7.0 ORNITHOLOGY

7.1 INTRODUCTION

7.1.1 Project description

A detailed proposed project description is included in Chapter 2 of this EIAR.

7.1.2 Scope and content

This chapter presents an assessment of the likely impact of the proposed project on bird populations of conservation importance.

The chapter was prepared by Tom Gittings. It is based on bird surveys carried out between the winters of 2019/20 and 2021/22, with some additional survey work from the summer of 2022. The surveys were carried out by various surveyors (see Section 7.2.3.4).

The bird survey work for this project covered the entire wind farm site. However, the proposed wind farm project will only involve development of the eastern section of the site. The eastern and western sections of the site are also topographically discrete and have some differences in their habitats. Therefore, in this chapter, the discussions of the results of the bird surveys, and bird distribution patterns around the wind farm site, often distinguish between the eastern and western sections of the site. The boundary between the two sections of the site is shown in Figure 7-1.This boundary follows the lowest point of the valley that divides the site.

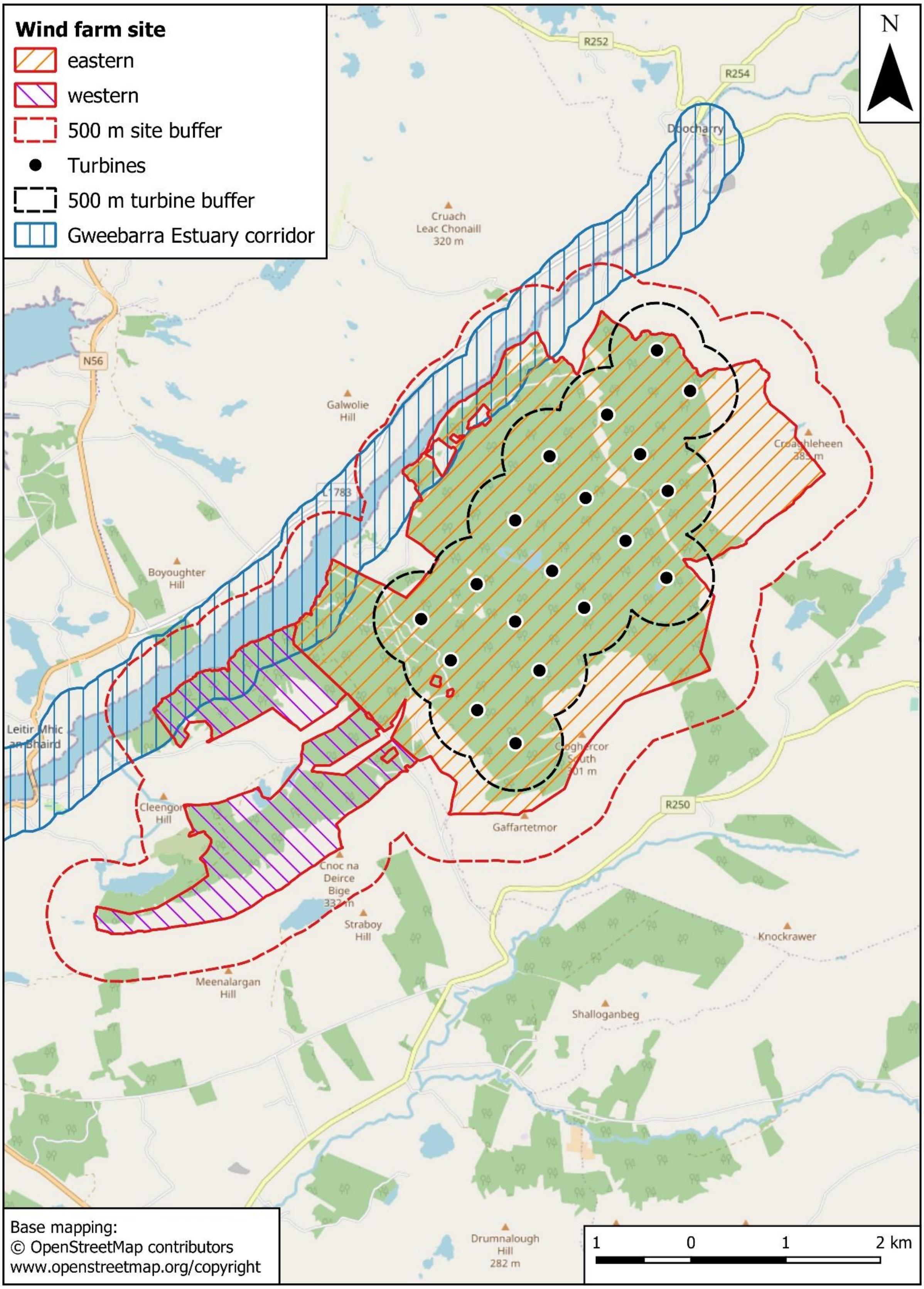

Figure 7-1 - The wind farm site, and the eastern and western subdivisions of the site.

7.1.3 Turbine models

There are eight turbine models that are being considered for this wind farm. These turbine models have rotor diameters ranging from 149-164 m, hub heights ranging from 112-125 m and tip heights ranging from 185-200 m. The collision risk modelling included all eight turbine models (see Section 7.2.6.7). The modelling showed that the variation in ground clearance was the most important factor in determining the variation in collision risk between the turbine models (see Appendix 7.7). The minimum possible ground clearance, given these ranges is 30 m, which is represented by one of the turbine models (the GE GE-164), while the maximum possible ground clearance is 50.5 m, which is represented by another of the turbine models (the Nordex N149). Therefore, all scenarios within the turbine range have been assessed.

The variation in turbine specifications between these models is only relevant to the collision risk modelling. The assessments of the other potential impacts, such as displacement and disturbance impacts, as well as the risk of Red Grouse colliding with the turbine bases, is based on the location of the turbines and distances from the turbine towers and/or other infrastructure, and are not affected by the variation in specifications between the turbine model.

7.1.4 Limitations

The bird surveys carried out for this wind farm project did not detect the presence of an occupied Golden Eagle nest close to the wind farm site in 2020, and information about this nest was not received until September 2021. This meant that it was not possible to take the presence of this nest into account in the design and implementation of the 2020 and 2021 bird surveys.

Very little information is available about the demographics of the Irish Golden Eagle population. Therefore, the Golden Eagle Population Model in this assessment uses some demographic parameters from Scottish sources.

The availability of information about the impacts of operational wind farms in Donegal on bird populations is very limited and this has affected the scope of the cumulative assessments.

7.2 METHODOLOGY

7.2.1 Study area

The ornithology study area was modified after winter 2019/20 surveys were completed. The study area originally only comprised the eastern section of the current site (see Figure 7-1). The wind farm site was expanded to its current extent and from the 2020 breeding season onwards the study area was also expanded. The study areas for different species and bird survey methods were defined by various buffer distances around the wind farm site (see relevant sections below).

7.2.2 Desk review

An initial desk review was carried out in the winter of 2019/20 at the start of the project. This was updated in August-October 2022.

This review included all bird records held by the National Biodiversity Data Centre for the six hectads (10 km squares) overlapping the wind farm site, which includes records from the four national bird atlas surveys (Sharrock *et al.*, 1976; Lack, 1980; Gibbons *et al.*, 1993; Balmer *et al.*, 2013).

Other data sources used included: information from rare and protected species records supplied by NPWS; and information on site coverage from the Irish Wetland Bird Survey; data from the 2010 and 2015 International Swan Censuses (supplied by BirdWatch Ireland); information on a local Golden Eagle nest site supplied by NPWS; and information contained in Environmental Impact Assessment Reports for other wind farm projects in this area. Consultation requests were also made to NPWS for any additional relevant records not contained in the rare and protected species records, and to the Golden Eagle Trust and the Irish Raptor Study Group for any relevant data or information but no further data was supplied.

Categorisation of species as red-listed, or amber-listed, in Birds of Conservation Concern in Ireland 2020 – 2026 (Gilbert *et al.*, 2021), and/or inclusion of species on Annex I of the Birds Directive, was used to help highlight species of potential interest.

As recommended by the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2019) the results of the desk review are integrated with the findings from the bird surveys in Sections 7.3.1-7.3.5.

7.2.3 Bird surveys

7.2.3.1 Scope

The scope of, and methods used for, the bird surveys were based on Scottish Natural Heritage's guidance: *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms* (SNH, 2017; referred to hereafter as the SNH guidelines).

The bird surveys included vantage point surveys to monitor flight activity over the wind farm site and targeted surveys were carried out, focussing on particular species based on the results of the desk review. These included Red-throated Diver, Golden Eagle and Merlin breeding surveys, breeding wader surveys, etc.

The overall survey effort included five seasons of vantage point surveys, with data from a sixth season included for Golden Eagle, as well as comprehensive surveys covering all the potential breeding and wintering species of conservation significance. The surveys provide a robust dataset for the purposes of assessing the occurrence of populations of conservation importance in, and around, the wind farm site and carrying out collision risk modelling.

The following sections provide summaries of the bird survey methods and coverage. This includes reviews of how the coverage corresponded to the recommendations of the SNH guidance. For this purpose, buffer distances around the proposed turbines and other wind farm infrastructure are used, rather than the overall wind farm site (as large parts of the site will not be developed). The infrastructure buffers exclude the met mast and its access track, as these are small, outlying developments.

Full details of the methods used for all the bird surveys are included in Appendix 7.1, Appendix 7.4 and Appendix 7.5.

7.2.3.2 Vantage point surveys

Vantage point surveys were carried out between October 2019 and September 2022, covering six seasons (winter 2019/20 – summer 2022). However, due to data processing time requirements, the assessments presented in this chapter are mainly based on the data from the first five seasons, although the Golden Eagle data from the sixth season has been included.

A total of ten vantage point locations were used. The vantage point locations and viewsheds are shown in Figure 7-2 and the overall viewshed coverage is shown Figure 7-3. Note, that there were adjustments in the position of VP5 over the first year of the survey; these are shown in Appendix 7.1. Apart from VP3, the vantage point locations are around the perimeter of the wind farm site and are all at least 500 m from the nearest turbine location. The VP1-VP6 viewsheds cover all the turbine locations.

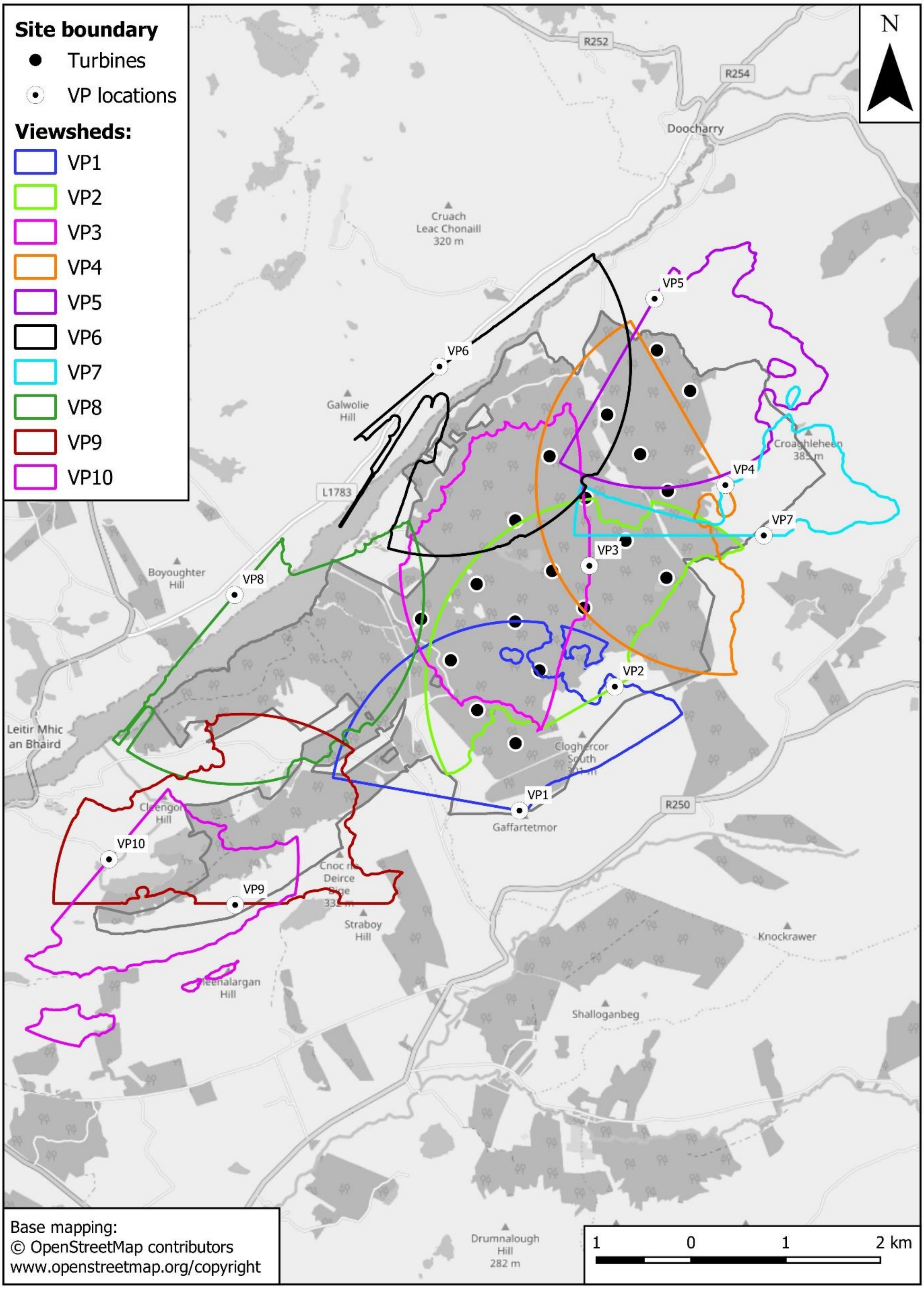

Figure 7-2 - Vantage point locations and viewsheds.

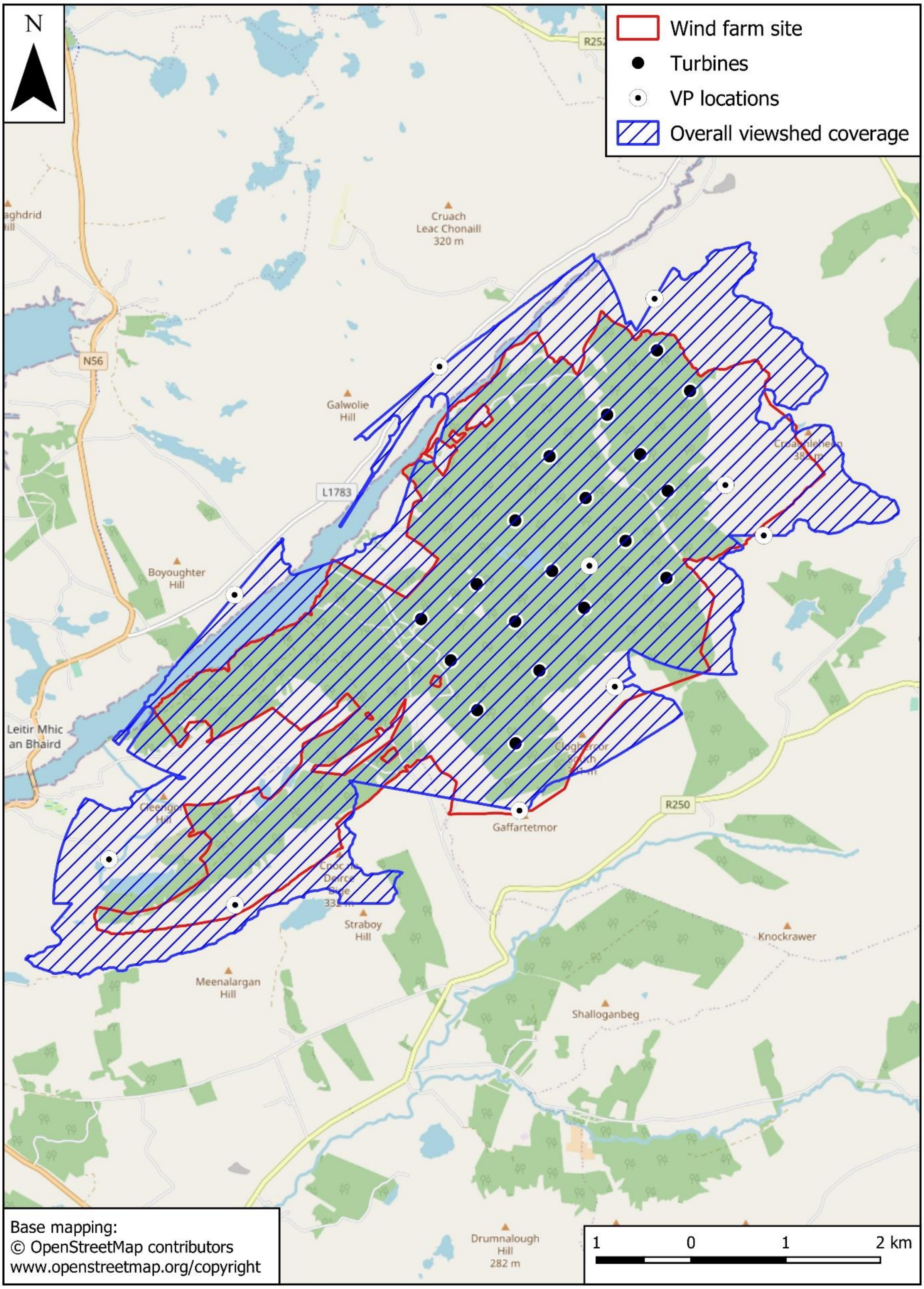

Figure 7-3 - Overall viewshed coverage.

