/01/2022	1408	BZ	Buzzard	1	18	10	20-0			Flying	Mobbed by HCs while perched in tree, flew downwards to ground level.
65	2	Non-breeding 2021-22	20/01/2022	1422	BZ	Buzzard	1	25	10	0-20			Flying	Flew up again, the low across field and up into tree
66	2	Non-breeding 2021-22	04/02/2022	1428	BZ	Buzzard	1	60	50				Flying	Flying S
67	2	Non-breeding 2021-22	04/02/2022	1510	BZ	Buzzard	2	135	10				Flying	Gliding slowly across site
68	2	Non-breeding 2021-22	04/02/2022	1526	BZ	Buzzard	1	23	10				Flying	Flying from one tree to join 2nd bird in another tree
69	2	Non-breeding 2021-22	04/02/2022	1533	BZ	Buzzard	1	30	5				Flying	Both birds departed (ID 15 & 16), 1st heading south, low
70	2	Non-breeding 2021-22	04/02/2022	1533	BZ	Buzzard	1	88	20				Flying	Heading north
71	2	Non-breeding 2021-22	13/03/2022	1026	BZ	Buzzard	1	40	5				Flying	Gliding low over the gorse
72	2	Non-breeding 2021-22	13/03/2022	1130	BZ	Buzzard	1	20	10				Flying	Flying slowly S
73	2	Non-breeding 2021-22	13/03/2022	1212	BZ	Buzzard	3	1440	40	20-40-60-			Flying	Flying, gliding, calling. One dropped and other two land on field to feed
74	2	Non-breeding 2021-22	13/03/2022	1234	BZ	Buzzard	2	120	20				Circling	Circling forest to W, different to previous 3 birds I think
75	2	Non-breeding 2021-22	13/03/2022	1252	BZ	Buzzard	2	210	40				Circling	Circling
76	2	Non-breeding 2021-22	13/03/2022	1312	BZ	Buzzard	1	60	20				Flying	Flying about in front of VP
77	3	Non-breeding 2021-22	04/10/2021	1552	BZ	Buzzard	1	0	0				Perched	Perched, didn't catch it fly off
78	3	Non-breeding 2021-22	16/09/2021	1202	BZ	Buzzard	1	45	5				Commuting	
79	3	Non-breeding 2021-22	16/09/2021	1239	BZ	Buzzard	1	165	10				Hunting	Dropped out of view
80	3	Non-breeding 2021-22	07/10/2021	1147	BZ	Buzzard	1	4	5				Hunting	Flying low over ground, and behind hedgerow
81	3	Non-breeding 2021-22	07/10/2021	1223	BZ	Buzzard	2	683	30	10-30-50		Ad	Hunting	Hunting over a ploughed field. A second bird joined, also hunting
82	3	Non-breeding 2021-22	07/10/2021	1317	BZ	Buzzard	1	46	30	40-30			Circling	Circling, then drifted down

Map ID	VP No	Season	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
83	3	Non-breeding 2021-22	07/10/2021	1329	BZ	Buzzard	1	28	40	40-30		Ad	Gliding	Dropping down behind hill
84	3	Non-breeding 2021-22	07/10/2021	1339	BZ	Buzzard	1	10	10			Juv	Hunting	Flying low along trees
85	3	Non-breeding 2021-22	10/11/2021	1010	BZ	Buzzard	1	8	1				Flying	Flying low along ground, calling
86	3	Non-breeding 2021-22	10/11/2021	1235	BZ	Buzzard	1	37	40				Flying	Flying NW
87	3	Non-breeding 2021-22	16/11/2021	1328	BZ	Buzzard	1	13	20				Circling	Quite distant
88	3	Non-breeding 2021-22	16/11/2021	1347	BZ	Buzzard	2	102	40				Flying	Drifting slowly W
89	3	Non-breeding 2021-22	16/11/2021	1421	BZ	Buzzard	1	80	50				Flying	Gliding about
90	3	Non-breeding 2021-22	03/12/2021	1345	BZ	Buzzard	1	5	10				Flying	Flying between gorse bushes
91	3	Non-breeding 2021-22	06/12/2021	953	BZ	Buzzard	1	40	10				Flying	Gliding and circling low over fields
92	3	Non-breeding 2021-22	06/12/2021	1153	BZ	Buzzard	1	36	10				Flying	Flying low over fields
93	3	Non-breeding 2021-22	06/12/2021	1216	BZ	Buzzard	1	20	10				Flying	Hovering, gliding, then dropped behind hill
94	3	Non-breeding 2021-22	12/01/2022	1330	BZ	Buzzard	1	515	30	20-30-10			Flying	Gliding over the rise, then E and W and down into gorse in front of quarry
95	3	Non-breeding 2021-22	12/01/2022	1330	BZ	Buzzard	1	120	20				Flying	Flew in with previous bird for a bit, then departed W
96	3	Non-breeding 2021-22	12/01/2022	1409	BZ	Buzzard	2	54	30	10-30			Flying	Flying low over gorse, 2nd bird came out and mobbed it.
97	3	Non-breeding 2021-22	12/01/2022	1409	BZ	Buzzard	1	54	30				Flying	first bird
98	3	Non-breeding 2021-22	12/01/2022	1409	BZ	Buzzard	1	54	30				Flying	second bird
99	3	Non-breeding 2021-22	20/01/2022	1045	BZ	Buzzard	2	30	20				Flying	Flew along trees calling, then landed in
100	3	Non-breeding 2021-22	20/01/2022	1048	BZ	Buzzard	2	10	20				Flying	Flew off again
101	3	Non-breeding 2021-22	20/01/2022	1100	BZ	Buzzard	1	95	30	30-20			Flying	Flying N, then banked and dropped
102	3	Non-breeding 2021-22	04/02/2022	1236	BZ	Buzzard	1	37	20	20-10-20			Flying	Flew up over gorse, then low across field, heading S
103	3	Non-breeding 2021-22	07/03/2022	924	BZ	Buzzard	1	260	30	20-30			Hunting	Drifting slowly about, hovering, gliding
104	3	Non-breeding 2021-22	07/03/2022	1037	BZ	Buzzard	1	20	40				Flying	Distant, drifting about
105	3	Non-breeding 2021-22	07/03/2022	1040	BZ	Buzzard	1	85	20	20-5			Flying	Initially hanging in the air, then drifted quite low over gorse and landed
106	3	Non-breeding 2021-22	07/03/2022	1057	BZ	Buzzard	2	165	20	2-20-10			Flying	One bird flew in low with food, another bird joined and landed in trees
107	3	Non-breeding 2021-22	07/03/2022	1128	BZ	Buzzard	1	105	20	5-20-40			Flying	Carrying something. Drifted W a bit, then flew low over fields and into tree
108	3	Non-breeding 2021-22	07/03/2022	1139	BZ	Buzzard	2	235	20				Flying	Carrying something, other bird dangling legs, eventually landed again
109	3	Non-breeding 2021-22	07/03/2022	1153	BZ	Buzzard	2	100	30	10-30-50			Flying	up again, one bird dangling legs, other flying normally
110	3	Non-breeding 2021-22	07/03/2022	1120	BZ	Buzzard	1	145	50	30-50			Flying	Rising, drifting N. Tattered wings, missing primaries
111	3	Non-breeding 2021-22	07/03/2022	1210	BZ	Buzzard	1	10	5	0-5			Flying	Flew from ground to tree. Presumably one of the ID16 birds
112	4	Non-breeding 2021-22	07/10/2021	859	BZ	Buzzard	1	28	20				Hunting	Scouting over fields, heading W
113	4	Non-breeding 2021-22	02/11/2021	1040	BZ	Buzzard	1	70	20				Flying	Flying SE, being mobbed
114	4	Non-breeding 2021-22	09/11/2021	1355	BZ	Buzzard	1	115	60				Circling	Distant
115	4	Non-breeding 2021-22	01/12/2021	1232	BZ	Buzzard	1	18	30				Flying	Drifting W
116	4	Non-breeding 2021-22	01/12/2021	1313	BZ	Buzzard	1	95	40				Hunting	Drifting E, stopping occasionally to hover
117	4	Non-breeding 2021-22	01/12/2021	1359	BZ	Buzzard	1	15	30				Flying	Came up above trees, drifted E
118	4	Non-breeding 2021-22	02/02/2022	1538	BZ	Buzzard	2	28	30	30-20			Flying	Gliding about
119	4	Non-breeding 2021-22	07/02/2022	1429	BZ	Buzzard	1	12	20				Flying	Flying N
120	4	Non-breeding 2021-22	07/03/2022	1246	BZ	Buzzard	1	20	10				Flying	Drifting low over fields
121	4	Non-breeding 2021-22	07/03/2022	1248	BZ	Buzzard	1	105	20				Flying	Drifting about
122	4	Non-breeding 2021-22	07/03/2022	1254	BZ	Buzzard	1	40	40	40-10			Hunting	Hanging, drifting, then dropped rapidly
123	4	Non-breeding 2021-22	07/03/2022	1254	BZ	Buzzard	1	480	50	30-50-20			Hunting	Plenty of time hanging, drifting slowly over to trees. Then mobbed by HC
124	4	Non-breeding 2021-22	07/03/2022	1259	BZ	Buzzard	1	60	40				Flying	Being mobbed by HC
125	4	Non-breeding 2021-22	07/03/2022	1316	BZ	Buzzard	1	20	30	30-10			Flying	Up again briefly, then dropped

Map ID	VP No	Season	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
126	4	Non-breeding 2021-22	07/03/2022	1334	BZ	Buzzard	1	70	10				Flying	Drifting low across fields
127	4	Non-breeding 2021-22	07/03/2022	1342	BZ	Buzzard	1	82	5				Flying	Flying low
128	4	Non-breeding 2021-22	07/03/2022	1350	BZ	Buzzard	1	75	40	40-10-20			Circling	Circling, then plunged. Back up briefly and dropped again
129	4	Non-breeding 2021-22	07/03/2022	1407	BZ	Buzzard	1	82	40	10-40-10			Hunting	Flying low through trees, then rose to hang and drop behind trees
130	4	Non-breeding 2021-22	07/03/2022	1424	BZ	Buzzard	2	440	60	30-60			Flying	One bird at 60m, the other at 30m throughout, both drifting W
131	4	Non-breeding 2021-22	07/03/2022	1446	BZ	Buzzard	1	15	30	30-20			Flying	Gliding along trees and then down
132	4	Non-breeding 2021-22	07/03/2022	1453	BZ	Buzzard	1	25	30	30-20			Flying	Gliding along trees and then down
133	4	Non-breeding 2021-22	07/03/2022	1536	BZ	Buzzard	1	27	10				Flying	Flew through, low