The overall vantage point survey effort at each vantage point in each season is shown in Table 7-1. The vantage points covering the turbine locations (VP1-VP6) received at least 36 hours of vantage point surveys in each of the first four seasons, apart from VP4 in the 2019/20 winter where only 35 hours of coverage was achieved.

Table 7-1: Total vantage point survey hours at each vantage point location in each season

Season	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8	VP9	VP10
2019/20 winter	36	36	36	35	39	36	0	0	0	0
2020 summer	36	36	36	48	46	36	48	30	30	30
2020/21 winter	36	36	36	36	36	36	36	36	36	36
2021 summer	36	36	36	48	48	36	48	36	36	36
2021/22 winter	30	36	0	36	0	0	0	36	30	42
2022 summer	36	36	0	0	0	0	0	36	0	72

Observations of all waterbird and raptor species, and any other species of potential conservation concern, during the vantage point surveys were recorded using the methodology for focal bird sampling in the SNH guidelines. Flight activity was recorded separately in five height bands: 0-25 m, 25-50 m, 50-160 m, 160-220 m and > 220 m. See Appendix 7.7 for details about how these height bands were used for collision risk modelling for the eight turbine models used in the assessment. The durations of all flight in each height band were recorded. Apart from in the first season, these durations were only recorded for flight activity within the mapped viewsheds, as it is only flight activity within the mapped viewsheds that is relevant for collision risk modelling. Details of the adjustments that were made to flight durations recorded in the first season are described in the collision risk modelling report (Appendix 7.7). All flightlines were mapped as accurately as possible.

Full details of the vantage point survey methods and coverage are included in Appendix 7.1.

7.2.3.3 Targeted surveys

7.2.3.3.1 Moorland breeding bird survey

Moorland breeding bird surveys were carried out in the 2020 and 2021 breeding seasons. These targeted Red Grouse and breeding waders. These covered the open moorland habitat (bog, heath and rough grassland) within the wind farm site. Additional habitat within 500 m of the site boundary was also covered but coverage of areas outside the site boundary was limited by access issues. However, all the open moorland habitat within 500 m of the turbine locations was covered with the exception of some areas of cutover bog in the outer part of the buffers around T18 and T19. The survey methodology and timings were based on the adapted Brown and Sheppard method recommended by the SNH guidelines.

Full details of the survey methods and coverage are included in Appendix 7.1.

7.2.3.3.2 Winter waterbird surveys

The SNH guidelines recommends that winter waterbird surveys should include, where relevant: feeding distribution surveys of swans and geese within 500 m of the wind farm site where the wind farm site includes known feeding areas or is within the core foraging range from SPA populations or other major roosts; surveys of known geese roost sites within 1 km of the wind farm site; and surveys of coastal waterbirds within 2 km of the wind farm site. The Cloghercor Wind Farm site does not fit the specific criteria cited in the SNH guidelines. Nevertheless, the spatial coverage of the winter waterbird surveys carried out for the Cloghercor Wind Farm project complied with the recommendations in the SNH guidelines.

The vantage point survey coverage was considered sufficient to assess Whooper Swan foraging usage of the lakes within 1 km of the proposed turbines and other wind farm infrastructure.

A walkover survey of open areas of bog and heath habitat was carried out in the winter of 2019/20 to assess possible usage of the site by Greenland White-fronted Goose and Golden Plover. This survey was not repeated in the winter of 2020/21 as it was considered that that the vantage point surveys provided sufficient coverage to assess any usage of the site by Greenland White-fronted Goose and Golden Plover.

Waterbird surveys of the Gweebarra Estuary were carried out in the winters of 2019/20 and 2020/21, using standard waterbird survey methods. These surveys covered the sections of the estuary upstream of Lettermacaward Bridge, which includes all the estuary within a 2 km buffer of the site boundary. In the winters of 2019/20, a monthly waterbird vantage point survey was carried out to assess connectivity and usage of the river as a commuting corridor.

In the 2020/21 winter, Whooper Swan and Greenland White-fronted Goose dusk roost surveys were carried out. These covered lakes within 1 km of the site boundary, where access was feasible. The surveys were conducted once per month between October 2020 and March 2021.

Full details of the waterbird survey methods and coverage are included in Appendix 7.1.

7.2.3.3.3 Breeding Red-throated Diver survey

Breeding Red-throated Diver surveys were carried out in the 2020 and 2021 breeding seasons. The buffer distance for Red-throated Diver surveys recommended by the SNH guidelines is 1 km. The Red-throated Diver surveys covered all the lakes within 1 km of the wind farm turbines and other infrastructure, apart from Lough Sallagh. The latter is a small lake that was visible from VPs 2 and 4, so the VP survey coverage was considered adequate. The survey methods followed Gilbert *et al.* (1998).

Full details of the Red-throated Diver survey methods and coverage are included in Appendix 7.1.

7.2.3.3.4 Breeding Golden Eagle survey

Breeding Golden Eagle surveys were carried out in 2020, 2021 and 2022. These surveys covered 6 km buffers around the wind farm site, as recommended by the SNH guidelines. The survey methods were based on Hardey *et al.* (2009, 2013).

All habitats within the 6 km buffer zone around the wind farm site with potential to support breeding Golden Eagle were covered. The surveys used three-six hour vantage point watches to cover the 6 km buffer zone. These were carried out at vantage point locations that were selected for the purposes of the Golden Eagle survey and were mainly located around the edges of the buffer zone. It is important to note that the vantage points used for the Golden Eagle survey (referred to as the EA vantage points, and numbered EA1, EA2, etc.) were different from the vantage points used for the standard vantage point survey over the wind farm site (referred to as the wind farm vantage points, and numbered VP1, VP2, etc.).

Eight EA vantage points were used in 2020, 13 EA vantage points were used in 2021 and 15 EA vantage points were used in 2022 (see maps in Appendix 7.4 and 7.5). The higher number of EA vantage points in 2021 and 2022 reflected the increase in the size of the survey area. Most of the intervening air space and terrain between the EA vantage points, and from the EA vantage points to the wind farm site, was visible.

Survey visits were planned for February-March (first visit), April (second visit), June (third visit) and July (fourth visit), based on the four-visit schedule set out in Hardey *et al.* (2009, 2013). However, in 2020, the first visit was only partially completed due to COVID-19 restrictions, while in 2021 the fourth visit was not carried out as the eagles were considered to have abandoned their nest.

Full details of the survey methods, and the survey dates and coverage are included in Appendix 7.4 and Appendix 7.5.

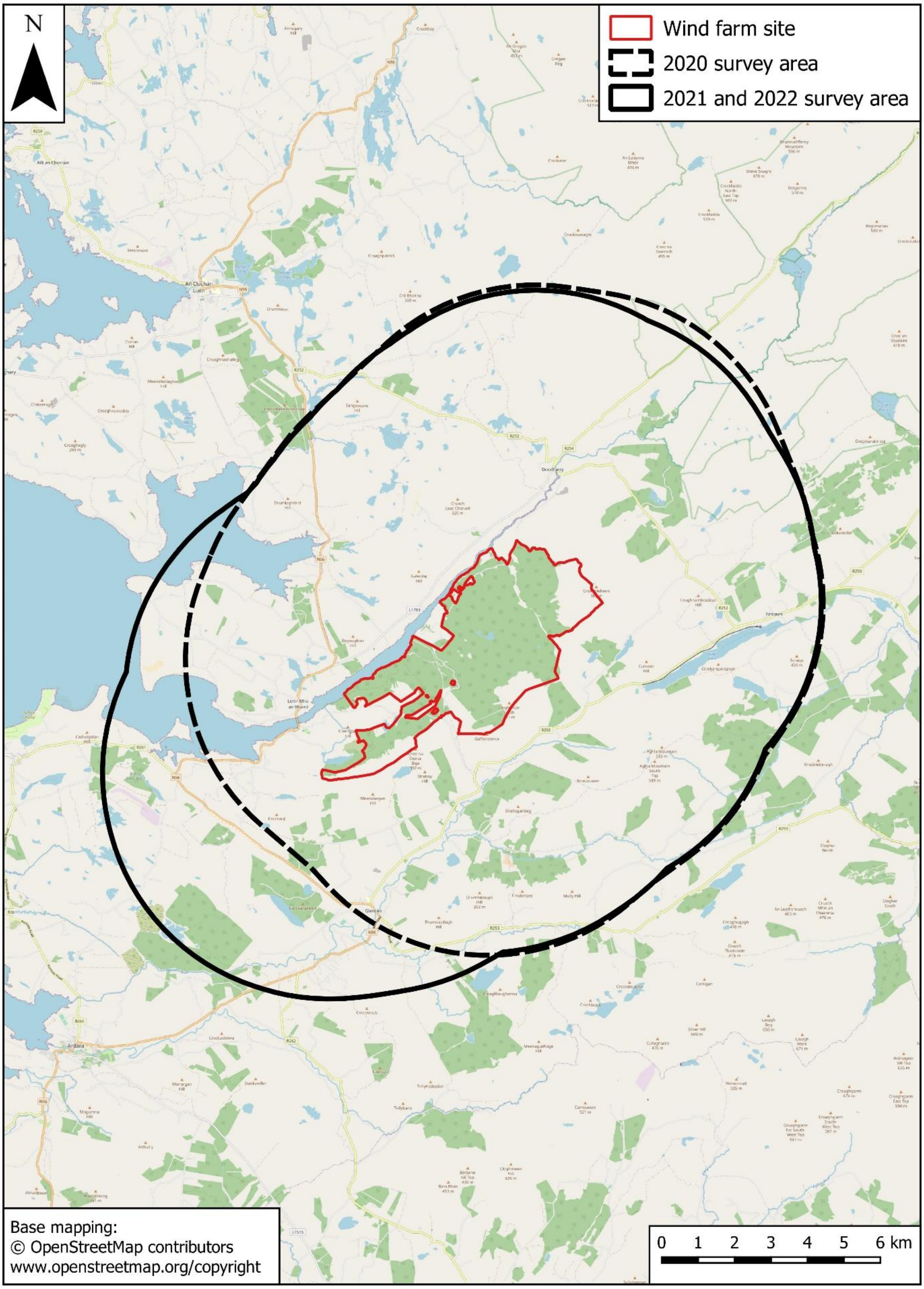

Figure 7-4 - Golden Eagle survey area and vantage points.

7.2.3.3.5 Breeding Golden Plover survey

The moorland breeding bird surveys collected data on breeding Golden Plover in 2020 and 2021. Following consultation with NPWS, a targeted Golden Plover survey was carried out in the 2022 breeding season. The objective of this survey was to collect data on Golden Plover commuting routes between the breeding area and potential grassland foraging habitat. There is no standard design for this type of survey. Therefore, the survey design was based on a literature review of information about Golden Plover breeding ecology.

The survey covered the incubation period, which is when the commuting behaviour mainly occurs. Surveys were out at weekly intervals during this period. The watches started at dawn, or finished at dusk, when changeovers of incubating birds are most likely to occur. The surveyor watched for the arrival of the non-incubating bird. When the changeover occurred, the observer tracked the flight path of the departing bird for as long as possible.

The survey took measures avoid causing undue disturbance to the breeding Golden Plovers and other species of conservation importance. This included using observation positions in the nesting area that did not cause persistent agitation by the plovers, and liaising with the Golden Eagle survey team to avoid disturbance to any eagle nests.

Full details of the Golden Plover survey methods and coverage are included in Appendix 7.1.

7.2.3.3.6 Breeding gull survey

The objective of the breeding gull survey was to identify gull colonies on any lakes in the vicinity of the wind farm site. The survey was carried out at the same time as the breeding Red-throated Diver survey The buffer distance for breeding gull surveys recommended by the SNH guidelines is 2 km. All the lakes within 2 km of the wind farm turbines and other infrastructure were covered by the breeding gull surveys, the moorland breeding bird surveys, or the vantage point surveys.

Full details of the breeding gull survey methods and coverage are included in Appendix 7.1.

7.2.3.3.7 Breeding Merlin survey

The SNH guidelines recommends that Merlin surveys cover a 2 km buffer distance around the wind farm site. However, this is not practicable in landscapes like the one around the Cloghercor Wind Farm site, where most of the 2 km buffer is potentially suitable Merlin habitat. An intensive Merlin survey of ten sample 3 x 3 km squares by Lusby *et al.* (2011) involved 845 hours of survey work, which amounts to around nine hours per km^2. This would translate to around 750 hours of survey work to cover the 2 km buffer around the Cloghercor Wind Farm site, while access issues would also have been a major constraint. Instead, as the main sensitivity was considered to be potential disturbance to Merlin nesting close to the wind farm site, the Merlin survey effort focussed on areas within a 500 m buffer around the wind farm site.

The Merlin surveys in 2020 and 2021 were based on the methods used by Lusby *et al.* (2011). This involves searching for Merlin signs and carrying out targeted vantage point surveys if areas of potential Merlin activity are identified from the sign searching.

In 2022, a dedicated Merlin survey was carried out. This comprised 84.5 hours of survey work by an experienced Merlin surveyor between 28th March and 10th August. The survey covered all areas of the wind farm site, as well as the 500 m buffer around the site. The survey included searches for Merlin signs in areas of suitable nesting habitat, and vantage point watches.

Full details of the Merlin survey methods and coverage are included in Appendix 7.1.

7.2.3.4 Personnel

The scoping, design and management of the bird surveys was carried out by John Meade in the winter of 2019/20, and Tom Gittings from the summer of 2020 onwards. The vantage point surveys, moorland surveys, Red-throated Diver and gull surveys were carried out by TOBIN Consulting Engineers (John Sherry, Sophia Couchman, Jason Cahill and Jack Glennon), Bella Terra Environmental Consultants (Nicholas Duff and Jamie Bliss) and Ryan Ecology (Conor Ryan, Michael Hogan, Jamie Wood and David Miley), and Daniel Moloney. The Golden Eagle surveys were carried out by Bella Terra Environmental Consultants (Nicholas Duff, Jamie Bliss, Chris Benson and Andrew Ellard) in 2020-2021 and by Daniel Moloney in 2022, with scoping advice for the 2022 survey from Ewan Weston. The Merlin survey in 2022 was carried out by Jamie Duff. The Golden Plover survey in 2022 was carried out by David Miley. Surveys of the habitat condition of prospective lands for the Golden Eagle habitat management plan were carried out by David Miley. Advice on evaluation of the Golden Eagle survey data, assessment of impacts to Golden Eagles and development of Golden Eagle mitigation measures was provided by Ewan Weston. A review of habitat management for Irish Hare, which contributed to the Golden Eagle habitat management plan, was carried out by Samantha Bell.

John Meade holds the position of Senior Ornithologist with TOBIN Consulting Engineers and is a qualified Environmental Ecologist with 19 years' experience in ecology, environmental sciences, project management and environmental consulting. John carries out monthly winter wildfowl and wader wetland counts for I-WeBS, and regular countryside bird surveys, Hen Harrier winter roost surveys, Garden Bird and also Bird Atlas surveys for BirdWatch Ireland on a voluntary basis. He also worked as Biological Advisor on the Marine Institute Celtic Explorer surveying whales; dolphins plus marine birds off the North-West coast of Ireland. John has extensive experience in all types of ecological monitoring methods. John has been involved in breeding and wintering bird surveys carried out throughout Ireland for breeding and wintering birds with particular focus on Hen Harrier, Short-eared owl and Whooper Swan flightpaths and activity.

Tom Gittings has a BSc in Ecology, a PhD in Zoology and is a member of the Chartered Institute of Ecology and Environmental Management. He has 27 years' experience in professional ecological consultancy work and research. He has specific expertise in ornithological assessments for wind energy projects and has been involved in numerous wind energy projects. His input to these projects has variously included survey work, collision risk modelling, writing the ornithological sections of EIS/EIAR and NIS reports, expert witness services at oral hearings, and provision of scoping advice and peer review services.

John Sherry has a BSc in Wildlife Biology and holds the title of Project Ecologist with TOBIN. John has over three years post-graduate experience in ecology and environmental consultancy, where he has mainly been involved in the surveying and reporting of large-scale infrastructure projects where he has carried out AA Screenings, NIS reports, EIARs and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. He has mainly been focused on ornithological surveys, involving winter and breeding bird surveys associated largely with proposed wind farms or other large infrastructure developments.

Sophia has a BSc (Hons) Ecology and Environmental Biology and has been part of the TOBIN Environment & Planning team since 2018. Sophia's experience lies in ornithological field surveys including vantage point surveys, wintering water bird surveys (I-WeBS) and Hen

Harrier roost surveys across the midlands of Ireland. Sophia has conducted vantage point surveys and walkover transects previously on Garryhinch Wind Farm and the Dublin Water Supply Project, which includes peatlands within Bord na Móna landholdings. She is very familiar with Bord na Móna peatland sites.

Jason Cahill is a Project Ecologist in TOBIN's Environment & Planning Division. He graduated from IT Tralee with a BSc (Hons) in Field Biology with Wildlife Tourism. Jason has experience with ornithological surveys and ecological clerk of works, including bat, badger, and amphibian surveys.

Jack Glennon is a Graduate Ecologist within TOBIN's Environment and Planning section. Jack is responsible for producing ecological reports on complex topics such as sensitive bird species monitoring reports and habitat management plans. Jack's skills include ecological assessments & ecological surveying.

Nicholas Duff has a BSc in Ecology and has been working in nature conservation and ecological consultancy for over 40 years. He was formerly the Head Park Ranger at Glenveagh National Park and has carried out numerous ecological assessments for wind farms and other developments.

Jamie Bliss is an experienced ornithological fieldworker who has conducted numerous surveys for large windfarm developments including preconstruction ornithological studies and construction/post construction ornithological monitoring for compliance reporting. He is fully au fait with breeding raptor survey methodologies and specifically for Merlin and took part in the 2018 National Merlin Census and training given by John Lusby.

Chris Benson is an experienced field ornithologist, British Trust for Ornithology (BTO) bird ringer and ringing trainer, with over 20 years' experience. He has been involved and worked on various scientific ornithological studies in the UK and Ireland including the European Science Foundation (ESF) Network study of trans-Saharan migrants between 1994 and 1996, and has been a long term contributor to the BTO nest record scheme specialising in the locating and recording of difficult and shy species such as Grasshopper Warbler. Chris has helped/supervised the bird ringing elements of many National Parks and Wildlife Service and Birdwatch Ireland studies of such species as Common Gulls, Black-headed Gulls, Little Egrets and Twite. He has worked as an ornithological field worker on the survey of breeding Irish Common Scoter. He has also worked on EIAs of many developments including over twenty wind farm developments in all parts of Ireland.

Andrew Ellard was a professional forensic scientist who switched careers to ornithology in 2016. He has a BA in Environmental Studies (First Class) from the University of Exeter. He has worked with the RSPB on farmland bird surveys and their Cirl Bunting project team and with BirdWatch Ireland on the CABB Breeding Bird Survey and the Corncrake Conservation Project.

Conor Ryan is a Consultant Ecologist and holds an MSc in Ecological Assessment and a BSc in Marine Science. He has accrued 12 years' experience in professional ecological consultancy work and research. His skillset includes expertise in ornithological surveying and he has worked on various ornithological surveys for windfarm projects in the west of Ireland over the past 6 years. Conor also has extensive experience in habitat surveying, impact assessment and the provision of ecological clerk of work services. He has been a lead and contributing author to numerous EIAR and NIS reports for a wide range of projects.

Michael Hogan holds an Advanced National Cert in Marine & Countryside Guiding/marine Interpretation (received from G.M.I.T in 2002). He has been an active member of Birdwatch

Ireland since 1999 and is a founding member of Birdwatch Mayo, which was formed in 2003. He has actively participated in voluntary bird survey work for Birdwatch Ireland and National Parks and Wildlife every year since 2003. He has worked in a professional ornithological capacity on a wide variety of ornithological surveys for projects including wind farms, ESB projects and motorway developments in the West of Ireland since 2017.

Jamie Wood has a Degree in Environmental Science and a Master's Degree in Environmental Management. Jamie is a full member of the Institute of Environmental Science and the Association of Ecological and Environmental Clerk of Works. Jamie is also Chartered with the Society for the Environment holding the postnominal C.Env. Over the past 20 years, working as an Environmental / Ecological Consultant, Jamie has gained extensive experience in a vast range of ecological surveys and assessment techniques; particularly bird, bat and mammal survey work. Jamie has over 12 years of experience working in the renewables industry, involved at all stages of project development from feasibility through planning and construction to post construction monitoring. In this period Jamie has worked for many of the wind industries largest players.

David Miley has a BSc in Marine Science, and a MSc in Applied Environmental Science. He has eight years of ornithological experience having worked in conservation (terns, breeding waders, seabirds), the agri-environment sector (The Hen Harrier Project, The Irish Breeding Curlew EIP), monitoring rare breeding waders in Ireland (Shannon Callows, Lough Corrib), survey coordination and fieldwork for the National Red Grouse Survey 2021/2022 and provide and coordinated and carried out various ornithological surveys for wind energy projects in Ireland (Vantage Point Surveys, Breeding Bird Surveys, Waterbird Surveys, Hen Harrier Roost Watches, Red Grouse Call-back Surveys, other species-specific surveys). Contributions to support planning applications has variously included survey field work, avian impact and mitigation advice, GIS shapefiles and attribute tables, inputs for EIS/EIAR and NIS reports.

Daniel Moloney has been conducting bird surveys since 2006 for wind farm impact assessments and other construction works across a range of projects and consultancy companies in the Republic of Ireland, Northern Ireland, and Scotland. Daniel has been working with BirdWatch Ireland for over 15 years across a range of projects and species including the Corncrake Conservation project on behalf of the NPWS, Curlew in the borders counties as part of the Halting Environmental Loss project in conjunction with the RSPB, a project manager on the INTERREG VA Cooperation Across Borders for Biodiversity project on waders in the border counties and more recently a bird specialist on the ACRES Co-operation Project in Donegal

Ewan Weston has a BSc in Zoology (First Class) and PhD in Ecology (Juvenile dispersal behaviour in the Golden Eagle *Aquila chrysaetos*). He has studied Golden Eagles throughout Scotland, especially population in north-east Scotland for the last 24 years. He has specific expertise on Golden Eagles through satellite tracking and has authored and co-authored a number of papers on Golden Eagle behaviour and landscape use – including in relation to wind energy. He has extensive experience of field surveys has worked as an ornithologist in the wind farm sector for 11 years, especially in relation to regional Golden Eagle conservation funded by developers.

Samantha Bell is currently completing a PhD on Irish Hares at University College Cork, and has a MSc in Conservation (Distinction) from the University of Exeter and a BSc in Zoology (First Class) from University College Cork. Her undergraduate dissertation was on the endoparasites of the Irish Hare and she has the senior author of four peer-reviewed papers on the Irish Hare.

7.2.4 Assessment and analysis of survey results

7.2.4.1 General

The survey results were analysed to assess the spatial and temporal occurrence patterns of sensitive species around the wind farm site. Details of these analyses are included in the relevant species accounts in Sections 7.3.1-7.3.5.

7.2.4.2 Gweebarra Estuary

A specific issue that had to be addressed was the treatment of bird activity in the section of the Gweebarra Estuary adjacent to the wind farm site. Two of the vantage points were located on the north side of the Gweebarra Estuary and their viewsheds included the Gweebarra Estuary. There were several waterbird species that were recorded in the Gweebarra Estuary, but were not recorded anywhere else within, or adjacent to, the wind farm site. There were other species for which much higher levels of activity were recorded in the Gweebarra Estuary, compared to other areas within, or adjacent to, the wind farm site.

Although the wind farm site extends to the southern shore of the estuary, there will be no wind farm infrastructure within 500 m of the estuary, while the nearest turbine location is over 1 km from the estuary. Therefore, the wind farm development is not likely to cause any disturbance or displacement impacts to bird populations in the Gweebarra Estuary.

Flight activity that was restricted to the estuary was excluded from most of the analyses carried out for this assessment. To do this, a 300 m wide buffer around the estuary shoreline was defined. This buffer distance was chosen as it included all the flightlines of birds following the estuary but did not include any part of the 500 m buffers around the proposed turbine locations.

Any flightlines that were wholly within the 300 m buffer were excluded from the analyses, unless otherwise stated.

The flightlines that were partly within the 300 m buffer were clipped, so that only the portion outside the buffer were included in the analyses, unless otherwise stated. The clipped portion of the flightlines outside the 300 m buffer were then used to recalculate the flight durations for the collision risk modelling, using the procedures described in Appendix 7.7.

7.2.5 Evaluation

The purpose of the evaluation was to identify the bird populations that required assessment of the potential impacts from the wind farm development. These are referred to as Important Avian Features, based on the term Important Ecological Features which is used in the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2019).

The desk review and survey results were initially reviewed to identify potential Important Avian Features. These were species with populations of conservation importance potentially occurring within, or commuting across, the wind farm site and the 500 m buffer around the wind farm site. The potential Important Avian Features included both species that were regularly recorded during the bird surveys, and species that were rarely recorded, or never recorded, but where analysis of desk review data and survey coverage was considered necessary to assess their status.

The species that only occurred within the Gweebarra Estuary corridor (see Section 7.2.4) were not included as potential Important Avian Features. There will be no wind farm infrastructure within 500 m of the estuary, while the nearest turbine location is over 1 km from the estuary. Therefore, the wind farm development is not likely to cause any disturbance, displacement, or collision risk impacts to bird populations in the Gweebarra Estuary.

For each of these potential Important Avian Features, the results of the desk review and surveys are summarised in this chapter, and this information was then used to either discount, or confirm, the species as an Important Avian Feature. Each confirmed Important Avian Feature was then evaluated according to two published set of evaluation criteria: the NRA criteria (NRA, 2009) and the Percival criteria (Percival, 2003).

The NRA evaluation scheme uses a geographic scale as recommended by the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2019). This scheme provides the only published criteria for evaluating habitats and species in Ireland and is widely used in ecological assessments for all types of projects (not just road schemes). It ranks receptors on a geographic scale from international importance to local importance, with the local importance scale being divided into two categories: local importance (higher value) and local importance (lower value).

The Percival criteria are specific to ornithological assessments for wind farm projects and rank receptors on a scale from very high to low sensitivity, with the very high ranking approximately corresponding to the NRA international importance and the low ranking approximately corresponding to the NRA local importance (higher value) rating.

The local scale is not defined in the NRA criteria. For the purposes of this assessment, the local scale was defined as the range of hills extending from Crocknadreeavarh in the west to Croaghleheen in the east. The boundaries were defined by the Gweebarra Estuary, the streams that the hills drain to along their eastern slopes and southern slopes, and various roads around the western side (Figure 7-5). The total extent of this local area is around 70 km^2, which is roughly equivalent to the size of local areas used by the author of this chapter in other comparable assessments.

The conservation status of bird populations in the island of Ireland are generally assessed on an all-Ireland basis (e.g., Gilbert *et al.*, 2021). Therefore, the combined Republic of Ireland and Northern Ireland populations are generally used for the evaluations in this chapter.

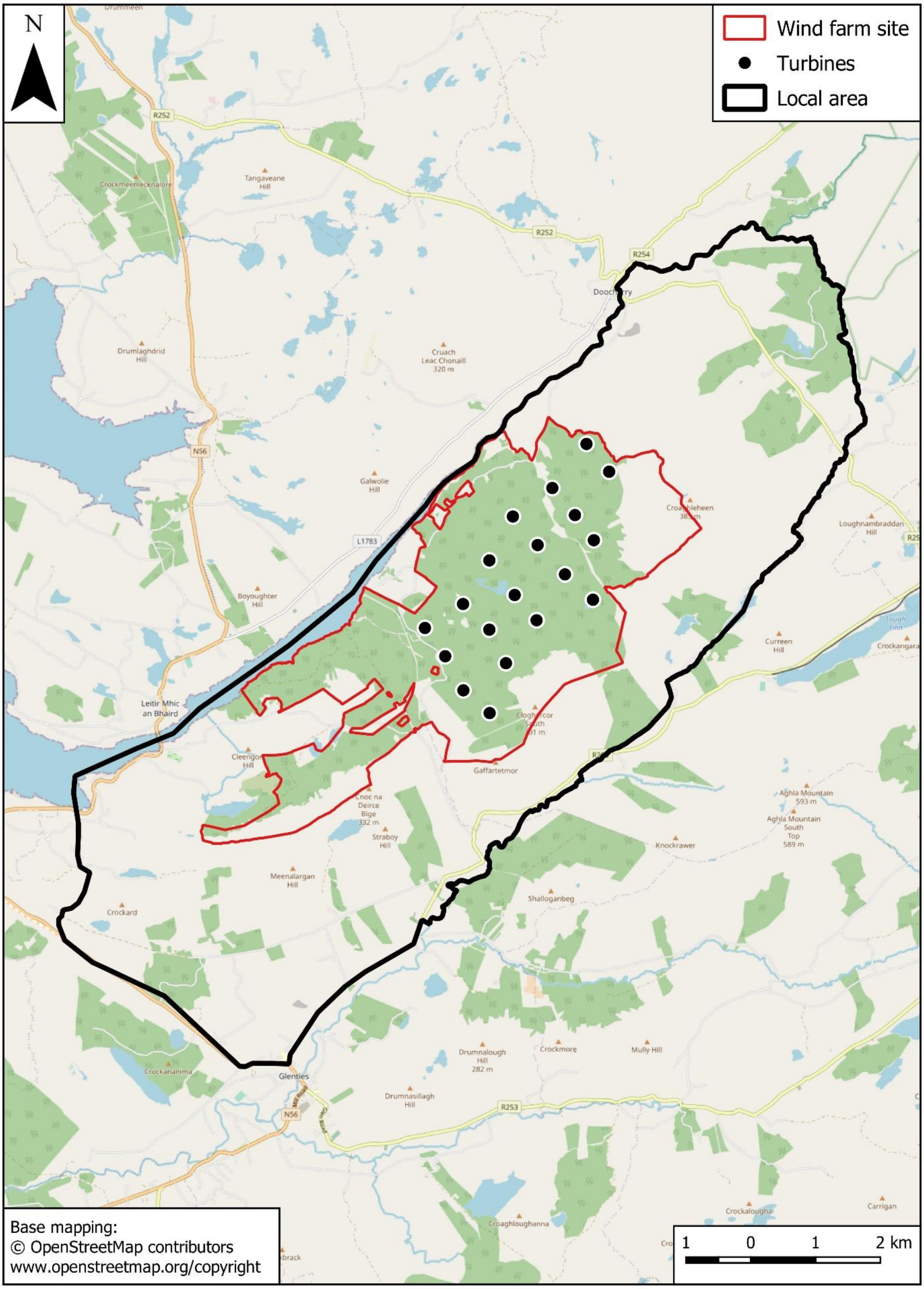

Figure 7-5 - Boundary of the local area used for the evaluations and assessments.

7.2.6 Impact assessment

7.2.6.1 Structure of the assessment

For each of the Important Avian Features, the impact assessment considers the following impact types: the do-nothing impact, the habitat loss, construction disturbance, displacement impacts, barrier effects, and collision risk. However, for species that were only recorded commuting over the wind farm site, and did not use habitats within the wind farm site or the 500 m buffer around the site, the impact assessment only considers barrier effects and collision risk, because the other potential impact types are not relevant.

The potential collision risk impacts are also assessed for all other waterbird and raptor species recorded during both sets of vantage point surveys.

Impacts from the turbine delivery route and decommissioning are discussed collectively for all receptors at the end of the impact assessment section.

7.2.6.2 Habitat loss

The habitat loss impact was assessed using habitat loss mapping and habitat loss data from the Chapter 6 (Biodiversity).

7.2.6.3 Construction disturbance

The construction disturbance assessment covers short-term impacts that would be limited to the construction-phase with the long-term displacement / barrier impacts from operation of the turbines being assessed separately. The assessment of these short-term impacts focussed on identifying any specific features, such as nest sites or roost sites, that might be particularly sensitive to construction disturbance.

The assessments of construction disturbance used buffers around the proposed wind farm infrastructure to assess potential impacts to sensitive species. These buffers are worst-case scenarios, as they assume that construction work will take place at all locations throughout the site at the same time. The buffers excluded the proposed met mast and associated access track. These are outlying features and the construction work required for them will be of short duration (1-2 weeks).

7.2.6.4 Operational disturbance

Operational disturbance impacts are generally included within the displacement impacts. However, potential operational disturbance impacts were assessed separately for Golden Eagle, Golden Plover, Red Grouse, Snipe, Teal and Common Gull.

The separate assessment for Golden Eagle is provided because their potential disturbance sensitivity distance is greater than the likely displacement distance. The assessment used buffers around the proposed wind farm infrastructure as described above for the assessment of construction disturbance.

The separate assessments for Golden Plover, Red Grouse, Snipe, Teal and Common Gull were carried out because of the potential for disturbance to ground-nesting birds from development of the recreational trails.

7.2.6.5 Displacement impacts

The assessment of displacement impacts, and barrier effects, included literature reviews to assess the potential sensitivity of the Important Avian Features to these types of impacts. Where Important Avian Features were potentially sensitive, the potential displacement rate was quantified where possible using figures from the literature on percentage reductions in population sizes /activity levels within specified distances from turbines.

Various reviews carried out by Hermann Hötker and colleagues present meta-reviews of studies on displacement impacts to a wide range of bird species (Hötker, 2006, 2017; Hötker *et al.*, 2004, 2007). These reviews are widely cited in wind farm ornithological assessments. However, Hötker does not list the sources of the studies used in his review, although a few studies are cited in the discussion of his results. His discussions acknowledge the limitations of many of the studies included in the review and notes that “many more studies, in particular those published as ‘grey literature’, just described bird numbers or bird densities in relation to wind farms but failed to give evidence of wind farms being the only or at least a significant cause of the observed effects” (Hötker, 2007). His implied argument is that if there is a clear trend towards negative effects across a large number of studies then, even if many of these studies are poor quality, this is still evidence of a negative effect. However, given the large number of comparisons made (36 breeding species and 22 non-breeding species), some significant excesses of positive or negative effects would be expected by chance. Therefore, while relevant results from these reviews are cited in the impact assessments in this chapter, these results should be interpreted with caution.

7.2.6.6 Barrier effects

Most work on the ornithological impacts on barrier effects from wind farms focuses on migrating birds (Humphreys *et al.*, 2015a). For populations of birds that are centred around a wind farm site, it will be difficult to distinguish between displacement impacts and barrier effects. Therefore, for most of the Important Avian Features covered by this assessment, there is no information available that can be used to assess their potential sensitivity to barrier effects, and the assessment of potential displacement impacts is likely to include barrier effects, if they occur. The only Important Avian Features for which separate assessments of barrier effects have been included are Whooper Swan, Golden Eagle, Lesser Black-backed Gull, Herring Gull and Great Black-backed Gull as these Important Avian Features had potential migration or commuting routes through the wind farm site.

7.2.6.7 Collision risk modelling

Collision risk modelling was carried out to assess the potential collision risk for all species recorded flying at potential collision height during the vantage point surveys.