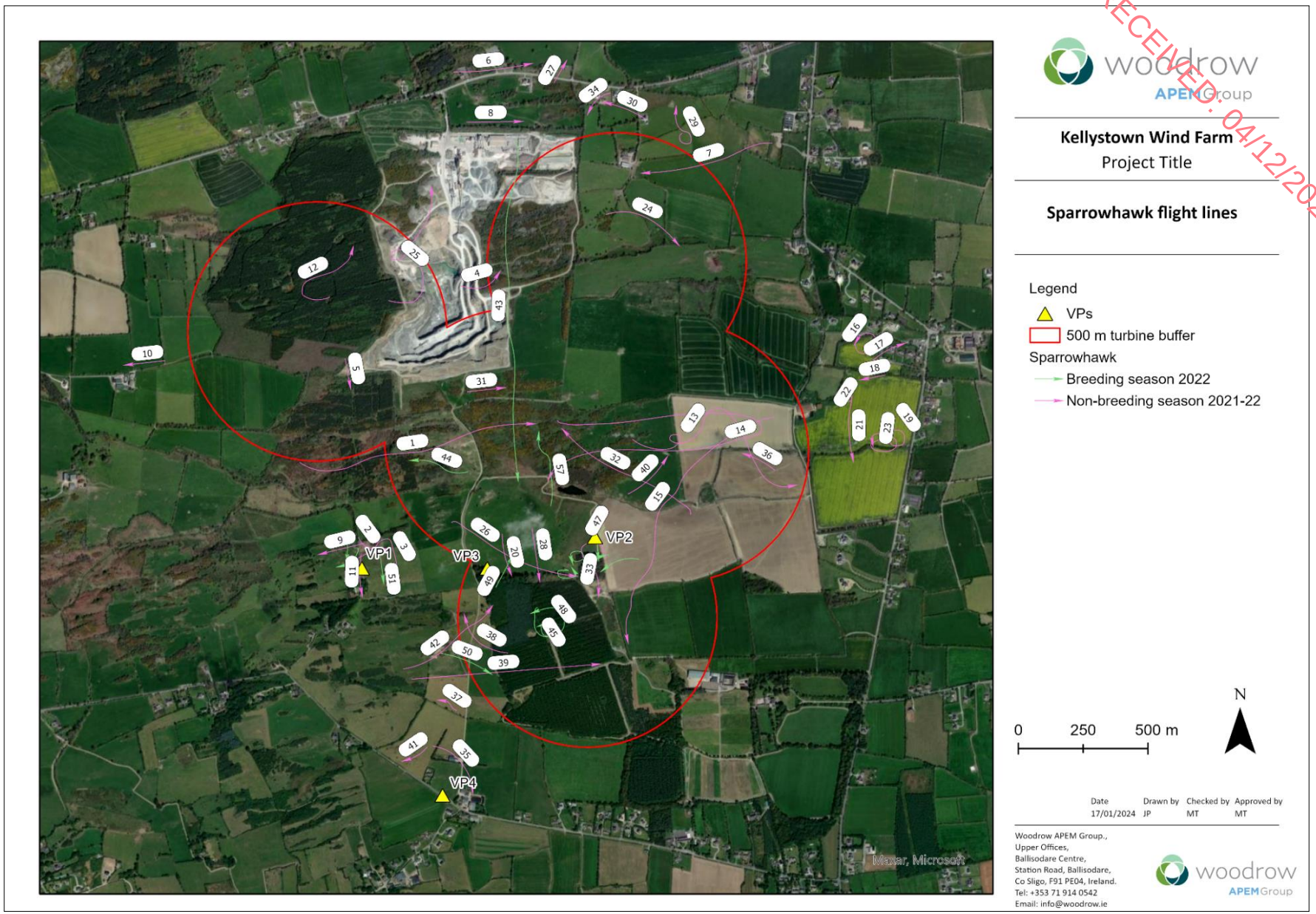

Figure A2.11: Sparrowhawk flights lines

Table A2.11: VP watch data for sparrowhawk

Flight records highlighted in light red were beyond the viewsheds for the VPs and will be excluded from the CRM

Observations of non-flight records, i.e. birds on the ground, perched or swimming are highlighted in light green

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
13	Non-breeding 2021-22	2	16/09/2021	931	SH	Sparrowhawk	1	80	15	2-15-1			Soaring	
25	Non-breeding 2021-22	3	16/09/2021	1344	SH	Sparrowhawk	1	35	10				Hunting	
26	Non-breeding 2021-22	3	16/09/2021	1423	SH	Sparrowhawk	1	35	2				Hunting	
1	Non-breeding 2021-22	1	21/09/2021	1259	SH	Sparrowhawk	1	65	10		F		Mobbed	Mobbed by MC
14	Non-breeding 2021-22	2	23/09/2021	856	SH	Sparrowhawk	2	80	5				Flying	Dropped out of view
15	Non-breeding 2021-22	2	23/09/2021	935	SH	Sparrowhawk	1	35	8				Hunting	
2	Non-breeding 2021-22	1	04/10/2021	738	SH	Sparrowhawk	1	300	10		F	Ad	Hunting	Flew up at a wagtail on the wire, landed briefly and then over the shrubs
3	Non-breeding 2021-22	1	04/10/2021	745	SH	Sparrowhawk	1	300	10		F	Ad	Flying	Flew in from behind, above the small patch of shrubs over field to E
16	Non-breeding 2021-22	2	04/10/2021	1147	SH	Sparrowhawk	1	130	40	20-40	F		Circling	Circling & being mobbed before flying away E
17	Non-breeding 2021-22	2	04/10/2021	1302	SH	Sparrowhawk	1	31	40	40-20			Mobbed	Being mobbed
18	Non-breeding 2021-22	2	04/10/2021	1312	SH	Sparrowhawk	1	65	60	60-20			Circling	Circling, then drifted down
19	Non-breeding 2021-22	2	04/10/2021	1324	SH	Sparrowhawk	1	230	180	180-80-20			Circling	Circling high, then swooped down, more circling, then dropped
20	Non-breeding 2021-22	2	04/10/2021	1338	SH	Sparrowhawk	1	34	15		M	Ad	Mobbed	Flying quite low, being mobbed by Swallows
27	Non-breeding 2021-22	3	07/10/2021	1324	SH	Sparrowhawk	1	30	80				Circling	Distant
4	Non-breeding 2021-22	1	08/10/2021	1151	SH	Sparrowhawk	1	16	30				Mobbed	Being mobbed by Rook, dropped behind hill
5	Non-breeding 2021-22	1	08/10/2021	1305	SH	Sparrowhawk	1	10	20		F		hunting	Flying along tree
35	Non-breeding 2021-22	4	09/11/2021	1328	SH	Sparrowhawk	1	5	5		F		Flying	Flying low, direct
36	Non-breeding 2021-22	4	09/11/2021	1551	SH	Sparrowhawk	1	15	50	50-20			Circling	Mobbed & dropped
21	Non-breeding 2021-22	2	10/11/2021	1449	SH	Sparrowhawk	1	13	20	10-20-10			Flying	Flew up, then back down behind trees
28	Non-breeding 2021-22	3	10/11/2021	1035	SH	Sparrowhawk	1	10	20		F		Flying	Flying across field and into trees
29	Non-breeding 2021-22	3	10/11/2021	1112	SH	Sparrowhawk	1	130	80	30-80	M		Circling	Initially flying N, mobbed by HC, the circled up, drifting away N
30	Non-breeding 2021-22	3	16/11/2021	1423	SH	Sparrowhawk	1	65	50	30-60			Flying	Gliding about
6	Non-breeding 2021-22	1	17/11/2021	1342	SH	Sparrowhawk	1	190	120	80-120-20			Circling	Drifting E, rising, then plummeted
7	Non-breeding 2021-22	1	01/12/2021	958	SH	Sparrowhawk	1	33	30				Flying	Flying E
8	Non-breeding 2021-22	1	01/12/2021	1107	SH	Sparrowhawk	1	19	30				Flying	Flying E
37	Non-breeding 2021-22	4	01/12/2021	1310	SH	Sparrowhawk	1	5	20	10-20			Flying	Popped up briefly before flying down behind hedgerow
31	Non-breeding 2021-22	3	03/12/2021	1531	SH	Sparrowhawk	1	8	5		F		Mobbed	Perched on dead tree, some HCs came in and hassled her
32	Non-breeding 2021-22	3	06/12/2021	1048	SH	Sparrowhawk	2	10	10	10-20-10	M,F		Flying	Flew rapidly to trees beside pond. Female dived down at male
9	Non-breeding 2021-22	1	07/01/2022	1009	SH	Sparrowhawk	1	12	1		M		Hunting	Flying low over field in front of VP
10	Non-breeding 2021-22	1	07/01/2022	1210	SH	Sparrowhawk	1	50	10		F		Flying	Flying low about hedgerow, being harassed by HCs
11	Non-breeding 2021-22	1	07/01/2022	1221	SH	Sparrowhawk	1	15	5		M		Hunting	Flew by close, low
38	Non-breeding 2021-22	4	07/01/2022	1550	SH	Sparrowhawk	1	27	10	10-20	M		Flying	Flying above trees, then down low and away over wall
12	Non-breeding 2021-22	1	10/01/2022	1352	SH	Sparrowhawk	2	135	20	20-30-20	M,F		Courtship	Pair flying together and swooping in at each other
39	Non-breeding 2021-22	4	10/01/2022	1100	SH	Sparrowhawk	1	35	20		F		Flying	Flying E, mobbed by HC
22	Non-breeding 2021-22	2	12/01/2022	1110	SH	Sparrowhawk	1	110	20	20-40-20	F		Circling	Initially circling up to about 40m, then dropped back down and flew N
33	Non-breeding 2021-22	3	20/01/2022	1159	SH	Sparrowhawk	1	27	30		M		Circling	Circled out, then back in again
23	Non-breeding 2021-22	2	04/02/2022	1512	SH	Sparrowhawk	1	30	30				Circling	Being mobbed

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
24	Non-breeding 2021-22	2	04/02/2022	1552	SH	Sparrowhawk	1	17	40	40-20-10			Flying	Moving E, swooped briefly, then down behind trees
34	Non-breeding 2021-22	3	04/02/2022	1159	SH	Sparrowhawk	1	9	30				Flying	Flying swiftly, the swooped down
40	Non-breeding 2021-22	4	07/02/2022	1248	SH	Sparrowhawk	1	62	50				Circling	Moving away from VP
41	Non-breeding 2021-22	4	07/03/2022	1338	SH	Sparrowhawk	1	75	30		M		Flying	Flying W
42	Non-breeding 2021-22	4	07/03/2022	1455	SH	Sparrowhawk	1	40	40	40-1	M		Flying	Being mobbed by HC, then descended and flew very low into trees
46	Breeding 2022	2	24/03/2022	931	SH	Sparrowhawk	1	15	10		M		Flying	Flying to trees, being mobbed by HC
43	Breeding 2022	1	28/03/2022	1816	SH	Sparrowhawk	2	105	30	20-30	M,F		Flying	Pair, flying towards forest
48	Breeding 2022	4	28/03/2022	1255	SH	Sparrowhawk	1	195	120	20-30-120	F		Displaying	Circling upwards, then performed 6 undulations, descending gradually
49	Breeding 2022	4	28/03/2022	1311	SH	Sparrowhawk	2	90	80	20-80	M,F		Circling	Pair up, though male only briefly. Female circled up but got quite distant
50	Breeding 2022	4	28/03/2022	1529	SH	Sparrowhawk	1	5	5				Flying	Flying low, being mobbed by HC, also flying back up at crow
45	Breeding 2022	2	19/04/2022	1315	SH	Sparrowhawk	2	120	200				Commuting	
44	Breeding 2022	1	20/04/2022	830	SH	Sparrowhawk	1	15	50	30-50			Flying	Direct flight
47	Breeding 2022	2	21/04/2022	1010	SH	Sparrowhawk	1	12	3				Flying	Landed in scrub at pond
51	Breeding 2022	1	18/05/2022	1530	SH	Sparrowhawk	1	4	2				Hunting	Attention drawn by swallows calling
52	Breeding 2022	2	17/06/2022	1245	SH	Sparrowhawk	1	0	0				Calling	From corpse behind VP within buffer
53	Breeding 2022	2	17/06/2022	1420	SH	Sparrowhawk	2	0	0		F		Nesting	Female feeding at nest. 1 chick observed
54	Breeding 2022	1	28/06/2022	1345	SH	Sparrowhawk	1	3	2				Hunting	Seen briefly. Attention drawn by swallows
56	Breeding 2022	2	20/07/2022	1100	SH	Sparrowhawk	1	2	10				Present	
57	Breeding 2022	2	21/07/2022	1200	SH	Sparrowhawk	1	28	30				Present	
55	Breeding 2022	1	03/08/2022	1535	SH	Sparrowhawk	1	7	10	5-10			Flying	Flew into ash tree but flew out again straight away