The collision risk modelling was carried out for the eight different turbine specifications that represent all the scenarios being considered for this wind farm site. These had ground clearances ranging from 30-50.5 m, and rotor diameters ranging from 149-164 m (see Appendix 7.7). For each Important Avian Feature the minimum and maximum collision risks across these eight turbine specifications are presented in this chapter, while the collision risks for all the turbine specifications are included in Appendix 7.7.

The collision risk modelling included used various modelling techniques to generate predicted transits. These included basic models, which could be applied to all species, and spatially structured models that accommodate heterogeneity in flight activity across the wind farm site, but which require sufficient levels of flight records to distinguish between sampling effects and true spatial structure. The data from the most appropriate model for each species was used for the final collision risk model.

Two variants of the basic models were calculated: one using the data from all the viewsheds, and the other using data from only the viewsheds overlapping the eastern section of the wind farm site where all the proposed turbine locations are.

Declines in detection rates with distance from vantage points is a common issue in vantage point surveys, and the SNH guidance recommends considering corrections for detectability effects. Therefore, the models also factored in detection rate functions to allow for these effects. The detection rate functions were calculated separately for small, medium and large species. They resulted in an increase of around 1.6-3.1 in the predicted collision risks, compared to models that do not account for this factor. This should be taken into account in any comparisons of predicted collision risks from this wind farm, compared to predictions from collision risk models for other wind farm projects, which do not usually account for declines in detections with distance.

Full details of the collision risk modelling are included in the collision risk model report (Appendix 7.7).

7.2.6.8 Aviation lighting

The proposed project will include medium intensity aviation lighting mounted on all the turbine nacelles. Artificial lighting has the potential to attract birds that are flying at night causing increased collision risks. A review by NatureScot (2020), concluded that the bird species that are most likely to be susceptible to increased collision risks caused by aviation lighting on wind turbines are burrow nesting seabirds and nocturnally migrating passerines (songbirds). The review also concluded that "for other species, especially resident breeding birds, there is little published evidence which suggests that lights on turbines are likely to present an existential risk to the viability of species populations, at any spatial scale".

The Important Avian Features identified in this assessment did not include any burrow nesting seabirds or passerines. Therefore, the potential impact of aviation lighting does not require assessment for any of the Important Avian Features.

7.2.6.9 Cumulative Effects

For Important Avian Features where potentially significant effects, or non-significant but sizeable effects, were identified, assessments were made of the potential for any additional cumulative effects from other activities in-combination with the predicted impact from the Cloghercor Wind Farm.

Assessments of cumulative effects are not required where all the potential effects were negligible or very small. In these cases, a very large number of similar effects would be required to produce a significant cumulative effect. Alternatively, if there was another project or plan with a significant, or near-significant, effect, the additional effect of the impact from the Cloghercor Wind Farm project would not materially increase the potential effect.

These focussed on impacts from other wind farm projects within the relevant geographical scale (e.g., within Donegal for receptors assessed as of county importance). However, other existing, approved and in-planning projects and activities were also considered, where relevant.

Existing and proposed wind farms within 20 km of the Cloghercor Wind Farm site were included in the assessment of cumulative effects at the local scale. Operational wind farms in Donegal were used for assessment of cumulative effects at the county scale. As the Irish distribution of breeding Golden Eagles is currently restricted to Donegal, these wind farms were also used for the assessment of cumulative effects to the Irish Golden Eagle population.

The online planning files were searched for all the above wind farms, and any available ecological assessments were reviewed. However, many wind farms did not have available assessments, while, for those that did, the scope of the bird surveys was often quite limited. Therefore, these reviews were supplemented by assessments of potential displacement impacts using buffers around turbine locations.

Mapping of turbine locations was obtained from OpenStreetMap[1]. This mapping was reviewed against aerial imagery and other sources, and additional turbines were added from those sources. Buffers were generated around the turbine locations, based on relevant displacement and disturbance distances. These buffers were then used to calculate the areas of relevant habitats within the displacement and disturbance distances, which provided an indication of the potential cumulative displacement or disturbance impact.

7.2.6.10 Assessment of significance

7.2.6.10.1 Construction disturbance, habitat loss, displacement, and barrier impacts

Percival (2003) includes a methodology for the assessment of significance for ornithological impacts from wind farm projects. This involves first evaluating the sensitivity of the Important Avian Feature (see Section 7.2.5). The magnitude of the predicted impact is then categorised using the scale shown in Table 7-2. A matrix is then used to combine the sensitivity of the Important Avian Feature and the impact magnitude to categorise an impact significance. This matrix approach combines conservation significance and impact magnitude in a single classification of significance. However, the CIEEM Guidelines (CIEEM, 2019) recommends that impact significance should be "qualified with reference to an appropriate geographic scale". Furthermore, matrix approaches to combine assessments of independent parameters, such as that used by Percival to combine sensitivity and impact magnitude, are unsatisfactory as they require arbitrary decisions about the categorisations of individual cells.

In this assessment, assessments of impact significance are presented using a geographic scale, as recommended by the CIEEM Guidelines. The evaluation of the Important Avian Features from the NRA criteria was used, and the magnitude of the impact was then classified according to the Percival impact magnitude criteria (Table 7-2). The evaluation and impact magnitude were then combined to describe the significance using the terminology from the EPA Guidelines (2017): e.g., a moderate negative effect at the county scale. The correspondence between the Percival impact magnitude criteria and the EPA significance scale used in this assessment is shown in Table 7-2. A significant effect is an effect classified as *significant*, *very significant*, or *profound*, and is significant at the geographic scale described, but not at higher geographic scales. For clarity, the term *very slight* was used to replace *not significant* in the EPA significance scale. The latter term (i.e., not significant) introduces ambiguity about whether impacts classified as *slight* or *moderate* are considered significant.

[1] © OpenStreetMap contributors, www.openstreetmap.org/copyright

Table 7-2: Percival criteria for categorising impact magnitude, and correspondence to EPA significance scale used in this assessment.

EPA significance	Percival Magnitude	Percival Description
Profound Very Significant	Very High	Total loss or very major alteration to key elements / features of the baseline conditions such that the post development character / composition/ attributes will be fundamentally changed and may be lost from the site altogether. *Guide: < 20% of population / habitat remains*
Significant	High	Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post development character/ composition/ attributes will be fundamentally changed. *Guide: 20-80% of population/ habitat lost*
Moderate	Medium	Loss or alteration to one or more key elements / features of the baseline conditions such that post development character / composition / attributes of baseline will be partially changed. *Guide: 5-20% of population / habitat lost*
Slight Very Slight	Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character / composition / attributes of baseline condition will be similar to pre-development circumstances/patterns. *Guide: 1-5% of population/ habitat lost*
Imperceptible	Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the “no change” situation. *Guide: < 1% population/ habitat lost*

Sources: Percival (2003) and EPA (2017).

7.2.6.10.2 Collision risk (general issues)

The potential significance of a predicted collision risk to an Important Avian Feature will depend upon its population size and its background mortality rates. A threshold level of a 1% increase in annual mortality has been suggested to determine whether the impact is non-negligible (Percival, 2003). This 1% threshold is widely used in UK wind farms assessments as a threshold for assessing significance. However, this is likely to be a very conservative threshold, and in some cases, such as small populations with low mortality rates, biologically implausible.

The use of a 1% threshold to assess increases in annual mortality appears to originate in European Commission guidance on the interpretation of derogations in the Birds Directive (EC, 2008; updated version of earlier guidance). Under Article 9(1)(c) of the Birds Directive, there is a derogation “to permit, under strictly supervised conditions and on a selective basis, the capture, keeping or other judicious use of certain birds in small numbers”. The guidance document (EC, 2008) includes consideration of how to interpret the concept of “small numbers” in the context of Article 9(1)(c). It recommends the use of a threshold of a 1% increase in annual mortality for two reasons:

- the figure must be much lower, by at least an order of size, than those figures characteristic of the taking of birds under Article 7. A figure of 1% meets this condition.

- the taking must have a negligible effect on the population dynamics of the species concerned. A figure of 1% or less meets this condition as the parameters of population dynamics are seldom known to within less than one percentage point and bird taking amounting to less than 1% can be ignored from a mathematical point of view in model studies.

(European Commission, 2008)

Therefore, the original introduction of a 1% threshold for assessing increases in annual mortality was not intended to indicate that all increases above this threshold are significant. The European Commission guidance indicates that sustainable hunting of wild birds can be permitted under Article 7 with an impact on annual mortality which may be an order of magnitude higher. Moreover, if increases of less than 1% are negligible and are within the margin of error in population modelling, then, it follows that, increases that are just above the 1% threshold are extremely unlikely to cause significant effects. This is reflected in the results of published population modelling that indicate much higher levels of increases in annual mortality are required to cause significant impacts of populations. For example, Bellebaum *et al.* (2013), reported a mortality threshold of 4.0% of the population size for the East German Red Kite population. Depending on the age composition of the population, this would represent an 8-10% increase in annual mortality, based on the annual survival rates for Red Kites given by Saether (1989; as quoted by BirdFacts, www.bto.org/understanding-birds/birdfacts) .

The European Commission hunting guidance (EC, 2008) also allows for exceedances of the 1% threshold, up to a maximum of 5%, for abundant species with a favourable conservation status. This use of a 5% threshold has been followed in wind farm assessments in Flanders, which are quoted as a case study in recent European Commission guidance on wind farm assessments (EC, 2020).

Therefore, the Percival criterion of a 1% increase in annual mortality does not represent a threshold for assessing significance but, instead, should be used as a threshold for indicating where more detailed assessment is required. Where an increase in annual mortality is around 1% it is unlikely that it will have a significant impact on the population trend, but some further consideration of the potential impact may be required for Important Avian Features of high conservation importance (e.g., a review of published population viability analyses on the species concerned, or on comparable species). However, when the increase in annual mortality is substantially greater than 1%, then further detailed assessment may be required, such as development of a population viability analysis for the specific population of concern (depending on the conservation importance of the population).

Consideration should also be given to the level of uncertainty in the collision risk prediction: i.e., what is the likely upper bound of the confidence interval around the predicted collision risk. For example, collision risk models for four species that incorporated uncertainty in the estimation of flight activity levels, produced upper limits of the confidence intervals around 44-136% higher than the mean predicted collision risk (Gittings, 2020). Conversely, the actual collision risk could be lower than the predicted collision risk.

Finally, all the assessments of potential increases in mortality assume that the collision mortality is additive: i.e., it occurs in addition to the existing background mortality. However, in practise, some level of collision mortality may be compensatory: e.g., the birds that die due to collisions reduce the level of overwinter mortality due to competition for food resources, etc.

7.2.6.10.3 Collision risk (Golden Eagle)

The Golden Eagle Population Model was used to assess the potential impact of the predicted collision risk on the Irish Golden Eagle population. This model was first developed by O'Toole *et al.* (2002) and subsequently refined by Whitfield *et al.* (2006, 2008) and Haworth Conservation (2010). It uses productivity and survival rates to track the growth of a population until it achieves full occupancy of all available home ranges. It also includes random variation in the population parameters. The model is widely used in Scottish wind farm assessments (e.g., MacArthur Green, 2018, 2021).

Full details of the application of the Golden Eagle Population Model in this assessment are included in the Golden Eagle Population Model report (Appendix 7.8). Summary details are included in section 7.4.2.6 of this chapter.

7.2.6.10.4 Collision risk (other species)

The potential increase in annual mortality, as a percentage of the background annual mortality, was assessed for all the Important Avian Features where relevant source populations could be defined. For each of these Important Avian Features, the impact has been assessed at a national scale. The impact was also assessed at the county scale where relevant population data was available, or could be estimated.

The sources of the population data are listed in the relevant species accounts. For some species, the Donegal population sizes were estimated using the BirdAtlas dataset from the National Biodiversity Data Centre. This included hectad presence-absence data covering the whole of the Republic of Ireland, and tetrad data of relative abundance for samples of tetrads from most of the hectads. The hectad data was used to estimate the proportion of the Republic of Ireland breeding range of each species that occurs in Donegal. The tetrad data was used to estimate the mean relative abundance of the species in Donegal as a percentage of its mean relative abundance throughout its range in the Republic of Ireland. The product of these two factors was then used to multiply the Republic of Ireland population figure to give an estimate for the Donegal population.

The Percival impact magnitude criteria were not used for assessments of the significance of collision risk impacts. As discussed above, any non-negligible increase in annual mortality to a population of conservation importance is potentially significant, so the Percival impact magnitude criteria are not appropriate for assessing the significance of collision risk impacts.

7.2.6.10.5 Presentation of impact significance

The impact significances assessed for each impact type for each Important Avian Feature are presented in the summary of the impact assessment at the end of the impact assessment (Section 7.4.17). To avoid excessive repetition, impact significances are only categorised in the species accounts where they are of potential significance, or where the categorisation as lower than significant requires discussion.

7.3 EXISTING ENVIRONMENT

7.3.1 Overview of bird survey results

A total of 24 waterbird, raptor and grouse species were recorded during the vantage point surveys, excluding species that only occurred in the Gweebarra Estuary, while one additional waterbird species (Woodcock) was recorded during other survey work. The occurrence patterns of the potential Important Avian Features are discussed in the species accounts in Sections 0-7.3.4. The other species are discussed in Section 7.3.5.

The following bird species were identified as potential Important Avian Features for the purposes of this assessment: Whooper Swan, Teal (breeding population), Red Grouse, Red-throated Diver, Sparrowhawk, Buzzard, Golden Eagle, Golden Plover (breeding population), Snipe (breeding population), Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Kestrel, Merlin and Peregrine. These are mainly species that regularly, or semi-regularly, occurred in the wind farm site, and which may have populations of conservation importance, as well as species that are known to have important populations in the wider area, and which could occur in the wind farm site. The Teal, Golden Plover and Snipe wintering populations are not included as potential Important Avian Features , because these species are much more widespread and abundant in winter, and, in the case of Teal and Golden Plover, the survey data showed that they do not have significant wintering populations in the wind farm area.

In the following sections, the potential Important Avian Features that are Annex I species under the Birds Directive are discussed first (Whooper Swan, Red-throated Diver, Golden Eagle, Golden Plover, Merlin and Peregrine) followed by non-Annex I red-listed species (Red Grouse, Snipe and Kestrel) and then by the remaining species (Teal, Sparrowhawk, Buzzard, Common Gull, Lesser Black-backed Gull, Herring Gull and Great Black-backed Gull). Within each of these groups, the species are arranged in taxonomic order.

Full details of all the survey results are included in Appendix 7.1 - Appendix 7.5.

7.3.2 Potential Important Avian Features (Annex I species)

7.3.2.1 Whooper Swan

Whooper Swan is a winter visitor to Ireland from Iceland. Birds arrive in Ireland in October and November and depart in late March and early April (Wernham *et al.*, 2002). The population is monitored by censuses at five yearly intervals. The most recent census recorded a total wintering population in Ireland of 19,111 Whooper Swans in January 2020 (Burke *et al.*, 2021).

Wintering Whooper Swans are widely distributed across most of Ireland, and frequently occur in landscapes similar to the landscape around the Cloghercor Wind Farm site. However, there are few sites with records of usage by Whooper Swan in the vicinity of the Cloghercor Wind Farm site, although this may partly reflect lack of survey effort. None of the lakes are monitored by the Irish Wetland Bird Survey (I-WeBS). In the 2015 survey, the nearest site where Whooper Swan were recorded was Clooney Lough, which is about 8 km west of the wind farm site. In the 2020 survey, small numbers of Whooper Swans were recorded at Finn Lough, about 3 km south-east of the wind farm site (2 birds), and Lough Shivnagh, about 8 km east of the wind farm site, while they were again recorded at Clooney Lough (10 birds). The Graffy Wind Farm Environmental Impact Assessment Report (RPS, 2021) noted that Lough Shivinagh and Lough Nambraddan were "identified as foraging areas or roost sites" for Whooper Swan; Lough Nambraddan is around 3 km south-east of the Cloghercor Wind Farm site.

During the Cloghercor Wind Farm vantage point surveys, there were 21 records of Whooper Swan. The median flock size was 7 (range 1-20). The recording rate was around three times higher in the 2019/20 winter, compared to the subsequent winters. Most records occurred during migration periods (October, November and March), with two-thirds of the records in October. While the spring migration period continues into early April, all of the April vantage point watches were in the second half of the month.

The flightline directions in October, November and March were mainly consistent with the expected migration directions: southerly in October and November and northerly in March (Figure 7-6). The mapped flightlines show a concentration in the eastern section of the site. However, VPs 8-10, which cover the western section of the site, were not surveyed in the 2019/20 winter.

Whooper Swans were also recorded in two of the vantage point watches carried out for the Golden Eagle survey, both of which were in late March during the spring migration period. These two records represent a recording rate of 0.20 records / 12 hours across all of the Golden Eagle survey March vantage point watches.

Whooper Swans were not recorded in any of the other bird surveys carried out for this project. All the vantage point survey records were of birds in flight, and there were no records of Whooper Swan on any of the lakes that were visible from the vantage points (Derkmore Lough, and Loughs Aneane Beg, Aneane More and Sallagh), or which were regularly passed while travelling to/from the vantage points (Lough Nacroaghy). Whooper Swans were not recorded during the estuary surveys in 2019/20, or in the roost surveys of lakes within 2 km of the wind farm site in 2020/21.

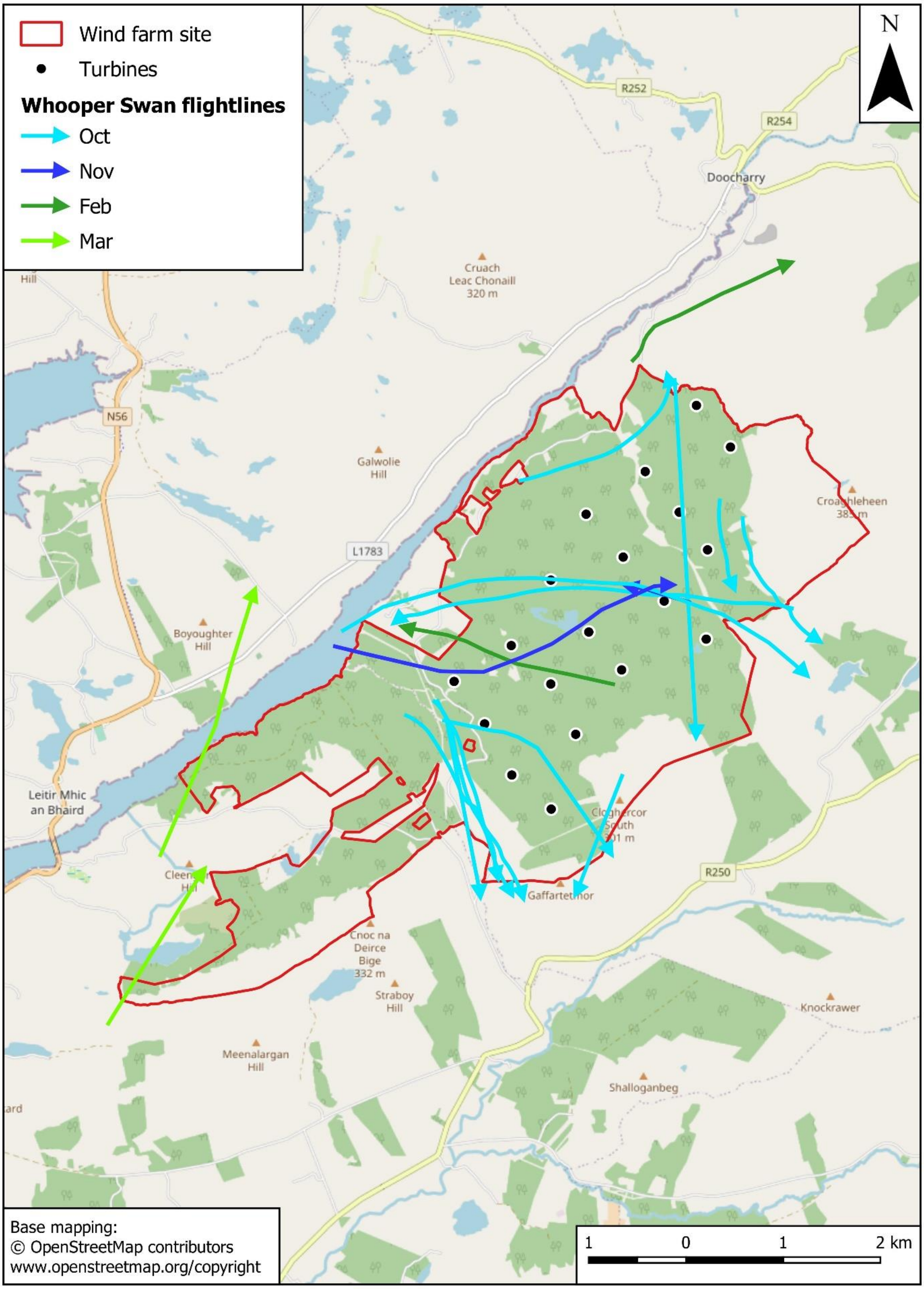

Figure 7-6 - Whooper Swan flightlines recorded in the vantage point surveys.

7.3.2.2 Red-throated Diver

Red-throated Diver is a very rare breeding species in Ireland, where it only occurs in a small number of lakes in Donegal. It is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA, but no detailed information is available about its distribution within the SPA. No information or records relating to Red-throated Diver were provided by NPWS in response to data requests and consultations. However, the inclusion of Lough Finn as an outlying section of the Derryveagh and Glendowan Mountains SPA suggests that the lake has some significance for the Red-throated Diver population of the SPA.

A probable breeding record of Red-throated Diver was recorded in tetrad G89T during the BirdAtlas 2007-2011 survey (Balmer *et al.*, 2013). This presumably relates to one of three small high altitude lakes clustered around a peak in the north-western part of the tetrad, as these appear to be the only standing water bodies in the tetrad. These lakes are around 2.3 km south-east of the wind farm site.

All the lakes within 1 km of the proposed turbine locations and other infrastructure were covered by dedicated Red-throated Diver breeding surveys, or checked during the breeding season during vantage points and other surveys. No sightings of Red-throated Diver, or evidence of their occurrence, were recorded. A pair of Red-throated Diver were recorded on Lough Fad, around 4 km north-east of the wind farm site, during the 2022 Golden Eagle survey.

Breeding Red-throated Diver commute from their breeding lakes to other lakes, or to the sea, to feed. There were no records of commuting Red-throated Diver during any of the wind farm or Golden Eagle survey vantage point watches.

7.3.2.3 Golden Eagle

Golden Eagle is a native Irish species that became extinct around 1912 due to human persecution (O'Toole *et al.*, 2002). Apart from a breeding pair in Antrim from 1953-1960, Golden Eagles remained absent from Ireland for the rest of the 20th century.

A reintroduction programme was carried out from 2001-2012, with birds released in Glenveagh National Park from Scotland. The first successful breeding from this reintroduction programme occurred in 2007. Population data is available for the period up to 2018 (Table 7-3). During this period, the number of pairs occupying home ranges has varied from three to six. The three-year running mean of territorial pairs shows a gradual increase starting in 2012.

In 2018, the most recent year for which published data is available, there were occupied territories in South Derryveagh, North Derryveagh / Glenveagh National Park, the Inishowen Peninsula, the Bluestack Mountains and the Glencolumbkille Peninsula / Slieve Toohey (Wilson-Parr and O'Brien, 2019).

Table 7-3: Irish Golden Eagle population data, 2008-2018.

Year	Territorial pairs		Breeding pairs	Successful pairs	Number of fledged young
	raw data	3-year mean			
2007	no data	-	no data	1	1
2008	4	-	1	0	0
2009	5	4.0	2	1	2
2010	3	4.0	3	3	3
2011	4	3.7	no data	2	2
2012	4	3.7	1	0	0
2013	3	4.0	2	2	2
2014	5	4.0	3	1	1
2015	4	4.3	4	0	0
2016	4	4.7	3	1	1
2017	6	5.0	3	3	3
2018	5	-	2	2	3

Sources: Hillis (2008-2012), Perry (2013), Perry and Newton (2014), Newton (2015, 2016) and Burke *et al.* (2020).

7.3.2.3.1 Golden Eagle habitat

Golden Eagles in Britain and Ireland occupy open landscapes and generally avoid closed canopy forestry plantations. Their flight activity is generally associated with rugged terrain, where the wind striking steep ridges generates air currents (orographic uplift) that they exploit for soaring.

The Golden Eagle Topography model uses topographical data as surrogates for orographic uplift to predict Golden Eagle flight activity. This model was developed by Fielding et al. (2020) using data from GPS-tagged dispersing juvenile Golden Eagles in Scotland. The model produces a map of the landscape divided into grid cells, with each cell having a score indicating its predicted use from 1 (little predicted use) to 10 (high predicted use).

For the present assessment, a Golden Eagle Topography model was used to assess the distribution of potentially suitable Golden Eagle topography in Donegal, and to evaluate the quality of the topography around the wind farm site.

The model indicates that the main concentrations of potentially suitable Golden Eagle topography in Donegal occur in the Blue Stack mountains, the Derryveagh mountains, the Slieve League peninsula, and the Malin Head Peninsula (Figure 7-7). In the vicinity of the wind farm site, potentially suitable Golden Eagle topography mainly occurs along the southern/eastern side of the site and in the landscape to the south and east of the site (Figure 7-8).

Full details of the development of this model, and discussion of the results, are included in Appendix 7.6.

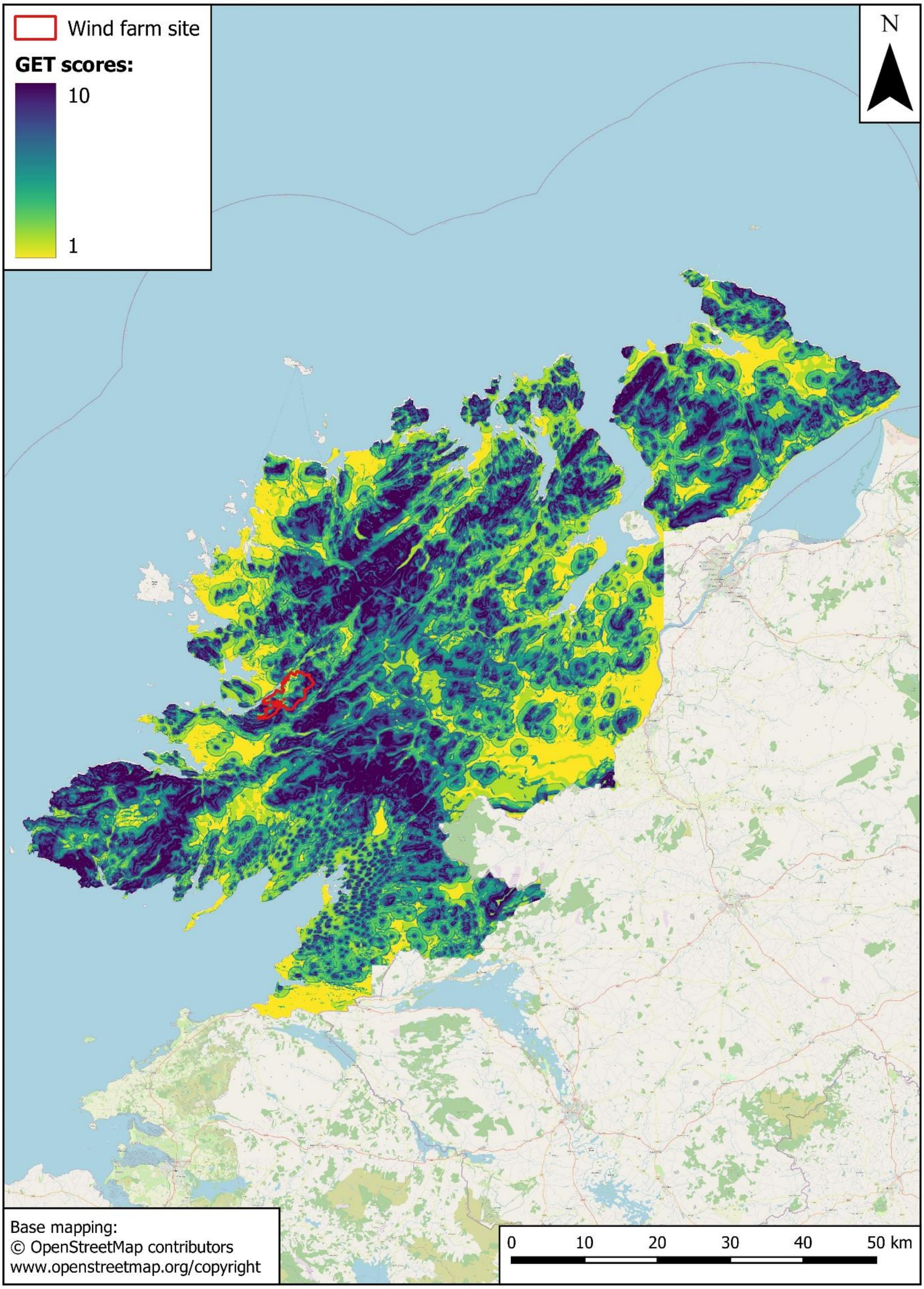

Figure 7-7 - Distribution across Donegal of suitable topography for Golden Eagle flight activity as indicated by the Golden Eagle Topography model.

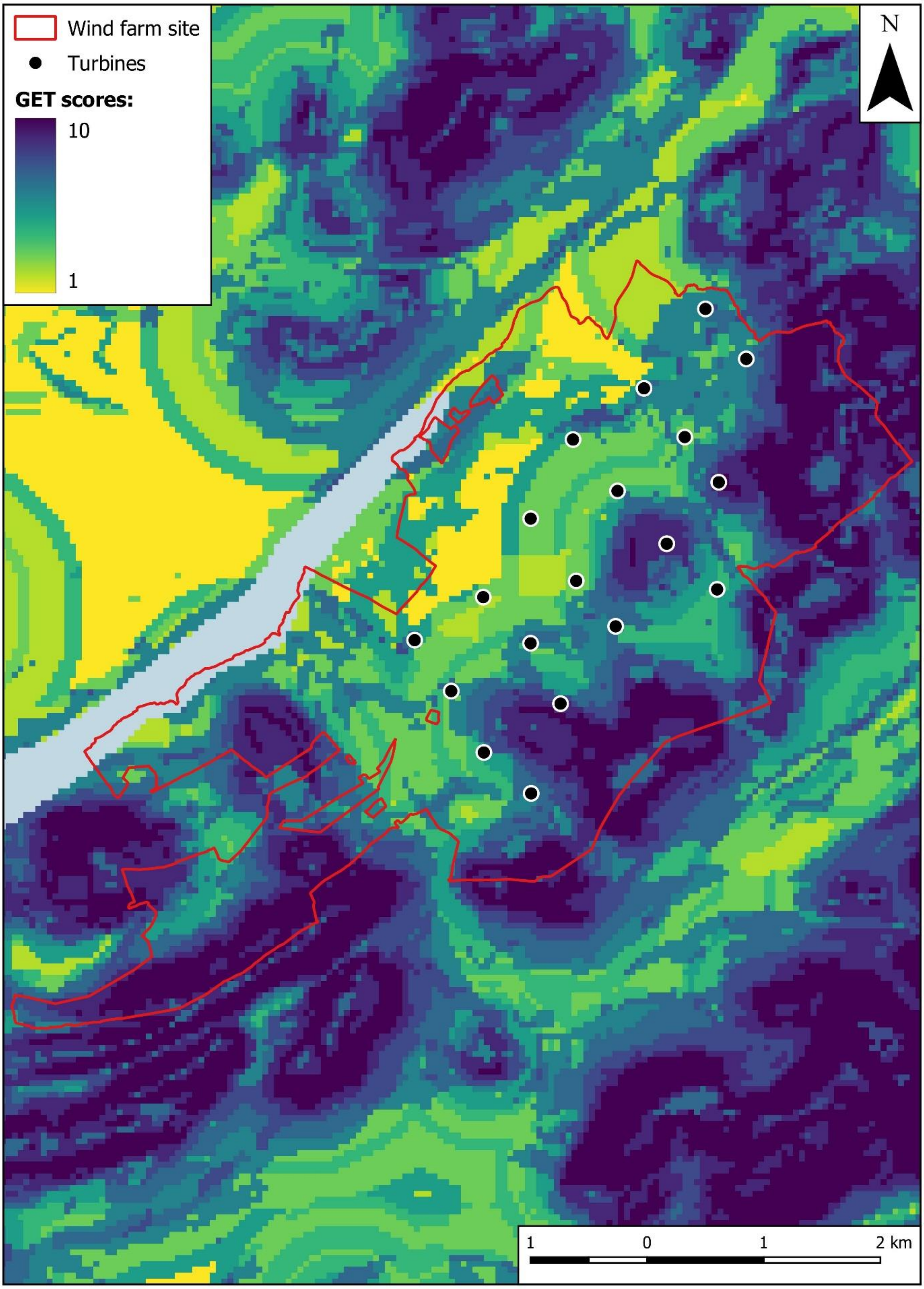

Figure 7-8 - Distribution around the wind farm site of suitable topography for Golden Eagle flight activity as indicated by the Golden Eagle Topography model.

7.3.2.3.2 Golden Eagle distribution and status in the 6 km buffer zone

This section discusses Golden Eagle nest sites that were recorded around the wind farm site.

Due to the sensitivity of the Irish Golden Eagle population, and its potential vulnerability to persecution, information about their nest sites needs to be kept confidential. An Bord Pleanála have stated that they will not accept confidential information. Therefore, in accordance with Article 42(18) of the Habitats Regulations (2011) and Article 7(1), 8 and 10 of the European Communities (Access to Information on the Environment) Regulations 2007 to 2014, specific information on the location of Golden Eagle nest sites, and information that could be used to derive the location of the nest sites, is not included in this chapter and associated appendices.

The sensitive information that has been redacted from this chapter and associated appendices has been compiled in a confidential annex. This confidential annex can be presented to An Bord Pleanála and relevant statutory consultees on request.

Evidence indicating the presence of Golden Eagle territorial pairs in the 6 km buffer zone around the wind farm site was recorded in each year from 2020-2022.

In 2020, the Golden Eagle survey did not locate any Golden Eagle nest sites, but information about a successful nest was subsequently provided by NPWS. This nest was located at the edge of the eastern part of the wind farm site.

In 2021, the Golden Eagle survey found what was considered to be an occupied nest site in the western part of the survey area, outside the wind farm site. Due to lack of activity at the site on the third survey visit it was considered to have failed. However, a walk in to the nest site location during the 2022 survey raised some doubts about whether it was suitable for Golden Eagles. In 2021, there was also what was considered to have been a second territorial pair in the eastern part of the survey area. The activity of this pair was focussed around the edge of the buffer zone, several kilometres from the wind farm site.

In 2022, the Golden Eagle survey recorded a nesting attempt at a separate site in the western part of the survey area, outside the wind farm site. Regular sightings of a pair were recorded. In late March, the pair was recorded nest building and attending the nest. However, the nest was abandoned following human disturbance (shepherding) close to the nest. After confirmation of no subsequent activity, a walk in to the nest site confirmed the presence of a Golden Eagle nest. The pair remained in the area across the summer with further records from the Golden Eagle survey and from the wind farm vantage point surveys. However, no further evidence of nesting attempts was recorded. This is typical for Golden Eagles, who do not usually make second nesting attempts after a failure.