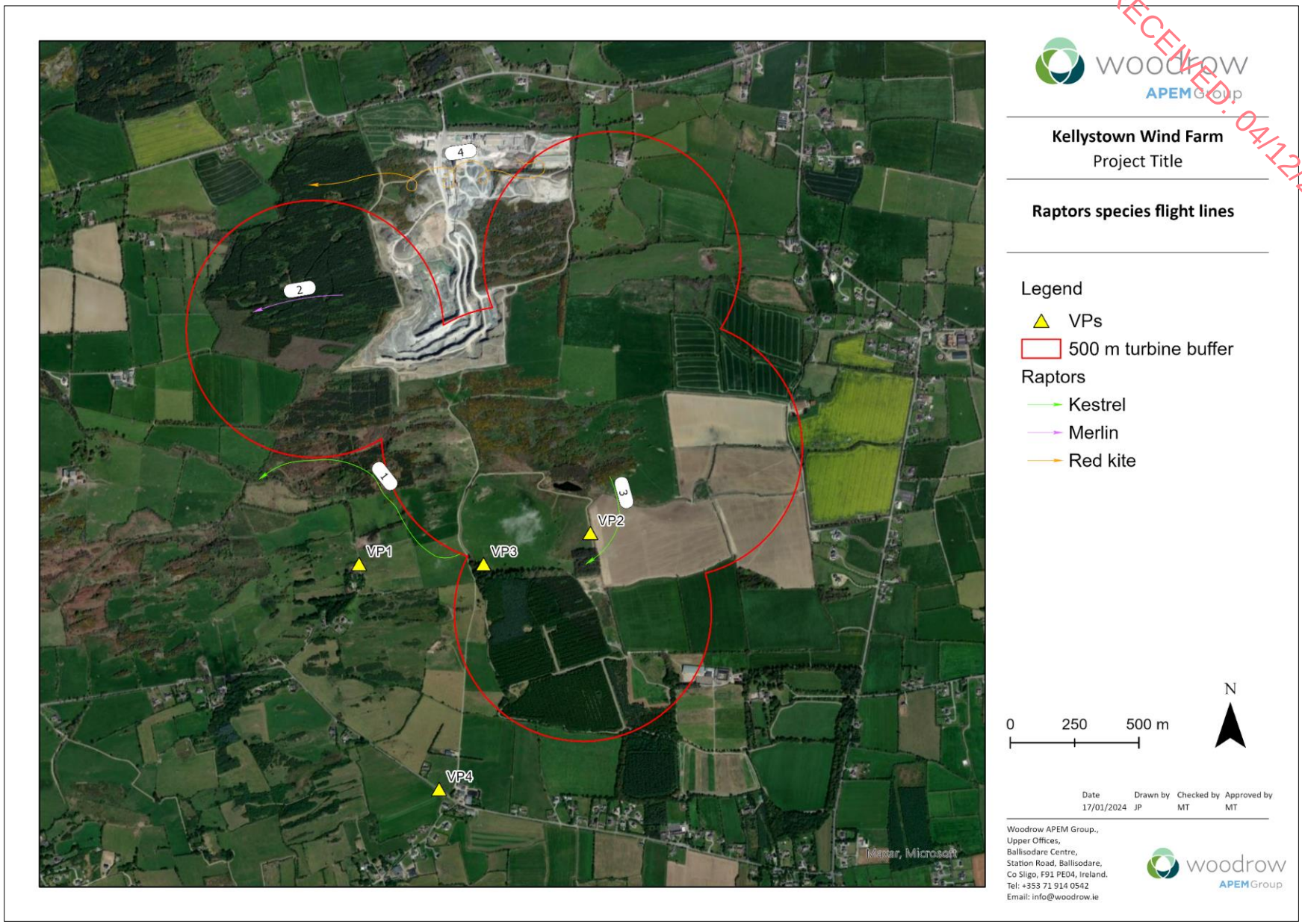

Figure A2.12: Other raptors flight lines

Table A2.12: VP watch data for other raptors

Map ID	Season	VP No	Date	Time	BTO code	Sp. Name	No. of birds	Total seconds recorded	Height (m)	Flight range	Sex	Age	Behaviour	Comments
1	Non-breeding 2021-22	1	01/12/2021	1123	K	Kestrel	1	46	10		F		Flying	Flying low and W
2	Non-breeding 2021-22	1	13/03/2022	1418	ML	Merlin	1	31	20		M		Flying	Flying W along treeline, then down
3	Breeding 2022	2	16/05/2022	1020	K	Kestrel	1	36	30				Commuting	
4	Breeding 2022	1	11/07/2022	1150	KT	Red kite	1	80	70				Circling	Circling above quarry and trees. Disappeared behind conifers

Appendix 3 – Survey effort tables and coverage maps

Table A3.1: Survey effort for VP watches showing weather conditions

Date	VP	Visit No.	Duration (hr)	Start Time	Target species	Surveyor	Wind Force	Wind Dir.	Vis.	Cloud (oktas)	Temp (C)	Ground Cond.	Rain	Disturbance	Factors affecting visibility
Non-breeding season 2021-22															
13/09/2021	1	1	1.00	1050	BH, HG, CM	MH	2	SE	Good	7-8	15-16	Dry	None	None	None
16/09/2021	2	1	3.00	820	BH, BZ, HG, SH, PE	MH	3	S-SW	Good	7	13-16	Dry	None	None	None
16/09/2021	3	1	3.00	1150	BZ, SH, HG	MH	4	S-SW	Good		17	Dry	None	None	None
16/09/2021	4	1	3.00	1525	BH, CM, HG	MH	4	S-SW	Good	8	17	Dry	None	None	None
17/09/2021	1	2	2.00	630	PE, BH	MH	4	S-SE	Good	8	15	Dry	Showers, turn rain	None	None
21/09/2021	1	3	3.00	1245	BZ, SH	MH	4	SW	Good	8	16	Dry	None	None	None
21/09/2021	4	2	3.00	915	HG	MH	1-2	W-SW	Good	8	15	Dry	Drizzle	None	None
23/09/2021	2	2	3.00	640	BH, HG, SH	MH	4	W-SW	Good	6-1	12-13	Dry	None	None	None
23/09/2021	3	2	3.00	1655	HG, PE, BH, MC, CM	MH	3	W-SW	Good	5	14-17	Dry	None	None	None
04/10/2021	1	4	3.00	725	SH, HG, CM, BH, GP	CS	3	SW	Good	2-6	8	Damp	None	None	None
04/10/2021	2	3	3.00	1055	BH, CM, HG, BZ, SH	CS	3	SW	Good	2-5	12	Damp	None	None	None
04/10/2021	3	3	3.00	1425	BH, HG, PE, BZ	CS	3	SW	Moderate	5-7	14	Damp	One heavy shower	None	Low cloud base
07/10/2021	2	4	3.00	1420	BZ, BH, HG	CS	4	S	Moderate	8	19	Damp	None	None	None
07/10/2021	3	4	3.00	1050	HG, BH, CM, BZ, ET, BW, LB, SH	CS	4	SW	Moderate	8	18	Damp	None	None	None
07/10/2021	4	3	3.00	720	LB, HG, BH, BZ, CM	CS	4	S	Moderate	8	16	Damp	Drizzle for the first hour	None	None
08/10/2021	1	5	3.00	1110	HG, BH, BZ, SH	CS	3	S	Mod-Good	6-7	19	Damp	None	None	None
08/10/2021	4	4	3.00	740	HG, LB, BH, CM, CU	CS	3	S	Moderate	7-8	15	Damp	None	None	None
02/11/2021	4	5	3.00	755	CM, BH, LB, CU, BZ	CS	1	W	Good	3	5	Damp	None	None	Mist at outset, then cleared
09/11/2021	1	6	3.00	940	BH, HG, CM, PE, BZ, CU	CS	3	W	Mod-Good	4-8	12	Damp		None	None
09/11/2021	4	6	3.00	1310	BH, CM, SH, BZ, PE	CS	3	W	Good	1-3	12	Damp	None	None	None
10/11/2021	2	5	3.00	1330	BH, CM, SH, BZ, PE	CS	2	SW	Mod-Good	3-7	10	Damp	None	None	None
10/11/2021	3	5	3.00	1000	BZ, CM, SH, BH, WS, LB, PE	CS	2	W	Good	2-8	10	Damp	None	None	None
16/11/2021	2	6	3.00	955	CM, GB, BH, HG, BZ, PE, CU	CS	3	SW	Moderate	8	10	Damp	None	None	None
16/11/2021	3	6	3.00	1325	BZ, BH, CM, SH, LB	CS	4	SW	Moderate	8	11	Damp	A few drops around 14.15	None	Bit misty for last 20 mins
17/11/2021	1	7	3.00	1250	SH, BH	CS	3	SW	Moderate	7	11	Damp	None	None	None
01/12/2021	1	8	3.00	825	BH, CM, PE, BZ, SH, HG, K	CS	5	NW	Mod-Good	4-7	7	Damp	Couple of brief showers	None	None
01/12/2021	4	7	3.00	1155	CM, BH, BZ, HG, CU, PE	CS	5	NW	Mod-Good	4-7	7	Damp	Couple of brief showers	None	None
03/12/2021	2	7	3.00	920	CM, BH	CS	3	SW	Moderate	8	7	Damp	None	None	None
03/12/2021	3	7	3.00	1250	BH, BZ, PE, LB, CM, SH	CS	3	W	Moderate	7-8	8	Damp	None	None	None
06/12/2021	2	8	3.00	1250	CM, BH, HG, BZ, ET	CS	5	SW	Good	2-3	5	Damp	None	None	None
06/12/2021	3	8	3.00	920	CM, BH, CU, BZ, HG, SH, ET	CS	4	W	Good	2	6	Damp	None	None	None