In both 2021 and 2022, the territorial pair in the vicinity of the wind farm site consisted of a sub-adult male and an adult female.

An indicative home range of the Golden Eagle pair in 2022 was mapped based on the observations of the adult flight activity and the Golden Eagle Topography map. This indicative home range extended along the ridge and its surrounds from Crocknadreeavarh to Croaghaleen, and north across the Gweebarra Estuary direction to Dooey to presumably hunt the dune system for rabbits (Figure 7-9). The total area of the indicative home range was around 90 km^2.

Further details of the results of the Golden Eagle surveys are included in Appendix 7.4 and Appendix 7.5.

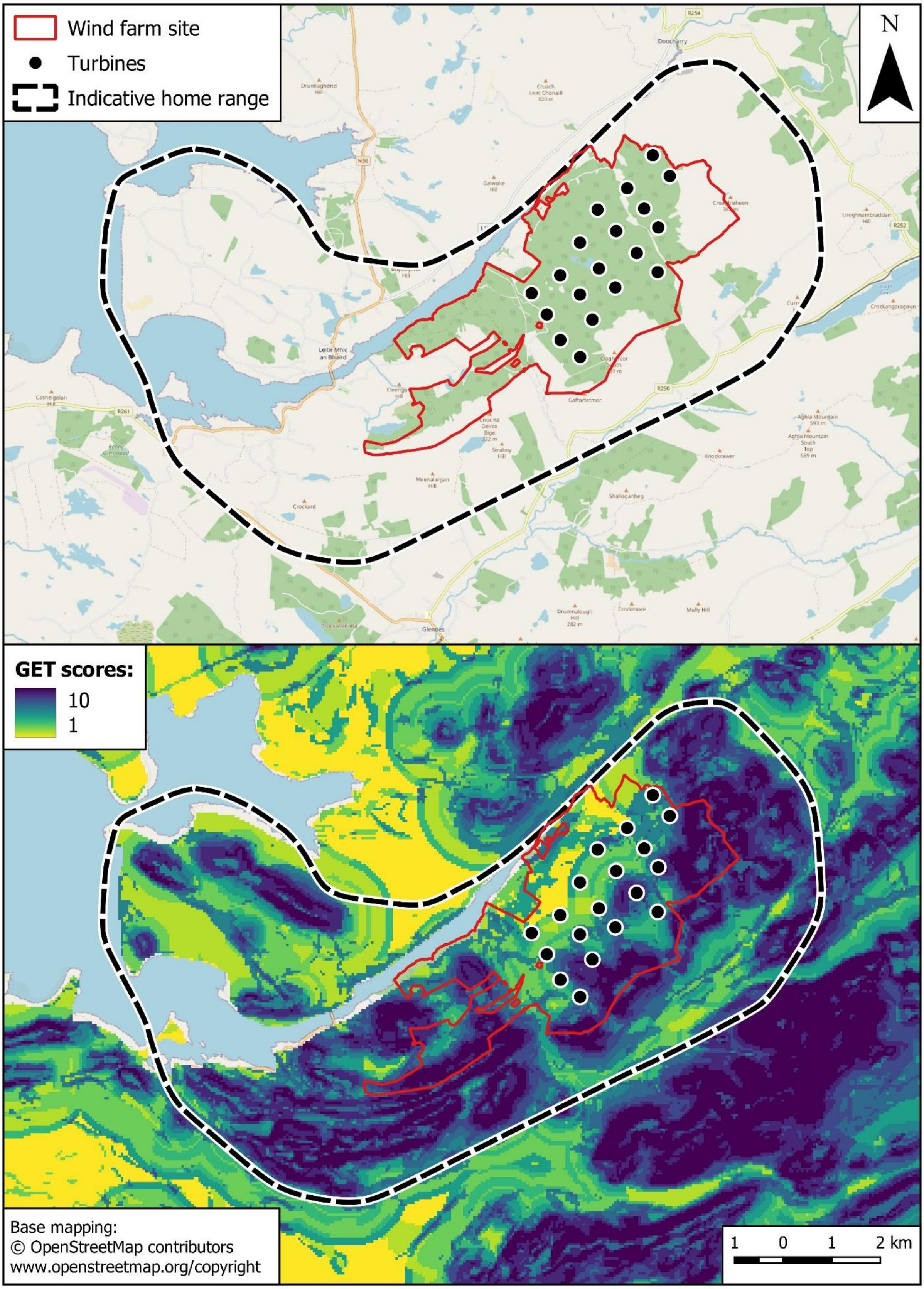

Figure 7-9 - Indicative home range of the Golden Eagle breeding pair in 2022.

7.3.2.3.3 Golden Eagle occurrence patterns around the wind farm site

Golden Eagles were regularly recorded during vantage point watches and other survey work around the wind farm site. The following analyses are based on records of Golden Eagles recorded during the timed wind farm vantage point watches, as these records can be standardised against survey effort.

Golden Eagles were recorded in all months of the year (Table 7-4). There was a general pattern of decrease in the recording rates across the breeding season from March to July, and then increasing from August to October. Recording rates in mid-winter (November-February), apart from a high rate in January.

Table 7-4: Golden Eagle recording rates (records / 60 hours) per month during the Cloghercor Wind Farm vantage point surveys.

Month	Records / 36 hours
Jan	4.53
Feb	0.8
Mar	3.75
Apr	2.8
May	2.37
Jun	0.84
Jul	0.77
Aug	2.4
Sep	3.86
Oct	4.95
Nov	1.03
Dec	0.75

The data in this table is derived from vantage point survey records during timed watches, and records outside viewsheds. Data from VPs 3, 5, and 6, which had very few Golden Eagle records, were excluded from the analysis. The recording rate is shown per 36 hours, as this represents six hours watch per VP per month for six VPs.

There was a very high recording rate in the 2019/20 non-breeding season (Table 7-5). However, there was only partial coverage of this season, and the recording rate is due to a high number of records in January 2020.

The low recording rate in the 2020 breeding season is notable, despite the presence of a breeding pair at the edge of the wind farm site. Based on the position of the nest site, the birds may have been flying behind the vantage point locations as they were entering / leaving the nest site. There are three possible explanations for this: the birds were entering the site from outside of the viewshed; the presence of the surveyors deterred the eagles, so the eagles avoided entering /leaving the nest site during the vantage point watches; or the activity and deliveries was mainly crepuscular and occurred mostly outside of the normal vantage point watch hours.

Table 7-5: Recording rates (records / 216 hours) per season of Golden Eagles during the Cloghercor Wind Farm vantage point surveys.

Season	Records / 216 hours
2019/20 non-breeding season	24.09
2020 breeding season	9.43
2020/21 non-breeding season	19.54
2021 breeding season	14.93
2021/22 non-breeding season	12.77
2022 breeding season	8.77

The data in this table is derived from vantage point survey records during timed watches, and records outside viewsheds. Data from VPs 3, 5, and 6, which had very few Golden Eagle records, were excluded from the analysis. The recording rate is shown per 216 hours, as this represents six hours watch per VP for six VPs across six months.

The distribution of Golden Eagle flight activity across the area covered by the vantage point surveys is shown in Figure 7-10.This shows the density of Golden Eagle flightlines in 500 m grid squares, corrected for variations in the total survey effort within each square. The areas of high flightlines density occurred d along the eastern and southern sides of the wind farm site and largely coincided with areas that had high scores in the Golden Eagle Topography model. The distribution pattern probably also reflects Golden Eagles exploiting the topography to follow preferential corridors when they were commuting across the Gweebarra Estuary: either following the ridgeline around the eastern side of the site or exploiting areas of high ground in the western section of the site while commuting to/from Dooey. The flightlines density was low around isolated areas of high GET scores in the interior of the eastern part of the wind farm site.

Golden Eagle flight activity was also strongly correlated with ground level altitude (Figure 7-11). There was a very gradual increase up to an altitude of 150 m, followed by a steep increase between 160 m and 200 m. The overall trend continues to increase above 200 m, but there is a wide variation in density between altitudinal bands, probably reflecting sampling effects caused by the relatively small components of viewsheds at these altitudes.

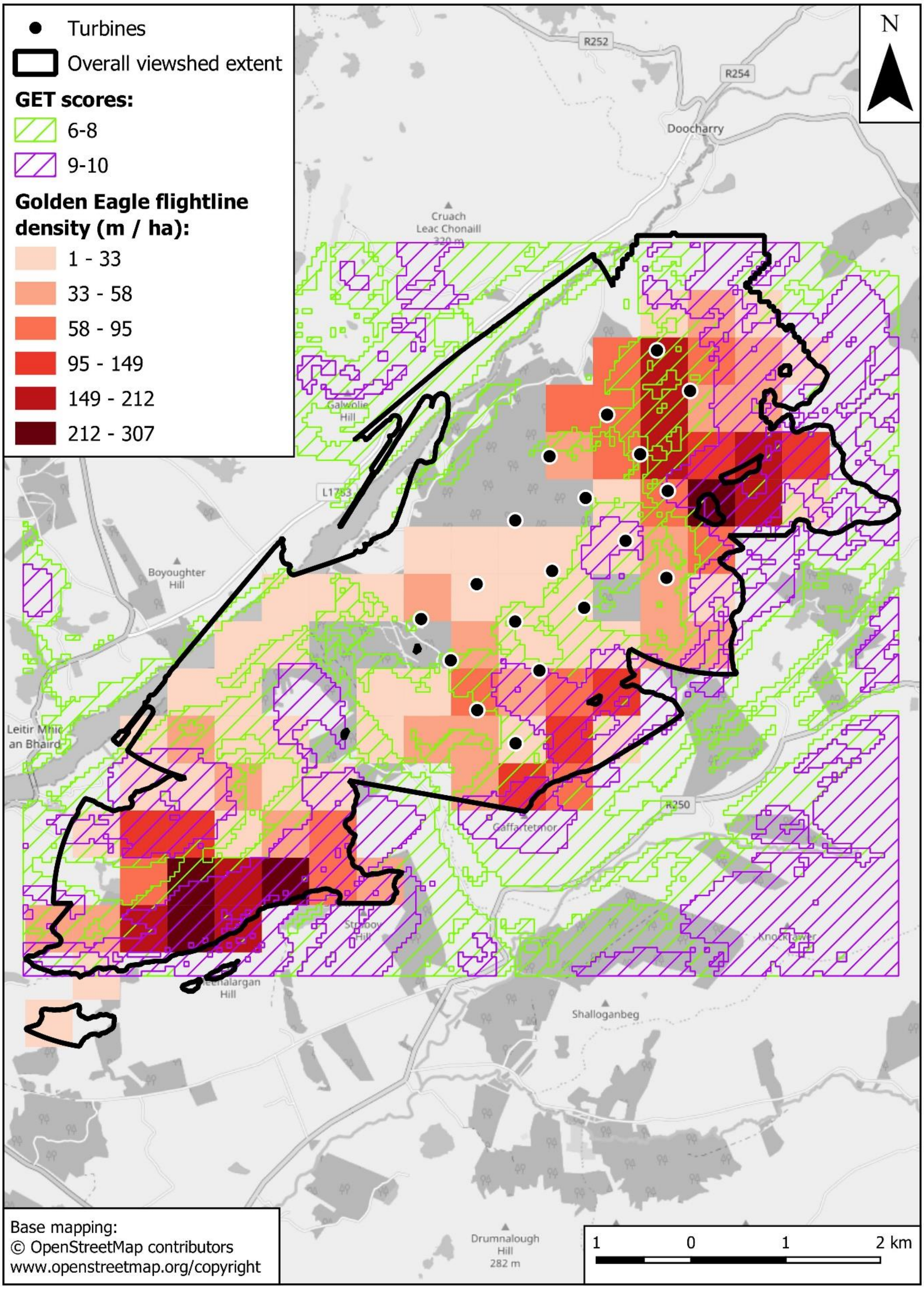

Figure 7-10 - Density of Golden Eagle flightlines recorded during the vantage point survey by 500 m grid squares.

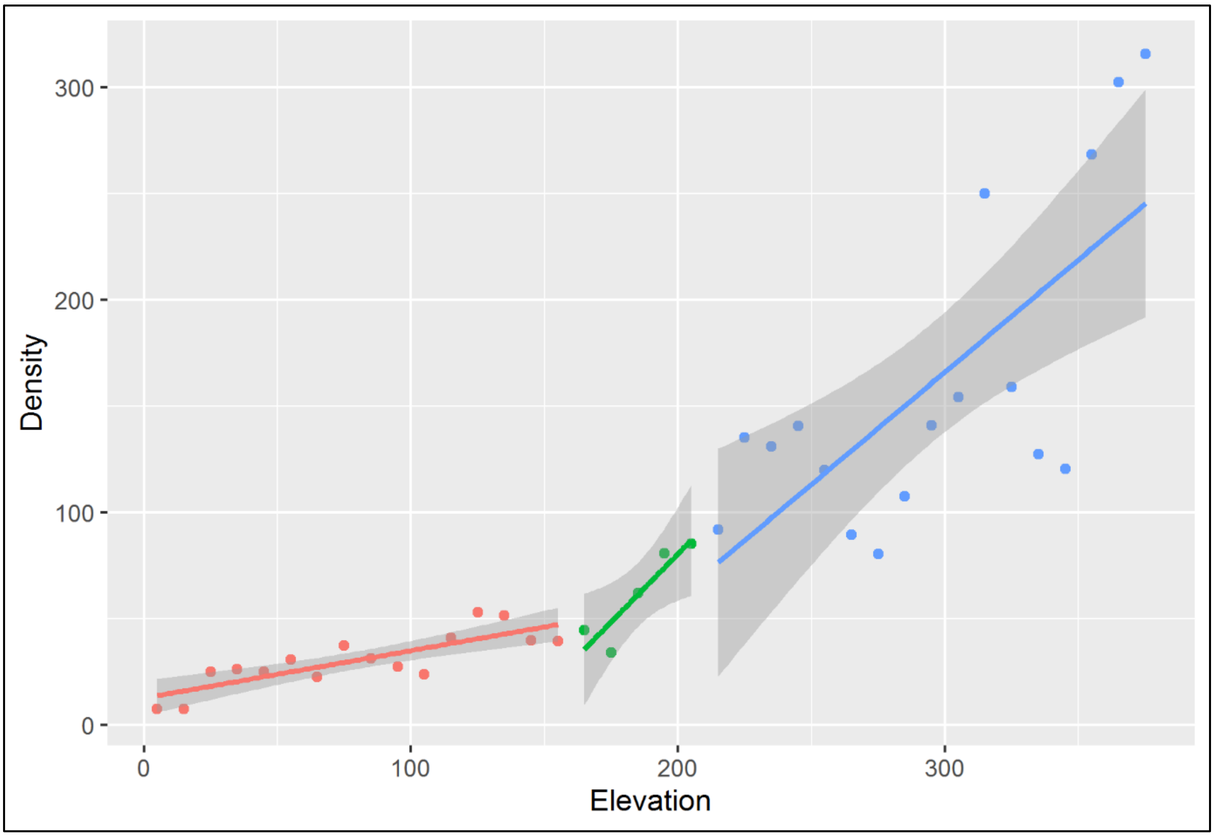

Figure 7-11 - Density of Golden Eagle flightlines by 10 m altitudinal bands.

7.3.2.3.4 Detectability effects

While the distribution patterns in Figure 7-10 and the relationships shown in Figure 7-11 provide a useful summary of Golden Eagle flight activity across the wind farm site, it is possible that they are influenced by detectability effects. Therefore, analyses were carried out of the combined effects of distance from the vantage points and the Golden Eagle Topography score of Golden Eagle flight activity density.

Figure 7-12 shows Golden Eagle flightlines densities in 250 m distance bands from the vantage point locations, divided by groupings of low-medium, high and very high scores from the Golden Eagle Topography model. A boxplot[2] was used for this figure because of the nature of the data, which meant that means and confidence intervals were not an appropriate way of summarising the data. In areas with very high GET scores, there were low flightlines densities within 250 m of the vantage points, although the sample sizes were small and the variability high. The flightlines densities were broadly similar across the remaining distance bands, but with some indications of a slight decrease in densities at distance of more than 1000 m from the vantage points. In the analyses of data from areas of low-medium and high GET scores, the

[2] In a boxplot, the box shows the range of values occupied by the middle 50% of the data distribution (i.e., from the 25th to the 75th percentile; the interquartile range). The thick line in the box shows the median value (where half the data is less than or equal to this value, and half the data is greater than or equal to this value). The whiskers show the range from the maximum to the minimum values. However, outliers are excluded from this range and are shown instead as black dots above, or below, the whiskers. The outliers are defined as values, where the difference from the median is more than 1.5 times the interquartile range.

sample sizes for distance bands close to the vantage point locations were very small, reflecting the general locations of the vantage points in areas with high Golden Eagle Topography scores[3]. However, the flightlines densities were broadly similar across the distance bands with sample sizes ≥ 10.

Overall, the analysis indicated that detectability effects are not likely to have had a large influence on the observed distribution patterns. The indication of reduced density in the closest distance band may be due to Golden Eagles avoiding the vantage points due to the presence of a human. However, the confidence interval is very wide for this band, reflecting the small sizes of the 0-250 m bands.

[3] VPs 3, 5 and 6 were excluded from the analyses due to the very low number of Golden Eagle flightlines recorded from these vantage points.