Date	VP	Visit No.	Duration (hr)	Start Time	Target species	Surveyor	Wind Force	Wind Dir.	Vis.	Cloud (oktas)	Temp (C)	Ground Cond.	Rain	Disturbance	Factors affecting visibility
07/01/2022	1	9	3.00	930	BH, SH, CM, HG	CS	3	W	Moderate	7	3	Light frost	None	None	None
07/01/2022	4	8	3.00	1300	LB, BH, CM, PE, SH	CS	4	W	Mod-Good	3-8	4	Damp	A few drops	None	None
10/01/2022	1	10	3.00	1240	BH, CM, SH, HG, BZ	CS	4	SW	Moderate	6-8	12	Damp	Some brief drizzle spells	None	None
10/01/2022	4	9	3.00	910	HG, BH, SH, CM	CS	3-4	SW	Moderate	8	11	Damp	A bit of drizzle	None	None
12/01/2022	2	9	3.00	955	CM, BH, HG, BZ, SH	CS	2-3	SW	Mod-Good	1-2	7	Damp	None	None	Slightly hazy
12/01/2022	3	9	3.00	1325	CM, BH, BZ, H	CS	2-3	SW	Good	1	8	Damp	None	None	None
20/01/2022	2	10	3.00	1340	BH, LB, BZ, CM, HG	CS	2	NW	Moderate	7	7	Damp	None	None	None
20/01/2022	3	10	3.00	1000	CM, BH, BZ	CS	2	NW	Moderate	3-8	5	Damp	None	None	None
02/02/2022	1	11	3.00	1040	CM, BZ, PE, CA, H, BH, HG	CS	3	W	Moderate	6-8	10	Damp	None	None	None
02/02/2022	4	10	3.00	1410	BH,CM,HG,H,BZ	CS	3	SW	Moderate	8	10	Damp	None	None	None
04/02/2022	2	11	3.00	1410	BH,CM,BZ,LB,SH,H	CS	3-4	W	Good	1-4	6	Damp	None	None	None
04/02/2022	3	11	3.00	1040	CM,BH,SH,BZ	CS	4-5	W	Good	1-5	5	Damp	None	None	None
07/02/2022	1	12	3.00	825	BH,CM,BZ,HG,PE	CS	4	SW	Moderate	8	11	Damp	Light shower	None	Low cloud base at the beginning
07/02/2022	4	11	3.00	1155	BH, CM, LB, HG,SH,H,CU,PE,BZ	CS	5	SW	Moderate	7-8	11	Damp	Light shower	None	None
07/03/2022	3	12	3.00	915	HG,BZ,CM,BH,GP,PE,H,LB	CS	4	SE	Good	4-7	6	Damp	None	None	None
07/03/2022	4	12	3.00	1245	BZ,HG,PE,SH,MA,H	CS	4	SE	Good	7-8	7	Damp	None	None	None
13/03/2022	1	13	3.00	1400	LB,HG,ML,BZ,CM,BH,GP,MA,PE	CS	4	SW	Mod-Good	4-7	11	Damp	Two light showers	None	None
13/03/2022	2	12	3.00	1025	HG,LB,BZ,CM,BH,GP	CS	4	S	Mod-Good	5-7	11	Damp	A few showers during first hour	None	None
Breeding season 2022															
23/03/2022	3	1	3.00	1515	BZ,HG,H,LB	CS	2-3	SE	Mod-Good	1-4	11	Damp	None	None	A bit dull towards evening
24/03/2022	2	1	3.00	650	HG,LB,BZ,WS,SH	CS	2	SW	Mod-Good	2-4	7	Damp	None	None	A bit hazy to the east
28/03/2022	1	1	3.00	1615	BZ,HG,LB,SH	CS	2	E	Good	1	13	Dry	None	None	None
28/03/2022	4	1	3.00	1245	SH,BZ,PE,HG,LB	CS	2	NE	Good	1-2	14	Dry	None	None	None
17/04/2022	1	2	3.00	730	HG, H	EF	1-2	SE	Moderate	8	9	Dry	None	None	None
19/04/2022	1	3	3.00	645	BZ, SM, GB, H	EF	0-1	W-SW	Mod-Good	3	7	Dry	None	None	Low mist for the first 30 min
19/04/2022	2	2	3.00	1015	BZ, SH	EF	1	W	Good	5	10	Dry	None	Tractors ploughing and sowing fields E of VP	None
19/04/2022	3	2	3.00	1400	BZ, GB, LG, PE,	EF	1-2	W	Good	3-4	11	Dry	None	None	None
20/04/2022	1	4	3.00	645	GB, BZ, HG, SH, PE	EF	0-2	SW-SE	Good	2	4	Dry	None	None	None
20/04/2022	3	3	3.00	1400	BZ, CM, LB,	EF	3	E	Good	1	9	Dry	None	None	None
21/04/2022	2	3	3.00	930	CM, SH, BZ, GB	EF	5	E	Good	3-6	10	Dry	None	None	None
21/04/2022	4	2	3.00	600	HG, BZ	EF	1-3	E	Good	7	4	Dry	None	None	None
24/04/2022	4	3	3.00	600	HG, BZ, MA	EF	4-5	NE	Good	1-3	4	Dry	None	None	Some glare looking E
16/05/2022	2	4	3.00	1015	K, MA, BZ, LG, MH	EF	1-2	SE	Good	5-8	12	Wet	Light shower	Banger going off every 15 min in front of VP	None

Date	VP	Visit No.	Duration (hr)	Start Time	Target species	Surveyor	Wind Force	Wind Dir.	Vis.	Cloud (oktas)	Temp (C)	Ground Cond.	Rain	Disturbance	Factors affecting visibility
16/05/2022	3	4	3.00	1345	BZ, PE	EF	1-2	SE	Good	3-4	13	Wet	None	None	None
17/05/2022	2	5	3.00	830	BZ, LB, Gull sp.	EF	1-2	S	Good	8	15	Damp	None	Banger going off in front of VP2	None
17/05/2022	3	5	3.00	1200	CA, LB, BZ, Gull sp.	EF	1	S	Mod-Good	8	15	Damp	Rain	None	None
18/05/2022	1	5	3.00	1330	MA, HG, SH, MA, LB, Gull sp.	EF	3-4	SE	Good	8	14	Damp	Light shower	None	None
18/05/2022	2	6	3.00	1700	BZ, Gull sp.	EF	4	SE	Good	7-8	13	Damp	Rain for last 30min	Banger going off in field in front of VP	None
22/05/2022	4	4	3.00	600	HG, MA, BZ, Gull sp.	EF	1	SW	Good	8	12	Wet	Light drizzle	None	None
26/05/2022	1	6	3.00	1715	BZ, LB, PE	EF	4	W	Good	4-5	15	Dry	None	None	None
29/05/2022	4	5	3.00	630	HG, BZ	EF	2-3	N	Good	4-6	9	Dry	None	None	None
05/06/2022	4	6	3.00	615	BZ, H, Gull sp., LB	EF	4	NE	Good	8	8	Dry	None	None	None
08/06/2022	3	6	3.00	1500	Gull sp., LB, H, HG, BZ	EF	5	SW	Mod-Good	8	14	Wet	Showers	None	Showers during 1st hour
17/06/2022	2	7	3.00	1115	HG, BZ, SH	EF	2-3	SW	Mod-Good	8	18	Dry	Light showers	None	Light showers
17/06/2022	3	7	3.00	1445	BZ, H	EF	1-2	SW	Poor-Good	8	19	Dry	Heavy showers	None	Heavy showers
19/06/2022	4	7	3.00	715	BZ, HG	EF	2-3	NE	Good	7-8	10	Dry	None	None	None
20/06/2022	3	8	3.00	1745	LB, MH, LG, BZ, Gull sp.	EF	0-1	S-SE	Good	1-3	20	Dry	None	None	None
27/06/2022	2	8	3.00	1215	BZ, LB, LG	EF	3	SW	Good	4-7	14	Damp	Light shower	None	None
28/06/2022	1	7	3.00	1115	HG, LB, BZ, SH	EF	3-4	SE	Mod-Good	4-8	14-16	Wet	Heavy showers	None	Heavy showers
29/06/2022	1	8	3.00	1200	BZ, PE, HG, CA, Gull sp.	EF	2	SW	Good	4-6	17	Dry	None	None	None
11/07/2022	1	9	3.00	1300	PE,KT,CA,BZ	EF	1	SW-S	Good	7-8	23-25	Dry	None	None	None
11/07/2022	3	9	3.00	1330	BZ,ET	EF	2	S	Good	5-7	25-26	Dry	None	None	None
17/07/2022	4	8	3.00	715	BZ, ,Gull sp.	EF	0-1	SE	Good	6-8	18-21	Dry	None	None	None
18/07/2022	1	10	3.00	1045	BZ	EF	1-2	S	Good	1-4	26-29	Dry	None	None	Glare at a distance
20/07/2022	2	9	3.00	1100	SH,BZ	EF	4-5	NW	Good	5-8	18-19	Dry	None	None	None
21/07/2022	2	10	3.00	1100	BZ,SH,PE	EF	1	N	Good	8	17-19	Dry	None	None	None
22/07/2022	3	10	3.00	1015	BZ,PE	EF	0-1	NW	Good	7-8	17-19	Dry	None	None	None
24/07/2022	4	9	3.00	715	BZ	EF	4	SW	Good	5-7	15-18	Damp	None	Banger going off every 15-20 min	None
31/07/2022	4	10	3.00	715	BZ	EF	0-1	NW	Good	8	12-14	Damp	None	None	None
03/08/2022	1	11	3.00	1100	HG, PE, BZ	EF	4-5	SW-W	Good	4-7	17-19	Dry	Light showers	None	None
03/08/2022	1	12	3.00	1430	PE, BZ, SH	EF	4-5	W	Good	4-8	17-18	Dry	None	None	None
04/08/2022	2	11	3.00	1000	BZ, PE	EF	4-5	NW	Good	3-5	15-16	Dry	None	None	None
04/08/2022	3	11	3.00	1330	PE, LG	EF	5	NW	Good	3-4	17	Dry	None	None	None
14/08/2022	4	11	3.00	730	CU	EF	0-1	NW-N	Good	3-4	16-22	Dry	None	None	None
15/08/2022	2	12	3.00	0830	BZ, HG, CA	EF	0-1	NE-SE	Mod-Good	8	17-18	Damp	Light showers	None	None
16/08/2022	3	12	3.00	1630	LG	EF	5	NW	Good	4-7	14-16	Dry	None	None	None
21/08/2022	4	12	3.00	1000	BZ	EF	2	W	Good	2-5	15-17	Dry	None	None	None