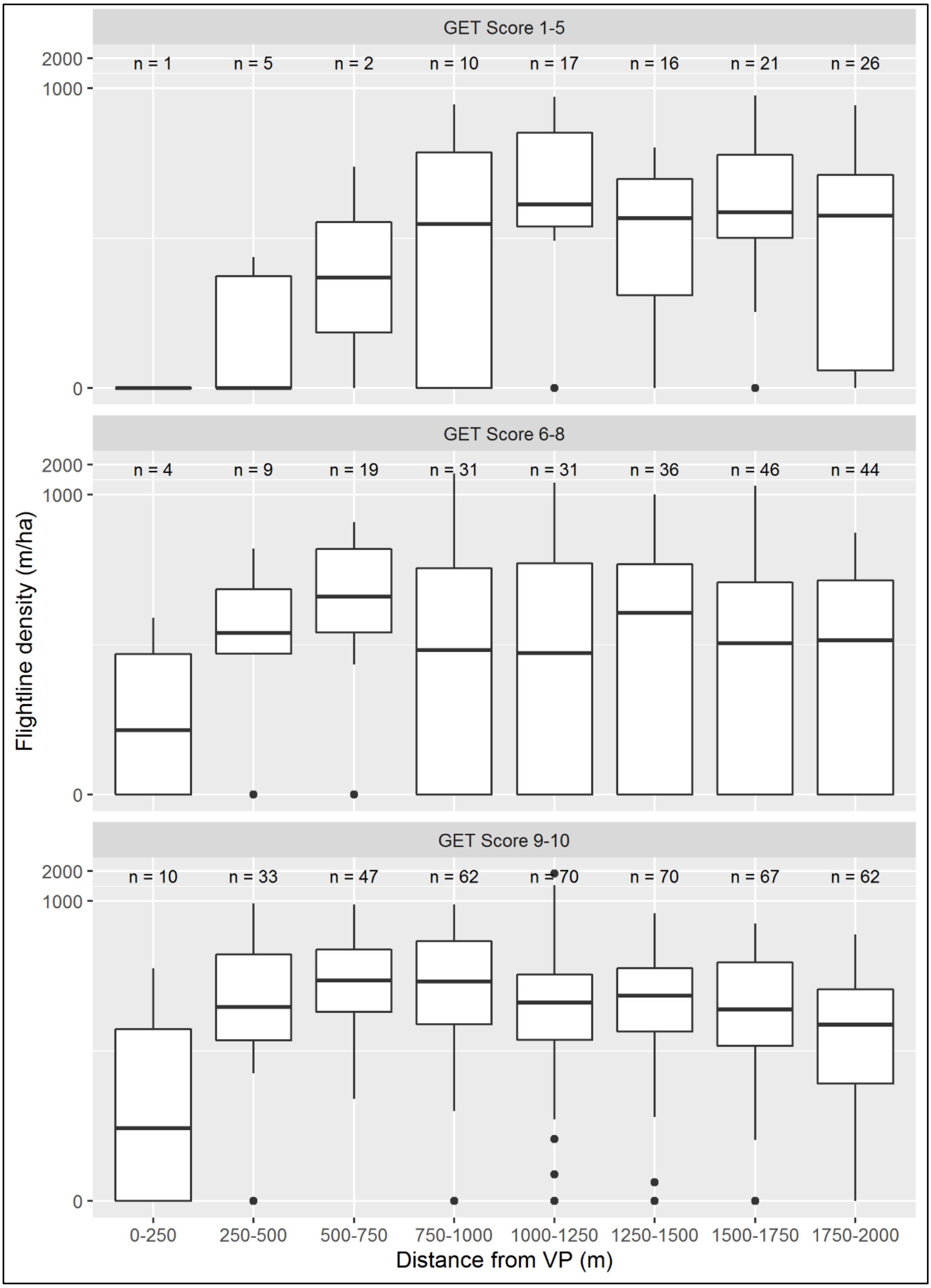

Figure 7-12 - Boxplot of Golden Eagle flightline density in 250 m distance bands from the vantage point locations, divided by grouping of low, high and very high scores from the Golden Eagle Topography model.

7.3.2.4 Golden Plover (breeding population)

Golden Plover is a very rare breeding species in Ireland, where it occurs in blanket bogs in the north-west of the island. No information or records relating to breeding Golden Plover were provided by NPWS in response to data requests and consultations.

It is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA, but little information is available on its distribution within the SPA. In a 2002 survey, the nearest breeding Golden Plover in the SPA was around 10 km from the wind farm site. However, this survey only covered sample tetrads within the SPA.

There do not appear to be any recent records of breeding Golden Plover in the vicinity of the Cloghercor Wind Farm site. Golden Plover was not recorded in the hectads containing the site in the BirdAtlas 2007-2011 surveys (Balmer *et al.*, 2013) and no records of breeding Golden Plover have been supplied by NPWS in response to our consultations and data requests. However, the management plan for the Coolvoy Bog SAC (NPWS, 2005) stated that there were believed to be one or two pairs of Golden Plover breeding in the SAC. Coolvoy Bog is close to the north-eastern boundary of the wind farm site.

7.3.2.4.1 Breeding evidence from the Cloghercor Wind Farm

Evidence of breeding Golden Plover was recorded in the Cloghercor Wind Farm site during the 2020 and 2021 breeding season bird surveys, and in the 2022 Golden Plover survey. This involved records of displaying birds in 2020 and 2021, and an occupied nest and brood of chicks in 2022.

Most of the records came from the eastern corner of the wind farm site (Figure 7-13). Based on the criteria defined by Gilbert *et al.* (1998) for the interpretation of breeding wader surveys carried out using the Brown and Shepard (1993) method, the distribution of records indicate that only a single pair of Golden Plover was present each year. There were two outlying records. One was near VP5 in 2021, which may have referred to a bird foraging away from the breeding area (see below). The other was south of VP2 in late July 2022, which was well after the chicks would have fledged.

The nest site found in 2022 was located around 600 m from the forest edge, and over 1 km from the nearest proposed turbine location (Figure 7-13). While nest sites were not found in 2020 and 2021, the centroid of the Golden Plover observations in the breeding area from those two years was very close to the 2022 nest site (Figure 7-13).

The breeding season records all occurred between 24thApril and 29th July. However, this range partly reflects the survey effort as in both 2020 and 2021, the April vantage point and moorland bird surveys were carried out at the end of the month, while the 2022 survey started in late April. There are no March records of Golden Plover from the Cloghercor Wind Farm site.

There were no other breeding season Golden Plover records during the vantage point surveys, moorland bird surveys, or other bird surveys carried out around the wind farm site. There were some Golden Plover records from the wider area in late March and April during the Golden Eagle surveys. However, none of these records involved birds displaying, or showing other evidence of breeding, so these records could have involved birds on spring migration.

Full details of all the Golden Plover breeding season records are included in Appendix 7.2.

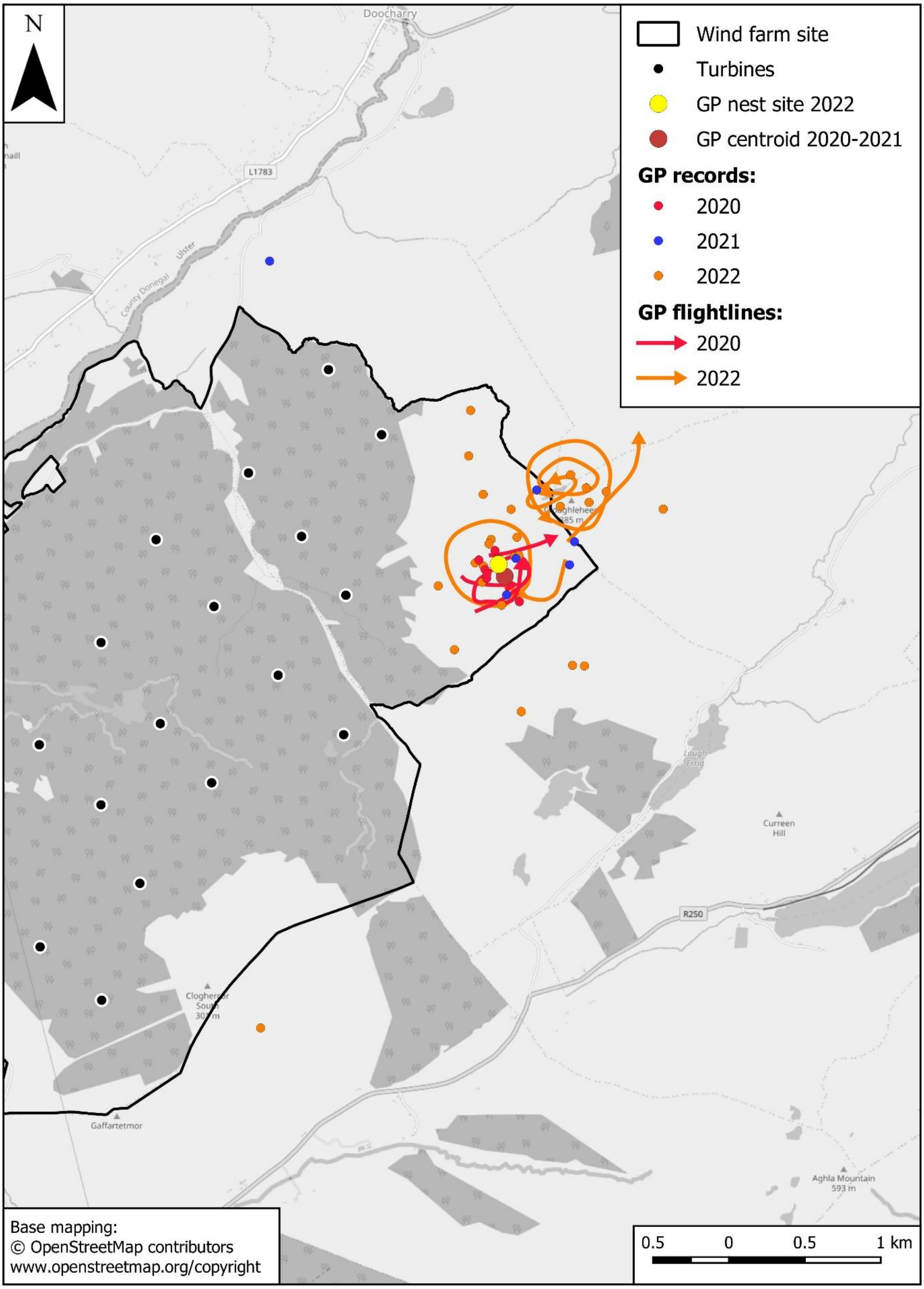

Figure 7-13 - Distribution of Golden Plover records.

7.3.2.4.2 Commuting behaviour

In Britain, breeding Golden Plover commute between their moorland nesting areas and grassland feeding areas. There do not appear to be any Irish studies that document breeding Golden Plovers commuting to grasslands to feed. This commuting behaviour mainly occurs during the incubation period. Male Golden Plovers usually incubate during the day and females at night, with most changeovers occurring early in the morning and late in the evening. Therefore, commuting Golden Plovers are most likely to be seen in the early morning and late evening.

Due to the presence of breeding Golden Plover, the survey effort at VPs 4, 5 and 7 was increased to 36 hours across April-July. This included a number of early morning and late evening watches. However, there were, no records of commuting Golden Plover in any of the vantage point watches during the Golden Plover breeding season.

In 2022, weekly dawn / dusk watches were carried out during the incubation period to attempt to map the arrival and/or departure directions of commuting birds. However, no evidence of birds commuting to / from the breeding territory was recorded.

Detailed observations of Golden Plover activity spanning the changeover period were recorded on two dates. On both dates, no evidence of the birds commuting to/from distant foraging areas was recorded. The birds arriving to take over the incubation just appeared without an obvious incoming flight. After the changeover, the bird that had left the nest remained present in the area for over an hour.

While these surveys do not rule out the possibility of the birds commuting to distant grassland areas some of the time, they indicate that, unlike the evidence from the British studies, it does not appear to be a regular pattern. The observations of a bird away from the territory in moorland habitat around VP5 in June 2021 is consistent with the above results, indicating that the non-incubating birds use moorland habitat to feed.

Full details of the 2022 Golden Plover survey results are included in Appendix 7.2.

7.3.2.5 Merlin

Merlin is a rare breeding species in Ireland, occurring mainly in open moorland in the north and west. It is quite widespread in Donegal. In the BirdAtlas 2007-2011 surveys, breeding evidence was recorded from three of the six hectads around the wind farm site. A breeding pair of Merlin was recorded close to the Graffy Wind Farm site in 2019 and 2020 (RPS, 2021), around 6 km south-east of the Cloghercor Wind Farm site. No records of breeding Merlin have been supplied by NPWS in response to our consultations and data requests. It is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA, but no information is available on its distribution within the SPA.

Merlin surveys were carried out in the 2020-2022 breeding season. In 2020 and 2021, these were combined with the moorland surveys and involved searching for Merlin signs, such as pellets and plucking posts. In 2022, a dedicated Merlin survey was carried out which combined searching for Merlin signs with sample vantage point watches in areas of suitable habitat. This comprised 84.5 hours of survey work between late March and early August. There were very few Merlin bird records during the moorland and Merlin surveys: just one record in 2020-21, and two in 2022 (one of which was only considered a probable). In 2020-21 there were a few records of fresh pellets and plucking posts, mainly around the western section of the site, although none were confirmed as referring to Merlin (Figure 7-14). In 2022, some feather plucks were found along the south-eastern side of the site (Figure 7-14). but these were mainly old (either from the non-breeding season or 2021 breeding season). On 29th July, two fresh plucks were found but these could be attributed to a family of Kestrel that where in that area at the time.

There were additional Merlin records during the vantage point surveys, the Golden Eagle surveys, and from incidental sightings. The distribution of breeding season records was concentrated along the south-eastern margins of the site (Figure 7-14). There were no breeding season records from the north-eastern margin of the site, which is the closest section to the Derryveagh and Glendowan Mountains SPA.

Overall, across three years of Merlin surveys, breeding season vantage point surveys, and other survey work, no evidence of breeding Merlin was recorded within the wind farm site, or in the 500 m buffer around the site, and there were very low incidences of Merlin bird detections. There are only small areas of deep heather that would be suitable for ground nesting Merlin and these are mainly in the north-east of the site on the lower slopes of Croaghleheen Hill. The forestry plantations are in neat blocks without many of the outlying groups or single trees that are often favoured by Hooded Crows/Merlin for nesting. There was a notable lack of Hooded Crows on the site which may have an impact on tree nesting opportunities for Merlin.

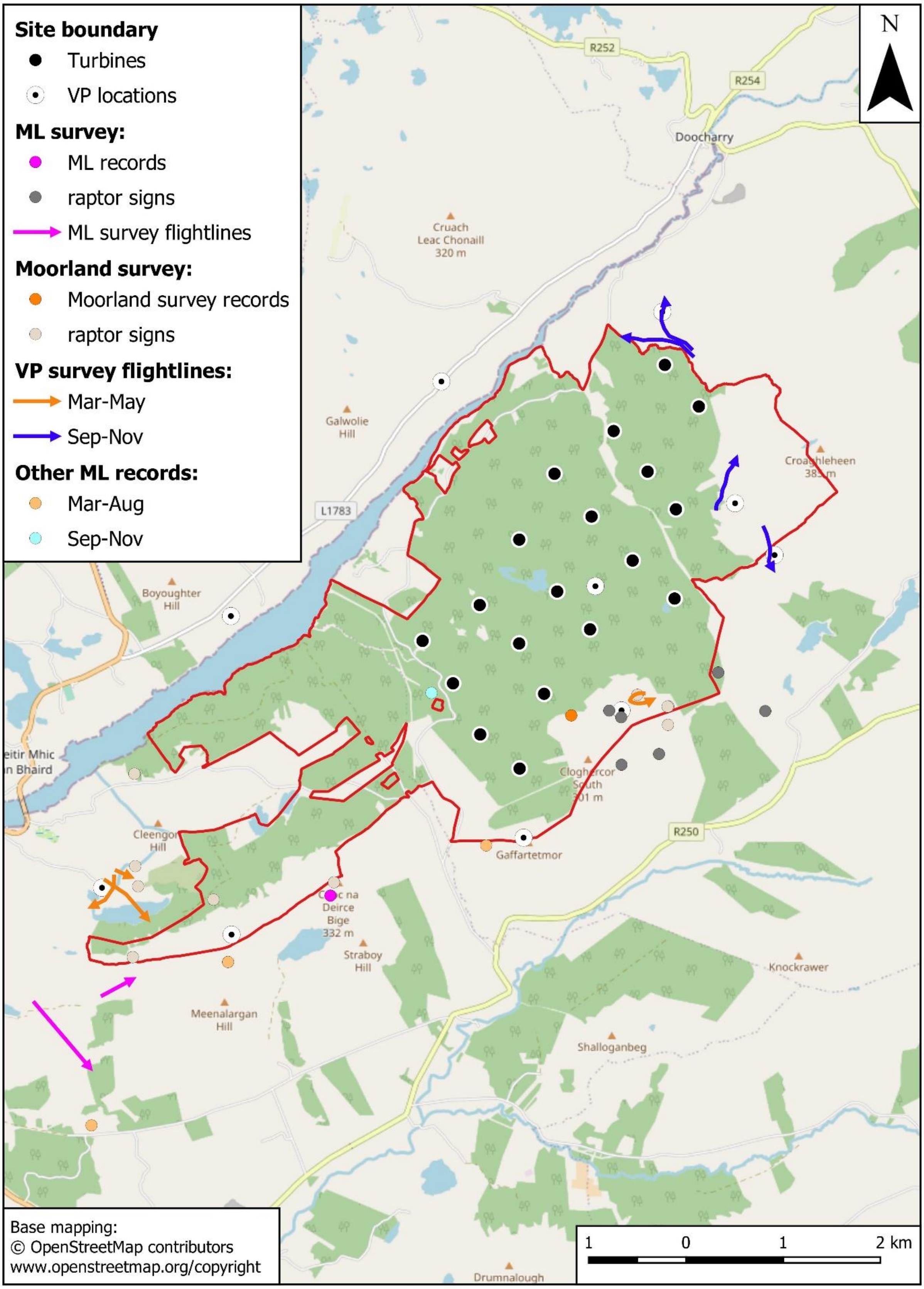

Figure 7-14 - Distribution of Merlin records.