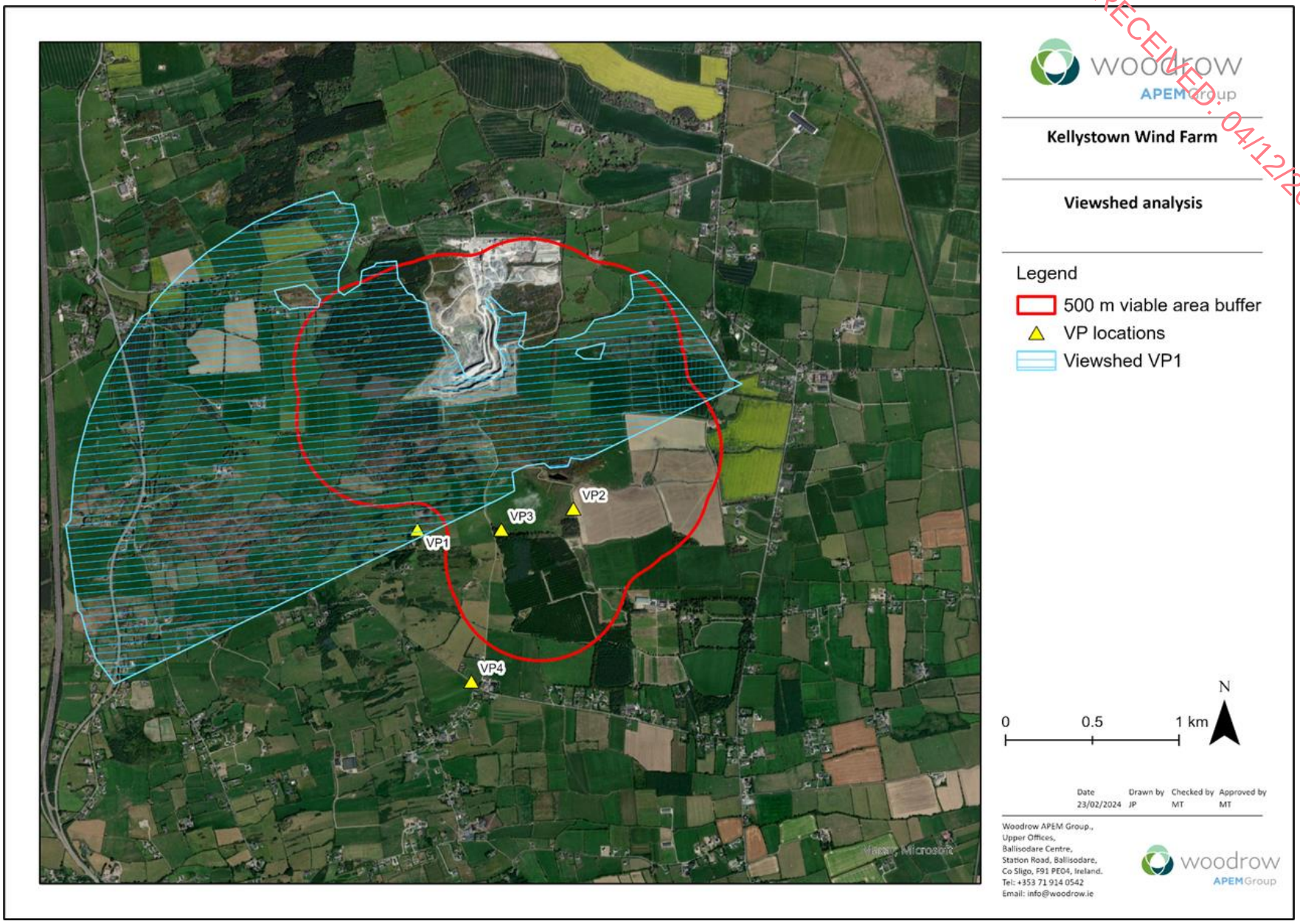

Figure A3.1: Viewshed for VP1 set to 15 m above ground level

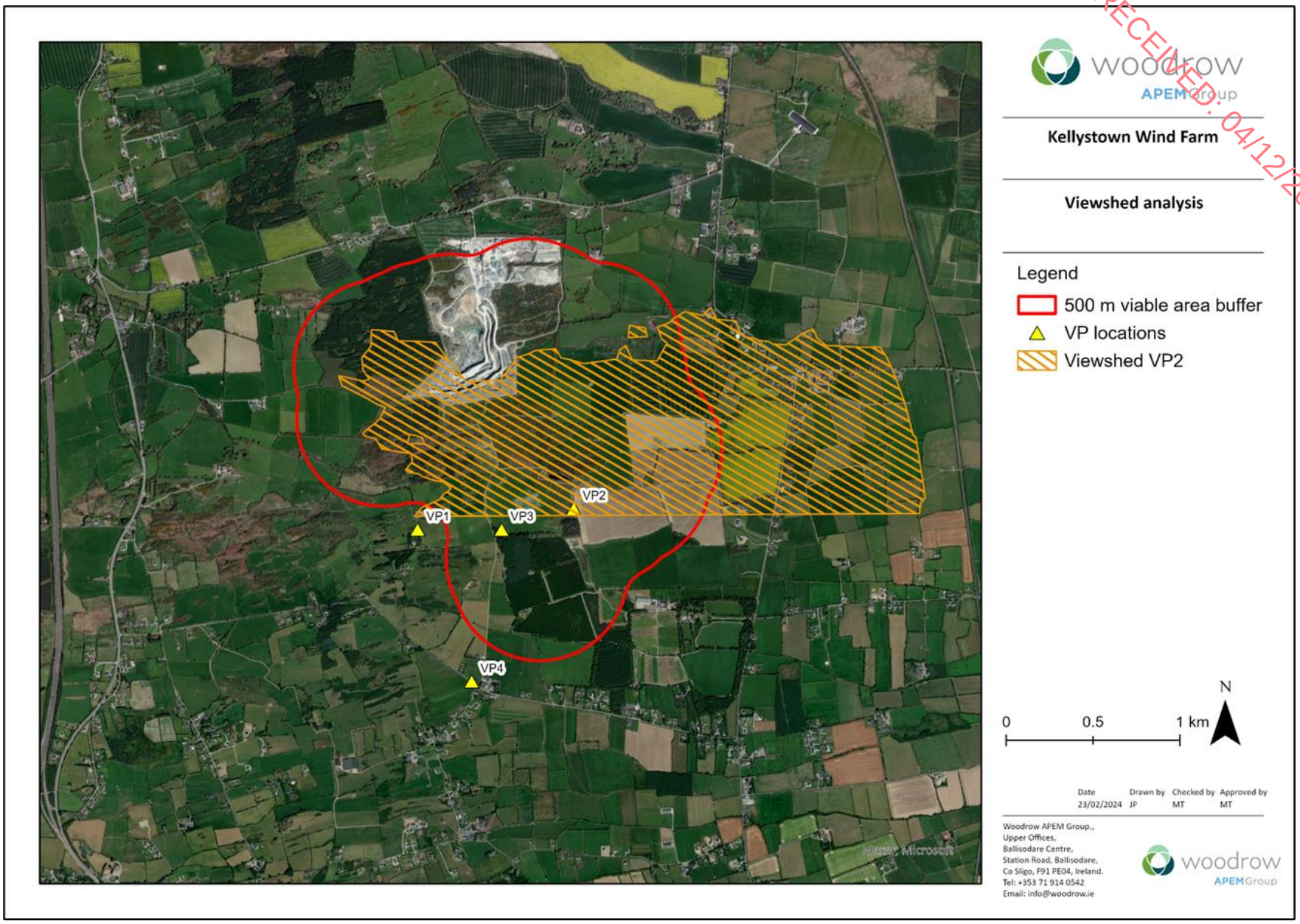

Figure A3.2: Viewshed for VP2 set to 15 m above ground level

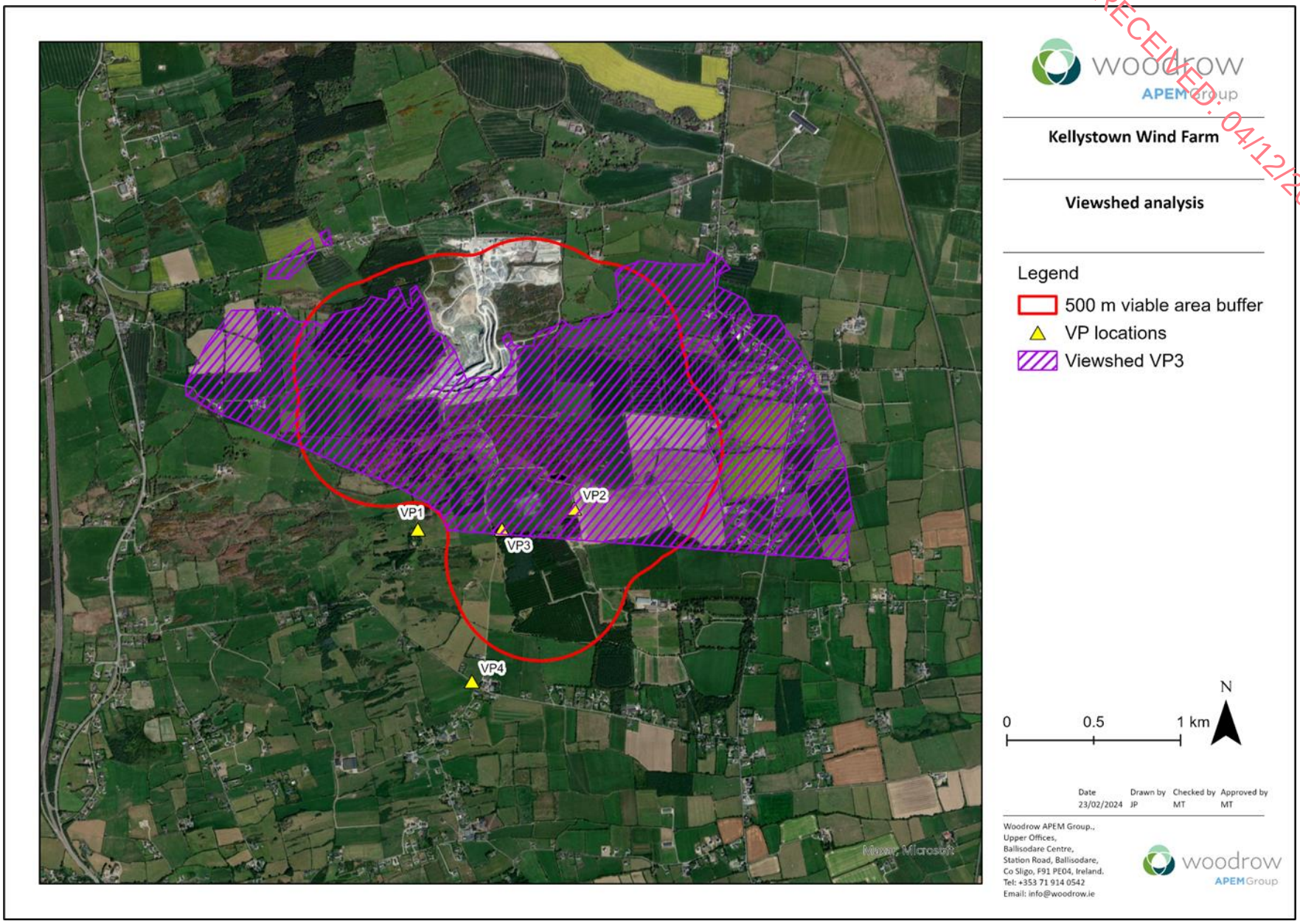

Figure A3.3: Viewshed for VP3 set to 15 m above ground level

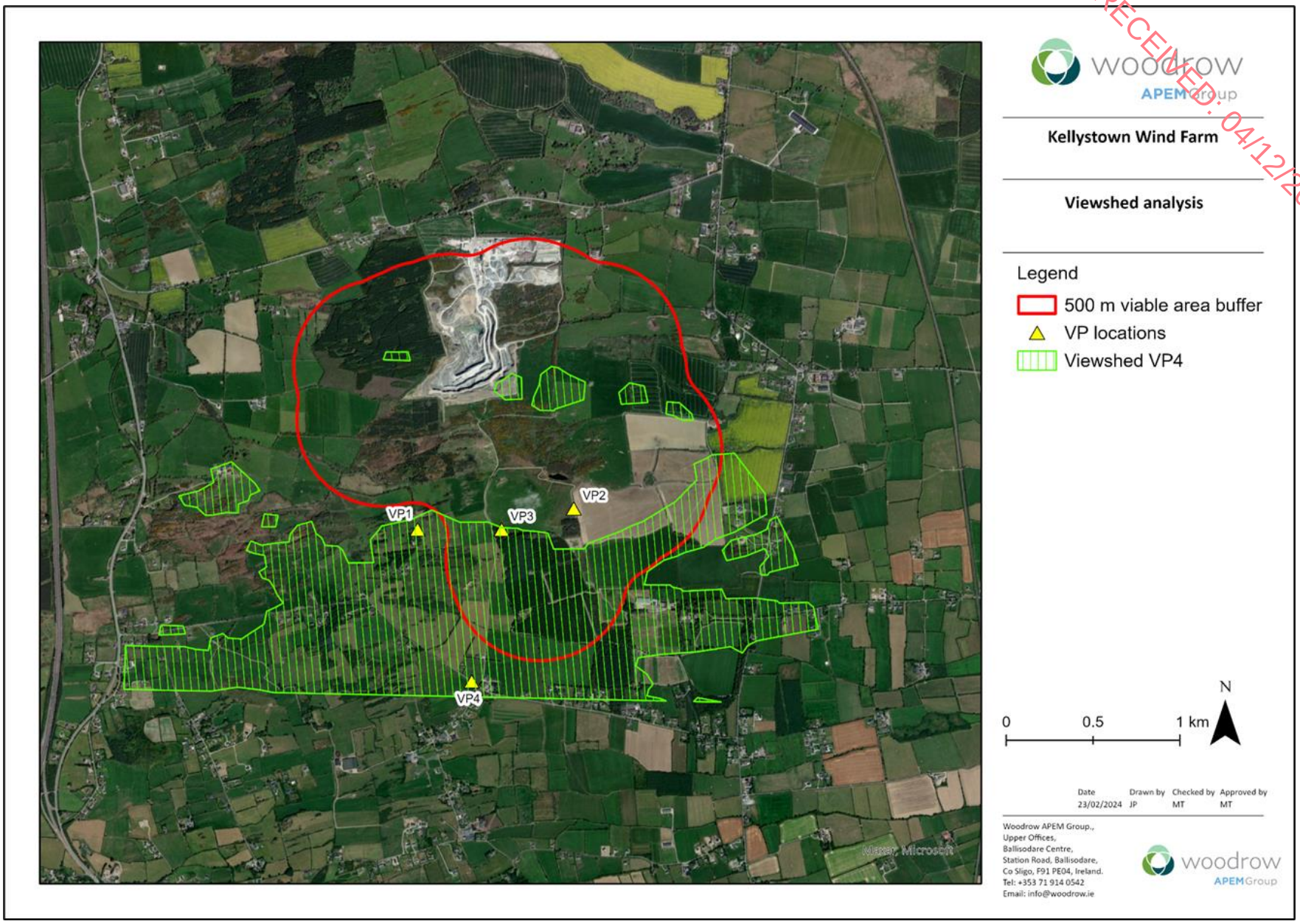

Figure A3.4: Viewshed for VP4 set to 15 m above ground level

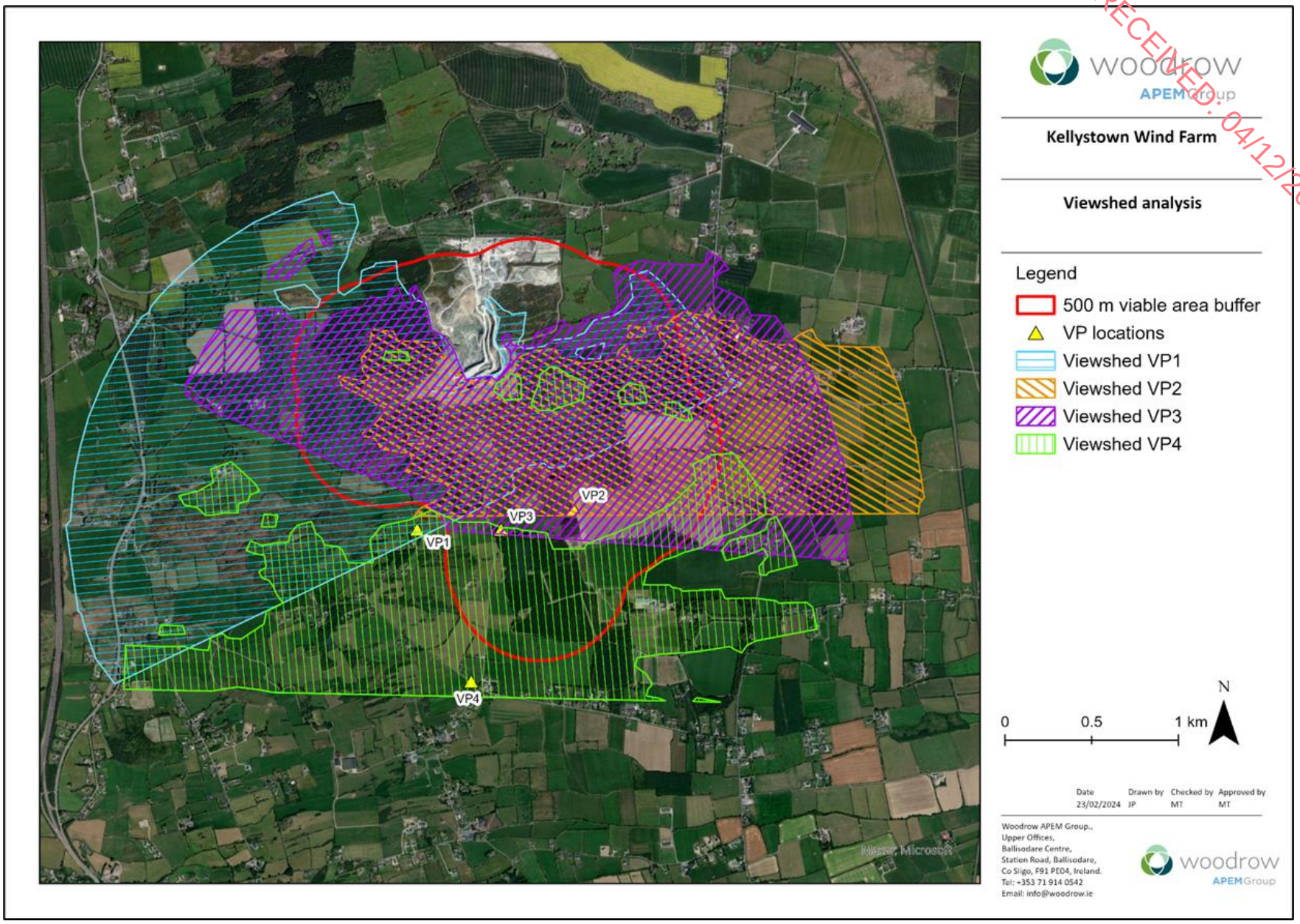

Figure A3.5: Viewsheds for all VPs set to 15 m above ground level

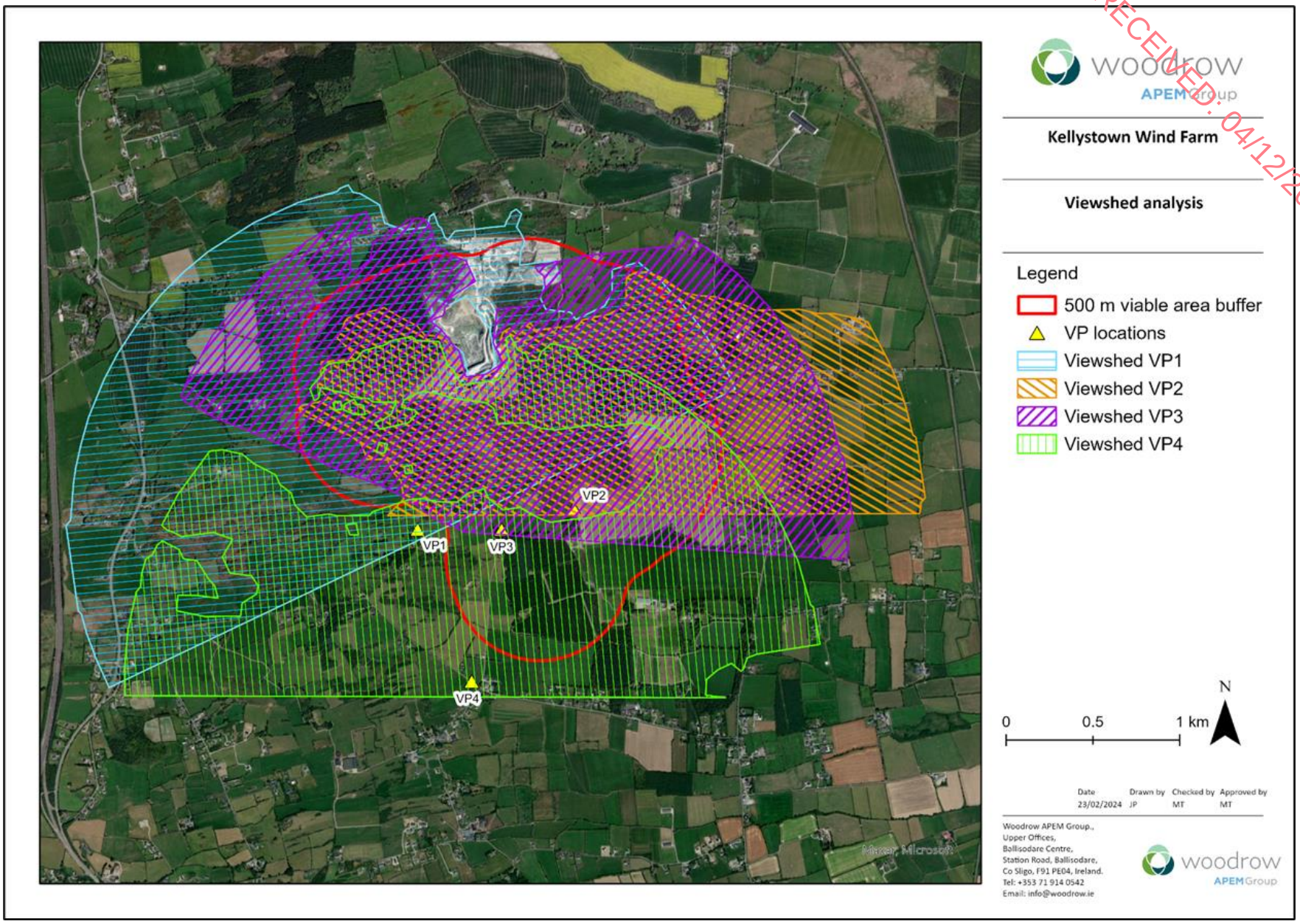

Figure A3.6: Viewsheds for all VPs set to 25 m above ground level

Table A3.2: Survey effort for site walkovers

Season	Date	Surveyor	Wind Force	Wind Dir	Cloud (oktas)	Temp. (C)	Rain
Breeding 2022	26/04/2022	EF	1	E	5	10	None
Breeding 2022	26/04/2022	EF	3	E	7	11	None
Breeding 2022	28/04/2022	EF	1	NW	8	7	None
Breeding 2022	28/04/2022	EF	3	E	8	10	None
Breeding 2022	29/04/2022	EF	1	NW	4	5	None
Breeding 2022	29/04/2022	EF	4	NE	-	10	None
Breeding 2022	27/06/2022	EF	3	SW	2	11	None
Breeding 2022	28/06/2022	EF	3	SE	9	10	Frequent showers
Breeding 2022	29/06/2022	EF	4	S	-	13	None
Breeding 2022	30/06/2022	EF	1	SE	8	12	None
Breeding 2022	18/07/2022	EF	1	S	3	23	None
Breeding 2022	20/07/2022	EF	4	NW	7	15	None
Breeding 2022	21/07/2022	EF	1	N	8	16	None
Breeding 2022	22/07/2022	EF	0	-	5	14	None
Non-breeding 2021-22	18/11/2021	CS	3-4	SW	8-9	13-14	Occasional light showers
Non-breeding 2021-22	13/01/2022	CS	2	SW	7	4	None
Non-breeding 2021-22	13/01/2022	CS	3	SW	9	5	None
Non-breeding 2021-22	13/01/2022	CS	3	SW	5	5	None
Non-breeding 2021-22	03/02/2022	CS	4	SW	6	9	Light showers
Non-breeding 2021-22	03/02/2022	CS	5	SW	6	10	Light showers
Non-breeding 2021-22	03/02/2022	CS	5	SW	6	11	None

Table A3.3: Survey effort for dusk surveys

Season	Date	Surveyor	Wind Force	Wind Dir.	Cloud (oktas)	Temp. (C)	Rain
Breeding 2022	23/03/2022	CS	3	S	3	10	None
Breeding 2022	24/03/2022	CS	2	SW	2	7	None
Breeding 2022	28/03/2022	CS	2	NE	1	8	None
Breeding 2022	18/05/2022	EF	4	SE	8	12	None
Breeding 2022	25/05/2022	EF	1	W	3	13	None
Breeding 2022	26/05/2022	EF	2	W	5	10	None
Breeding 2022	20/06/2022	EF	0	SW	2	17	None
Breeding 2022	22/06/2022	EF	0	SE-SW	5	17	None
Breeding 2022	30/06/2022	EF	0	W	7	13	None
Breeding 2022	15/08/2022	EF	1	NW	8	17	None
Breeding 2022	16/08/2022	EF	2-4	NW	5	13-14	None
Breeding 2022	31/08/2022	EF	1	NE	1	14-17	None

Table A3.4: Survey effort for breeding raptor surveys

Season	Date	Surveyor	Wind Force	Wind Dir.	Cloud (oktas)	Temp. (C)	Rain
Breeding 2022	23/03/2022	CS	3	SE	1	12	None
Breeding 2022	24/03/2022	CS	2	SW	5-7	12	None
Breeding 2022	20/04/2022	EF	2	E	2	9	None
Breeding 2022	21/04/2022	EF	5	E	2	10	None
Breeding 2022	15/05/2022	EF	2	SW	4	13	None
Breeding 2022	22/05/2022	EF	3	SW	6	14	None
Breeding 2022	05/06/2022	EF	4	NE	8	12	None
Breeding 2022	19/06/2022	EF	3	NE	6	16	None
Breeding 2022	17/07/2022	EF	1	S	5-8	20-24	None
Breeding 2022	24/07/2022	EF	4	SW	4-8	19-20	None
Breeding 2022	14/08/2022	EF	1	NE-E	4-7	24-25	None
Breeding 2022	21/08/2022	EF	2	SW	3-5	17-18	None

Table A3.5: Survey effort for wider area waterbird surveys

Season	Date	Surveyor	Wind Force	Wind Dir.	Cloud (oktas)	Temp. (C)	Rain
Non-breeding 2021-22	13/09/2021	CS	2	SE	07-Aug	16	None
Non-breeding 2021-22	08/10/2021	CS	3	S	5	19	None
Non-breeding 2021-22	21/10/2021	CS	3-4	NW	0-4	8-11	None
Non-breeding 2021-22	21/10/2021	CS	3-4	NW	0-4	8-11	None
Non-breeding 2021-22	01/11/2021	CS	3-4	W	3-9	8-10	Occasional moderate showers
Non-breeding 2021-22	01/11/2021	CS	3-4	W	3-9	8-10	Occasional moderate showers
Non-breeding 2021-22	02/11/2021	CS	3	W-NW	3-4	9-10	None
Non-breeding 2021-22	02/12/2021	CS	2-3	NW-W-SW	2-8	4-6	None
Non-breeding 2021-22	02/12/2021	CS	2-3	NW-W-SW	2-8	4-6	None
Non-breeding 2021-22	17/12/2021	CS	3	SE	9	9	None
Non-breeding 2021-22	21/01/2022	CS	2	W	7	5	None
Non-breeding 2021-22	21/01/2022	CS	3	W	8	7	None
Non-breeding 2021-22	25/01/2022	CS	2	W	6	7	None
Non-breeding 2021-22	02/02/2022	CS	3	W	8	9	None
Non-breeding 2021-22	03/02/2022	CS	4	SW	7	11	None
Non-breeding 2021-22	04/02/2022	CS	4	W	6	4	Light showers
Non-breeding 2021-22	22/02/2022	CS	4	W	3	8	Light showers
Non-breeding 2021-22	08/03/2022	CS	5	SE	9	6	None
Non-breeding 2021-22	08/03/2022	CS	5	SE	9	7	Moderate showers
Non-breeding 2021-22	08/03/2022	CS	4	S	6	8	Heavy showers

Appendix 4 – Historical bird records

Table A4.1: List of historic bird records recorded within 10 km of the viable area for Kellystown Wind Farm

Bird species are grouped by conservation status, as per *Birds of Conservation Concern in Ireland 4: 2020–2026* (Gilbert *et al*., 2021) and ranked by likelihood of occurrence within 2 km viable area buffer r

- BoCCI assessments based on wintering, breeding, and/or passage populations have been denoted by (W), or (P), respectively; with V = vagrant and na = not assessed
- Likelihood of occurrence within 2 km: ? = unknown, H = historic population 1 = regularly occurring widespread/common 2 = regularly occurring – less common, low density populations linked to habitat requirements 3 = more scare, potential to occur based on habitat suitability also very occasional, sporadic 4 = unlikely 5 = inconsequential, e.g. vagrant

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
RED-LISTED				
Grey wagtail (*Motacilla cinerea*)		Red (B)		1 - likely to be breeding/foraging along water courses
Kestrel (*Falco tinnunculus*)		Red (B)		1 - likely breeding and wintering
Meadow pipit (*Anthus pratensis*)		Red (B)		1 - likely breeding and wintering
Swift (*Apus apus*)		Red (B)		1 - potentially breeding in quarry, likely to forage through the area
Redwing (*Turdus iliacus*)		Red (W)		1 - likely wintering and on passage
Barn owl (*Tyto alba*)		Red (B)		2 - likely to occur in area, with potential for breeding
Stock dove (*Columba oenas*)		Red (B)		2 - likely to occur in area, with potential for breeding
Bewick's swan (*Cygnus columbianus* subsp. *bewickii*)	Annex I	Red (W)		3 - has become a rarely recorded species in Ireland
Whinchat (*Saxicola rubetra*)		Red (B)		3 - limited contemporary records
Shoveler (*Anas clypeata*)	Annex II - Section I, Annex III - Section III	Red (B/W)		3 - limited habitat for breeding or wintering (small ponds/loughs)
Golden plover (*Pluvialis apricaria*)	Annex I	Red (B/W)		3 - no potential breeding habitat, potential foraging habitat for wintering birds in agricultural grassland, stubbles and cultivated land
Dunlin (*Calidris alpina*)	Annex I	Red (B/W)		3 - no potential breeding habitat, wintering birds predominately coastal
Redshank (*Tringa totanus*)		Red (B/W)		3 - no potential breeding habitat, wintering birds predominately coastal
Common scoter (*Melanitta nigra*)	Annex II - Section II, Annex III - Section III	Red (B/W)		3 - possibly moving between coast and inland breeding loughs
Woodcock (*Scolopax rusticola*)	Annex II - Section I, Annex III - Section III	Red (B)		3 - potential breeding habitat, wintering birds likely to occur regularly
Yellowhammer (*Emberiza citrinella*)		Red (B)		3 - potential breeding habitat, with hedgerows and cereal
Black-tailed godwit (*Limosa limosa*)	Annex I	Red (W)		3 - potential foraging habitat for wintering birds in agricultural grassland, stubbles and cultivated land
Snipe (*Gallinago gallinago*)	Annex II - Section I, Annex III - Section III	Red (B/W)		3 - potential breeding and wintering habitat
Lapwing (*Vanellus vanellus*)	Annex II - Section II	Red (B/W)		3 - some limited potential breeding habitat associated with cereal production with contemporary breeding record, potential foraging habitat for wintering birds in agricultural grassland, stubbles and cultivated land

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
Curlew (*Numenius arquata*)	Annex II - Section II	Red (B/W)		3 - limited potential breeding habitat, although historically bred, potential foraging habitat for wintering birds
Eider (*Somateria mollissima*)	Annex II - Section I, Annex III - Section II	Red (B/W)		4 - coastal species
Knot (*Calidris canutus*)		Red (B/W)		4 - coastal species
Oystercatcher (*Haematopus ostralegus*)		Red (B/W)		4 - coastal species
Bar-tailed godwit (*Limosa lapponica*)	Annex I	Red (W)		4 - coastal species
Greater scaup (*Aythya marila*)		Red (W)		4 - coastal species
Grey plover (Pluvialis squatarola)		Red (W)		4 - coastal species
Long-tailed duck (*Clangula hyemalis*)	Annex II - Section II	Red (W)		4 - coastal species
Purple sandpiper (*Calidris maritima*)		Red (W)		4 - coastal species
Kittiwake (*Rissa tridactyla*)		Red (B)		4 - marine species
Razorbill (*Alca torda*)		Red (B)		4 - marine species
Slavonian grebe (*Podiceps auritus*)		Red (W)		4 - marine species
Twite (*Carduelis flavirostris*)		Red (B)	Pre-1995 (1991)	4 - no breeding records, if wintering typically at coast in dunes and salt marshes
Nightjar (*Caprimulgus europaeus*)	Annex I	Red (B)	Pre-1995 (1972)	H - limited habitat for breeding (upland plantations - clear-felled or recently planted)
Pochard (*Aythya ferina*)	Annex II - Section I, Annex III - Section II	Red (B/W)	Pre-1995 (1984)	H - limited habitat for breeding or wintering
Goldeneye (*Bucephala clangula*)	Annex II - Section II	Red (W)	Pre-1995 (1984)	H - limited habitat for breeding or wintering
Corn crake (*Crex crex*)	Annex I	Red (B)	Pre-1995 (1972)	H - no longer occurs in Co. Louth as a breeding species
Grey partridge (*Perdix perdix*)	Annex II - Section I, Annex III - Section I	Red (B)	Pre-1995 (1991)	H - potential breeding habitat associated with cereal production
Quail (*Coturnix coturnix*)		Red (B)	Pre-1995 (1972)	H - potential breeding habitat associated with cereal production
AMBER LISTED				
Goldcrest (*Regulus regulus*)		Amber (B)		1 - likely breeding and wintering
Greenfinch (*Carduelis chloris*)		Amber (B)		1 - likely breeding and wintering
House sparrow (*Passer domesticus*)		Amber (B)		1 - likely breeding and wintering
Linnet (*Carduelis cannabina*)		Amber (B)		1 - likely breeding and wintering
Skylark (*Alauda arvensis*)		Amber (B)		1 - likely breeding and wintering
Starling (*Sturnus vulgaris*)		Amber (B)		1 - likely breeding and wintering
Black-headed gull (*Chroicocephalus ridibundus*)		Amber (B/W)		1 - no potential breeding habitat, potential foraging habitat in agricultural grassland, stubbles and cultivated land
Common gull (*Larus canus*)		Amber (B/W)		1 - no potential breeding habitat, potential foraging habitat in agricultural grassland, stubbles and cultivated land
Herring gull (*Larus argentatus*)		Amber (B/W)		1 - no potential breeding habitat, potential foraging habitat in agricultural grassland, stubbles and cultivated land

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
Lesser black-backed gull (*Larus fuscus*)		Amber (B/W)		1 - no potential breeding habitat, potential foraging habitat in agricultural grassland, stubbles and cultivated land
House martin (*Delichon urbicum*)		Amber (B)		1 - likely breeding
Sand martin (*Riparia riparia*)		Amber (B)		1 - likely breeding
Spotted flycatcher (*Muscicapa striata*)		Amber (B)		1 - likely breeding
Swallow (*Hirundo rustica*)		Amber (B)		1 - likely breeding
Willow warbler (*Phylloscopus trochilus*)		Amber (B)		1 - likely breeding
Northern wheatear (*Oenanthe oenanthe*)		Amber (B)		2 - likely occurring on passage, possibly breeding although suitable habitat may be limited
Coot (*Fulica atra*)	Annex II - Section I, Annex III - Section II	Amber (B/W)		2 - limited potential breeding and wintering habitat (small ponds/loughs)
Mallard (*Anas platyrhynchos*)	Annex II - Section I, Annex III - Section I	Amber (B/W)		2 - limited potential breeding and wintering habitat (small ponds/loughs)
Mute swan (*Cygnus olor*)		Amber (B/W)		2 - limited potential breeding and wintering habitat (small ponds/loughs)
Teal (*Anas crecca*)	Annex II - Section I, Annex III - Section II	Amber (B/W)		2 - limited potential breeding and wintering habitat (small ponds/loughs)
Wigeon (*Anas penelope*)		Amber (B/W)		2 - limited potential breeding and wintering habitat (small ponds/loughs)
Merlin (*Falco columbarius*)	Annex I	Amber (B)		2 - no potential breeding habitat, potential foraging habitat for wintering birds
Hen harrier (*Circus cyaneus*)	Annex I	Amber (B)		2 - no potential breeding habitat, potential foraging habitat for wintering birds - limited winter roost potential
Kingfisher (*Alcedo atthis*)	Annex I	Amber (B)		2 - potential foraging along water courses - breeding unlikely
Whooper swan (*Cygnus cygnus*)	Annex I	Amber (B/W)		2 - some potential wintering habitat, including improved grassland and cultivated fields, limited roosts (small ponds/loughs)
Greylag goose - Icelandic migrant (*Anser anser*)	Annex II - Section I, Annex III - Section II	Amber (W)		3 - likely to occur on passage/commuting - wintering flock in Co. Louth is reported as Icelandic and historically the county supported 1,400 birds; however, numbers declined in recent years. Any feral resident birds (naturalised, introduced population) are listed on the Third Schedule (Reg. S.I. 477) as an invasive species
Greenland white-fronted goose (*Anser albifrons* subsp. *flavirostris*)	Annex I, Annex II - Section II, Annex III - Section III	Amber (W)		3 - likely to occur on passage/commuting - wintering flock in Co. Louth relatively small (< 100 birds)
Brambling (*Fringilla montifringilla*)		Amber (W)		3 - likely to occur over winter in small numbers
Gadwall (*Anas strepera*)	Annex II - Section I	Amber (B/W)		3 - limited potential breeding and wintering habitat (small ponds/loughs)
Great crested grebe (*Podiceps cristatus*)		Amber (B/W)		3 - limited potential breeding and wintering habitat (small ponds/loughs)
Tufted duck (*Aythya fuligula*)	Annex II - Section I, Annex III - Section II	Amber (B/W)	Pre-1995 (1991)	3 - limited potential breeding and wintering habitat (small ponds/loughs)
Mediterranean gull (*Larus melanocephalus*)	Annex I	Amber (B)		3 - no potential breeding habitat, potential foraging habitat in agricultural grassland, stubbles and cultivated land
Arctic tern (*Sterna paradisaea*)	Annex I	Amber (B)		3 - no potential breeding habitat, possibly birds moving to inland breeding loughs
Common tern (*Sterna hirundo*)	Annex I	Amber (B)		3 - no potential breeding habitat, possibly birds moving to inland breeding loughs

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
Tree sparrow (*Passer montanus*)		Amber (B)		3 - potential breeding habitat, with hedgerows and cereal
Cormorant (*Phalacrocorax carbo*)		Amber (B/W)		3 - potential for commuting birds - no potential breeding and v. limited foraging habitats (small ponds/loughs)
Shelduck (*Tadorna tadorna*)		Amber (B/W)		3 - potentially breeding at inland locations, wintering birds coastal
Black guillemot (*Cepphus grylle*)		Amber (B)		4 - coastal species
Roseate tern (*Sterna dougallii*)	Annex I	Amber (B)		4 - coastal species
Sandwich tern (*Sterna sandvicensis*)	Annex I	Amber (B)		4 - coastal species
Red-breasted merganser (*Mergus serrator*)		Amber (B/W)		4 - coastal species
Red-throated diver (*Gavia stellata*)	Annex I	Amber (B/W)		4 - coastal species
Brent goose (*Branta bernicla*)		Amber (W)		4 - coastal species
Turnstone (*Arenaria interpres*)		Amber (W)		4 - coastal species
Ringed plover (*Charadrius hiaticula*)		Amber (B/W)		4 - limited suitable habitat for this predominately coastal species
Fulmar (*Fulmarus glacialis*)		Amber (B)		4 - marine species
Gannet (*Morus bassanus*)		Amber (B)		4 - marine species
Guillemot (*Uria aalge*)		Amber (B)		4 - marine species
Manx shearwater (*Puffinus puffinus*)		Amber (B)		4 - marine species
Shag (*Phalacrocorax aristotelis*)		Amber (B)		4 - marine species
Little gull (*Larus minutus*)	Annex I	Amber (P)		4 - marine species
Black-throated diver (*Gavia arctica*)	Annex I	Amber (W)		4 - marine species
Great northern diver (*Gavia immer*)	Annex I	Amber (W)		4 - marine species
Barnacle goose (*Branta leucopsis*)		Amber (W)		4 - rarely occurring on Ireland's eastern seaboard
Little tern (*Sternula albifrons*)	Annex I	Amber (B)		4 - coastal species
Russian/European white-fronted goose (*Anser albifrons* subsp. *albifrons*)	Annex I, Annex II - Section II, Annex III - Section III	na - rarity (W)		5 - rarely recorded winter visitor
Bearded (tit) reedling (*Panurus biarmicus*)		Amber (B)	Pre-1990 (1966)	H - limited breeding habitat (reedbeds)
GREEN LISTED				
Chiffchaff (*Phylloscopus collybita*)		Green (B)		1 - likely breeding
Blackbird (*Turdus merula*)		Green (B)		1 - likely breeding and wintering
Blackcap (*Sylvia atricapilla*)		Green (B)		1 - likely breeding and wintering
Blue tit (*Cyanistes caeruleus*)		Green (B)		1 - likely breeding and wintering
Bullfinch (*Pyrrhula pyrrhula*)		Green (B)		1 - likely breeding and wintering
Buzzard (*Buteo buteo*)		Green (B)		1 - likely breeding and wintering
Chaffinch (*Fringilla coelebs*)		Green (B)		1 - likely breeding and wintering
Coal tit (*Periparus ater*)		Green (B)		1 - likely breeding and wintering
Collared dove (*Streptopelia decaocto*)		Green (B)		1 - likely breeding and wintering
Dunnock (*Prunella modularis*)		Green (B)		1 - likely breeding and wintering

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
Goldfinch (*Carduelis carduelis*)		Green (B)		1 - likely breeding and wintering
Great tit (*Parus major*)		Green (B)		1 - likely breeding and wintering
Hooded crow (Corvus corone)		Green (B)		1 - likely breeding and wintering
Jackdaw (*Corvus monedula*)		Green (B)		1 - likely breeding and wintering
Jay (*Garrulus glandarius*)		Green (B)		1 - likely breeding and wintering
Lesser redpoll (*Carduelis cabaret*)		Green (B)		1 - likely breeding and wintering
Long-eared owl (*Asio otus*)		Green (B)		1 - likely breeding and wintering
Long-tailed tit (*Aegithalos caudatus*)		Green (B)		1 - likely breeding and wintering
Magpie (*Pica pica*)		Green (B)		1 - likely breeding and wintering
Mistle thrush (*Turdus viscivorus*)		Green (B)		1 - likely breeding and wintering
Pied/white wagtail (*Motacilla alba*)		Green (B)		1 - likely breeding and wintering
Reed bunting (*Emberiza schoeniclus*)		Green (B)		1 - likely breeding and wintering
Robin (*Erithacus rubecula*)		Green (B)		1 - likely breeding and wintering
Rook (*Corvus frugilegus*)		Green (B)		1 - likely breeding and wintering
Siskin (*Carduelis spinus*)		Green (B)	Pre-1995 (1984)	1 - likely breeding and wintering
Song thrush (*Turdus philomelos*)		Green (B)		1 - likely breeding and wintering
Sparrowhawk (*Accipiter nisus*)		Green (B)		1 - likely breeding and wintering
Stonechat (*Saxicola torquata*)		Green (B)		1 - likely breeding and wintering
Treecreeper (*Certhia familiaris*)		Green (B)		1 - likely breeding and wintering
Whitethroat (*Sylvia communis*)		Green (B)		1 - likely breeding and wintering
Woodpigeon (*Columba palumbus*)	Annex II - Section I, Annex III - Section I	Green (B)		1 - likely breeding and wintering
Wren (*Troglodytes troglodytes*)		Green (B)		1 - likely breeding and wintering
Pheasant (*Phasianus colchicus*)	Annex II - Section I, Annex III - Section I	Non-native (B/W)		1 - likely breeding and wintering
Dipper (*Cinclus cinclus*)		Green (B)		1 - likely to be breeding/foraging along water courses
Grey heron (*Ardea cinerea*)		Green (B/W)		1 - likely to be foraging in area using small ponds/loughs and water courses
Little egret (*Egretta garzetta*)	Annex I	Green (B/W)		1 - likely to be foraging in area using small ponds/loughs and water courses
Fieldfare (*Turdus pilaris*)		Green (W)		1 - likely wintering and on passage
Jack snipe (*Lymnocryptes minimus*)		Green (W)		1 - likely wintering in small number, numbers increasing on spring passage
Great black-backed gull (*Larus marinus*)		Green (B/W)		1 - no potential breeding habitat, potential for scavenging on fallen stock
Peregrine falcon (*Falco peregrinus*)	Annex I	Green (B)		1 - quarry provides potential nesting habitat - likely breeding and wintering
Raven (*Corvus corax*)		Green (B)		1 - quarry provides potential nesting habitat - likely breeding and wintering
Rock dove (*Columba livia*)	Annex II - Section I	Green (B)		1 - quarry provides potential nesting habitat - likely breeding and wintering (potentially interbreeding with feral pigeons)
Grasshopper warbler (*Locustella naevia*)		Green (B)		2 - likely breeding - limited to wetter, unimproved grasslands with open areas of scrub and brambles

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
Moorhen (*Gallinula chloropus*)		Green (B)		2 - limited number of small ponds/loughs provide potential breeding and wintering habitat
Water rail (*Rallus aquaticus*)		Green (B)		2 - limited number of small ponds/loughs provide potential breeding and wintering habitat
Little grebe (*Tachybaptus ruficollis*)		Green (B/W)		2 - limited number of small ponds/loughs provide potential breeding and wintering habitat
Sedge warbler (*Acrocephalus schoenobaenus*)		Green (B)		2 - limited to areas with suitable habitat with areas of marshy/swampy ground
Pink-footed goose (*Anser brachyrhynchus*)		Green (W)		3 - likely to occur on passage - wintering flock in Co. Louth relatively small (< 100 birds)
Glaucous gull (*Larus hyperboreus*)		Green (W)		3 - mostly recorded at the coast
Cuckoo (*Cuculus canorus*)		Green (B)	Pre-1995 (1991)	3 - possible breeding, relatively scarce in Co. Louth - scrubby habitats with associated less improved grasslands in site suitable for host species
Snow bunting (*Plectrophenax nivalis*)		Green (W)		3 - possibly occurring over winter in small numbers - limited suitable habitat
Great-spotted woodpecker (*Dendrocopos major*)		Green (B)		3 - recent coloniser to Ireland - likely to breeding/wintering in areas with woodland
Black redstart (*Phoenicurus ochruros*)		Green (P/W)		3 - scarce passage migrant
Rock pipit (*Anthus petrosus*)		Green (B)		4 - coastal species
Little stint (*Calidris minuta*)		Green (P)		4 - coastal species
Greenshank (*Tringa nebularia*)		Green (W)		4 - coastal species
Iceland gull (*Larus glaucoides*)		Green (W)		4 - coastal species
Sanderling (*Calidris alba*)		Green (W)		4 - coastal species
Arctic skua (*Stercorarius parasiticus*)		Green (P)		4 - marine species
Grey phalarope (*Phalaropus fulicarius*)		Green (P)		4 - marine species
Little auk (*Alle alle*)		Green (P)		4 - marine species
Glossy ibis (*Plegadis falcinellus*)		na - rarity		5 - limited suitable habitat for this rare summer migrant - small numbers more frequently recorded annually in Ireland
Black brant (*Branta bernicla* subsp. *nigricans*)		Green (W)		5 - rarely recorded winter visitor
Dark-bellied brent goose (*Branta bernicla* subsp. *bernicla*)		Green (W)		5 - rarely recorded winter visitor
Yellow-legged gull *(Larus michahellis*)		Green (W)		5 - rarely recorded winter visitor
Not assessed (na)				
Dotterel (*Charadrius morinellus*)		na - rarity (P)		3 - rarely recorded passage migrant
Hobby (*Falco subbuteo*)		na (P)		3 - rarely recorded passage migrant - incidence increasing as UK breeding population increases
Kumlien's Iceland gull (*Larus glaucoides* subsp. *kumlieni*)		na - rarity (W)		4 - coastal species
Surf scoter (*Melanitta perspicillata*)		na - rarity (W)		4 - marine species
Velvet scoter (*Melanitta fusca*)		na - rarity (W)		4 - marine species
Lapland (longspur) bunting (*Calcarius lapponicus*)		na - rarity (P)		5 - rarely recorded passage migrant

Common name (scientific)	EU Birds Directive	Conservation status	Pre-1995 records (yr last recorded)	Likelihood of occurrence within 2 km
Melodious warbler (*Hippolais polyglotta*)		na - rarity (P)		5 - rarely recorded passage migrant
Ortolan bunting (*Emberiza hortulana*)		na - rarity (P)		5 - rarely recorded passage migrant
Serin (*Serinus serinus*)		na - rarity (P)		5 - rarely recorded passage migrant
White-winged black tern (*Chlidonias leucopterus*)		na - rarity (P)		5 - rarely recorded passage migrant
Russian/European white-fronted goose (*Anser albifrons* subsp. *albifrons*)	Annex I, Annex II - Section II, Annex III - Section III	na - rarity (W)		5 - rarely recorded winter visitor
Rose-coloured starling (*Sturnus roseus*)		na - rarity		5 - rarely recorded species
Continental cormorant (*Phalacrocorax carbo* subsp. *sinensis*)		na - rarity		5 - rarely recorded sub-species
Carrion crow (*Corvus corone*)		na - rarity (V)		5 - rarely recorded sub-species
Barred warbler (*Sylvia nisoria*)		na - rarity (P)		5 - scarce passage migrant
American golden plover (*Pluvialis dominica*)		na - rarity (V)		5 - vagrant
American herring gull (*Larus smithsonianus*)		na - rarity (V)		5 - vagrant
Forster's tern (*Sterna forsteri*)		na - rarity (V)		5 - vagrant
Franklin's gull (*Larus pipixcan*)		na - rarity (V)		5 - vagrant
Laughing gull (*Larus atricilla*)		na - rarity (V)		5 - vagrant
Rufous-tailed rock thrush (*Monticola saxatilis*)		na - rarity (V)		5 - vagrant