7.3.2.6 Peregrine

Peregrine is a widespread but scarce breeding species in Ireland, nesting on coastal cliffs and inland quarries and buildings. It is widespread along the coastline in Donegal but only has a scattered distribution inland (Balmer *et al.*, 2013). In the BirdAtlas 2007-2011 surveys, breeding evidence was only recorded from one of the six hectads around the wind farm site. This was hectad G93, which is to the south-east of the site. The only tetrad record for this hectad was around 14 km from the wind farm site, although there could have been additional roving records elsewhere in the hectad. No records of breeding Peregrine have been supplied by NPWS in response to our consultations and data requests. It is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA, but no information is available on its distribution within the SPA.

There were several records of Peregrine from the western part of the wind farm site in 2021. This included a record during the moorland survey of a pair of Peregrines in April 2021 making a food pass near VP9. The male then flew off 2.5 km to the north-west and the female flew off north, with one bird being seen 45 minutes later. The other record was in July 2021, also near VP9. A food pass is indicative of breeding. There were a further four records from this part of the wind farm site in May-July 2021, but no further evidence of breeding behaviour. Potentially suitable nesting ledges were checked as part of the Golden Eagle surveys. Therefore, the Peregrines did not appear to be breeding locally.

There were three records of Peregrine from the eastern part of the wind farm site in March, May and July 2020. There is a small quarry around 1.8 km north-east of the wind farm site. This quarry was checked in the 2021 breeding season and no evidence of nesting Peregrine was found.

Peregrines were recorded in the wider area during the Golden Eagle surveys. These records all came from the eastern edge of the 6 km buffer around the wind farm site (EA VPs 6, 7 and 12). The records at EA VP6 in both 2021 and 2022 were considered to relate to probable breeding.

7.3.3 Potential Important Avian Features (red-listed species)

7.3.3.1 Red Grouse

Red Grouse is a scarce breeding species in Ireland, where it occurs in open moorland habitats. It is widely distributed in Donegal and was recorded as breeding in the six hectads around the wind farm site in the BirdAtlas 2007-2011 survey (Balmer *et al.*, 2013). The Cró na mBraonáin Red Grouse Sanctuary (NRGSC, 2013) is located on the northern side of Aghla Mountain, around 2 km from the wind farm site.

Red Grouse were recorded during the moorland surveys and the vantage point surveys in the open bog and heath habitats along the southern and eastern margins of the wind farm site. The moorland survey records were concentrated around Derkbeg Hill in the western section of the site, and around VPs 2 and 4 in the eastern section of the site (Figure 7-15). The vantage point survey records showed an additional concentration around VP9 in the western section of the site. There was a notable absence of records from the open moorland habitat around VP5, adjacent to the north-eastern boundary of the site, and in the cutover bog to the north of VP1 in the centre of the site. As would be expected from the ecology of the species, there were no records from within the forested sections of the site.

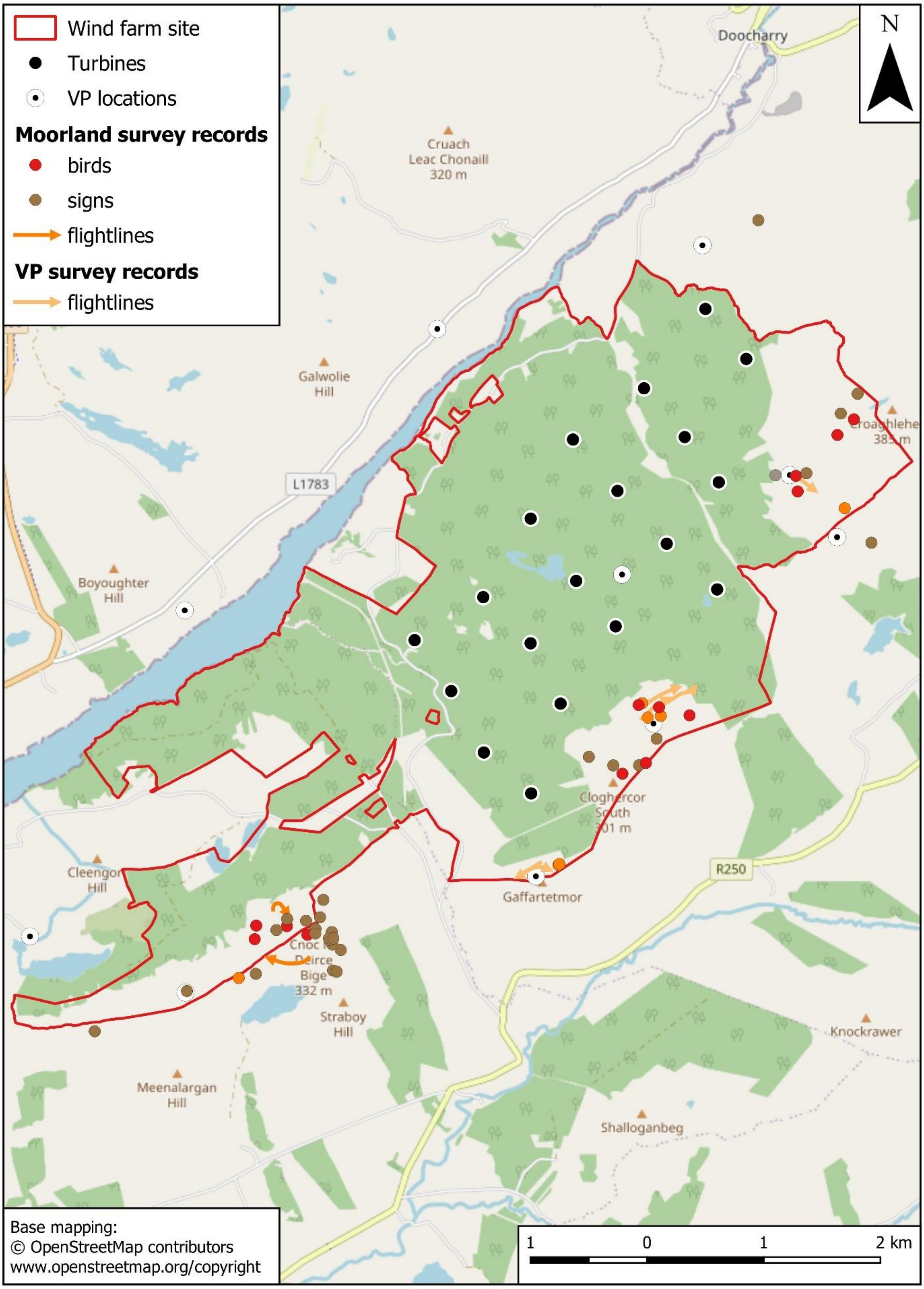

Figure 7-15 - Red Grouse records from the moorland surveys and vantage point surveys.

7.3.3.2 Snipe (breeding population)

Snipe is a widespread, but scarce, breeding species in Ireland, which is in rapid decline. It breeds in various open wetland habitats including bogs and wet heath, wet grassland and fen. At the time of the BirdAtlas 2007-11 survey, it was widespread in Donegal and breeding evidence was recorded from five of the six hectads around the wind farm site (Balmer *et al.*, 2013).

Breeding season records of Snipe were recorded from scattered locations around the edge of the wind farm site (Figure 7-15). These were mainly associated with lakes around the western section of the site. There were also some records from the open bog habitat in the vicinity of VP5. This section of bog is low-lying and relatively wet. Apart from a couple of records on the ridge above Lough Nacroaghy, there were no records from the upland bog / heath habitats.

The only records of Snipe showing behaviour that was indicative of breeding (displaying or chipping) were the two March-April records adjacent to Derkmore Lough and the two May-June moorland survey records around Lough Nacroaghy. The other May-June records are also likely to have involved locally breeding birds. However, records from March-April and July-August could include late / early wintering birds.

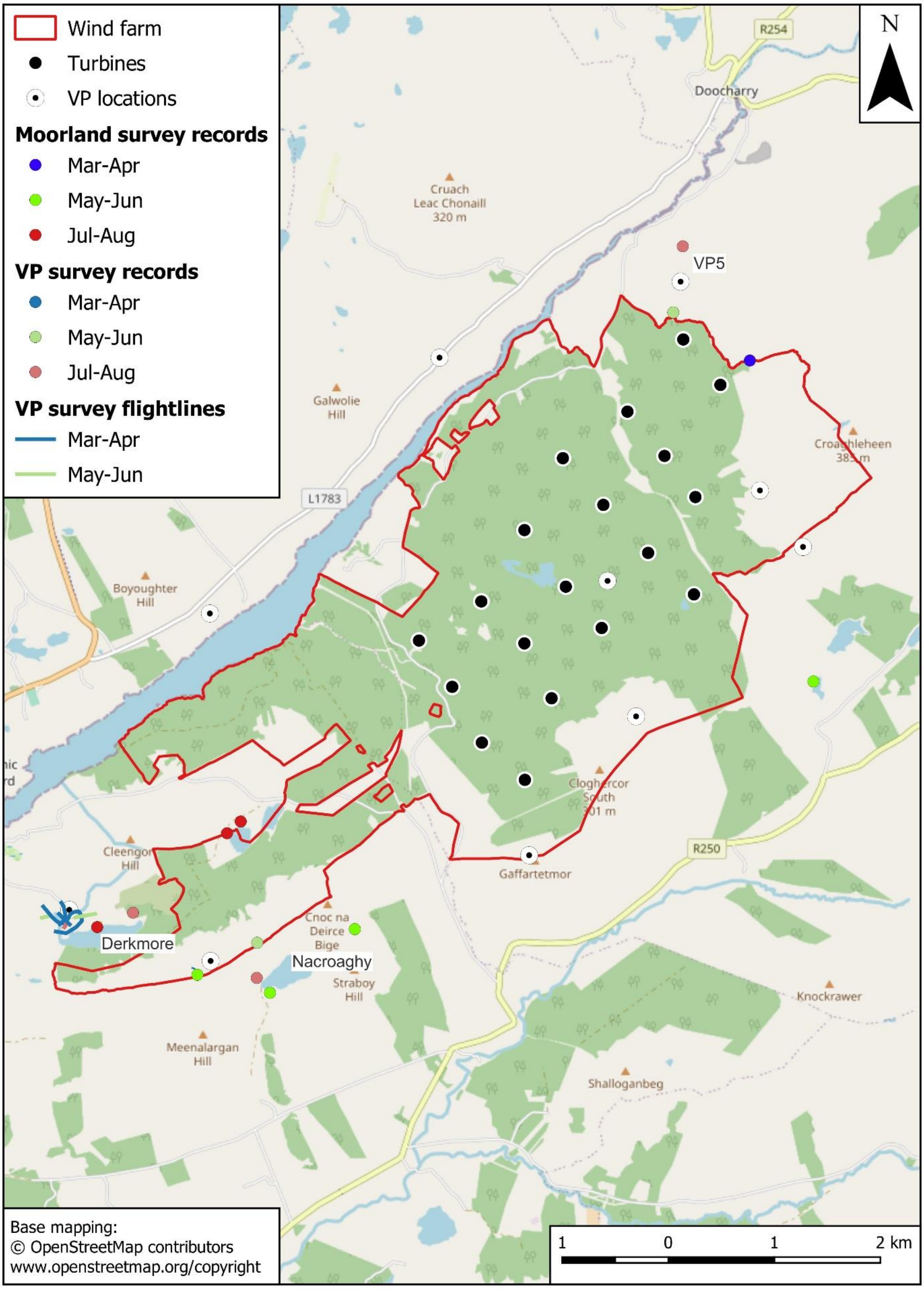

Figure 7-16 - Breeding season Snipe records.

7.3.3.3 Kestrel

Kestrel is a widespread, but declining breeding species in Ireland. In the BirdAtlas 2007-2011 surveys, breeding evidence was recorded in 88% of hectads in Ireland (Balmer *et al.* 2013). These included all six of the hectads around the wind farm site.

Kestrels were recorded regularly in the vantage point surveys (Appendix 7.2). There was a much higher recording rate in summer 2020, compared to the other seasons. The highest number monthly recording rate occurred in August and September, which may have been associated with post-fledgling juvenile activity. The vantage point survey records were widely distributed around the site. However, they mainly occurred in open habitats and there were very few flightlines recorded within large blocks of forestry (Figure 7-17).

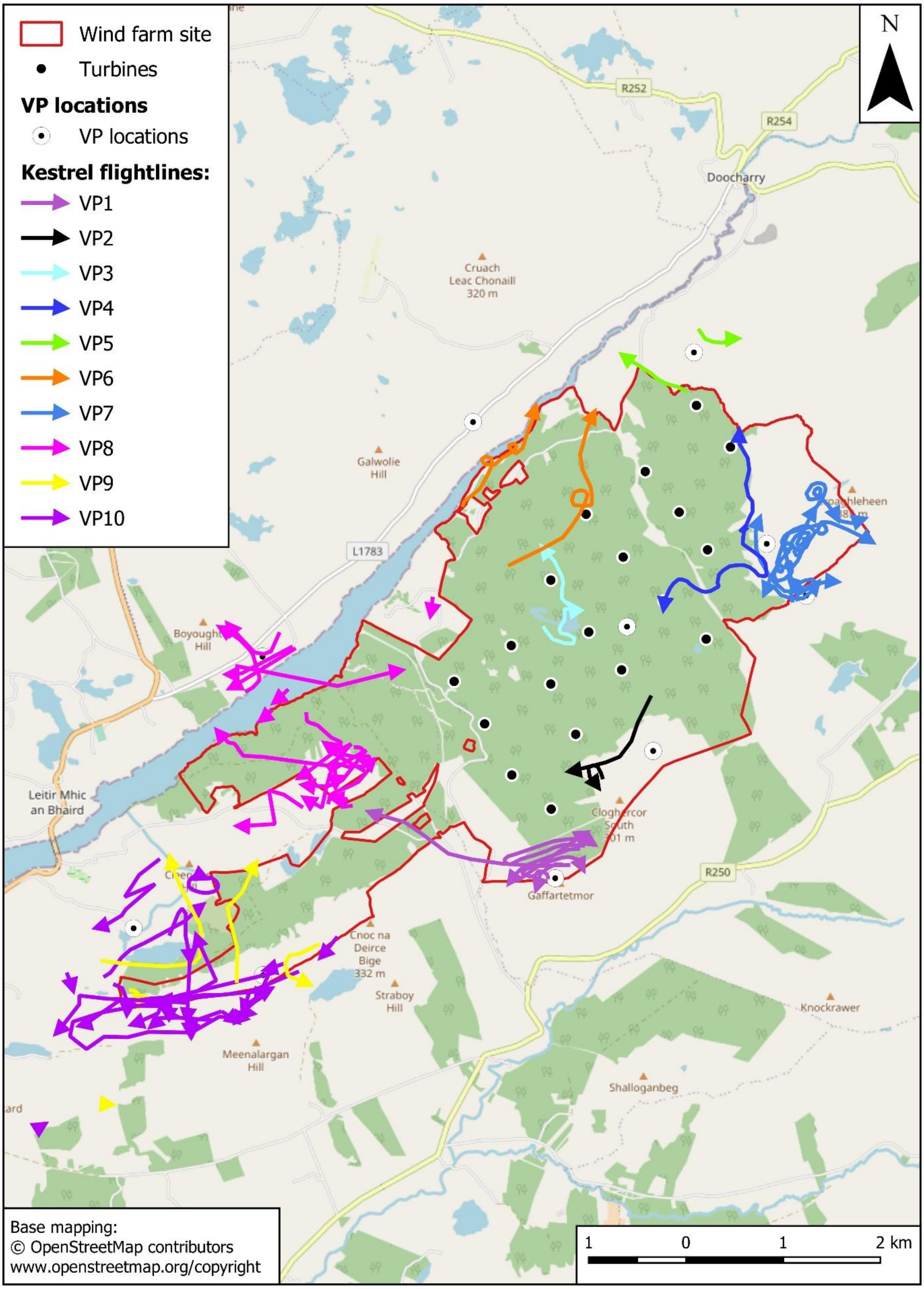

Figure 7-17 - Kestrel flightlines recorded in the vantage point surveys.

7.3.4 Potential Important Avian Features (other species)

7.3.4.1 Teal (breeding population)

Teal is a scarce breeding species in Ireland. In the BirdAtlas 2007-2011 surveys, breeding evidence was recorded in 20% of hectads in Ireland (Balmer *et al.* 2013). These included three of the hectads around the wind farm site.

Evidence of breeding Teal was recorded from four locations within and around the wind farm site: Lough Aneane Beg, Lough Doo, Lough Nacroaghy, and a small upland lake near VP4. In each case, the records involved females with broods of ducklings.

7.3.4.2 Sparrowhawk

Sparrowhawk is a widespread species in Ireland, and was recorded as possibly breeding in 81% of hectads in the BirdAtlas 2007-11 survey (Balmer *et al.*, 2013). These included two of the hectads around the wind farm site. However, it generally occurs in higher densities in the south and east of Ireland.

It was recorded regularly, but in low numbers, in the vantage point surveys (Appendix 7.2). There was no clear seasonal pattern to the records and the overall differences between seasons may just reflect random sampling variation. Most of the vantage point survey records involved flightlines along the Gweebarra Estuary, or in the western section of the site and there were only three flightlines recorded in the eastern section of the site (Figure 7-18). This distribution pattern probably reflects an association with more productive agricultural habitats and broad-leaved woodland along the Gweebarra Estuary and around the north-western margins of the wind farm site.

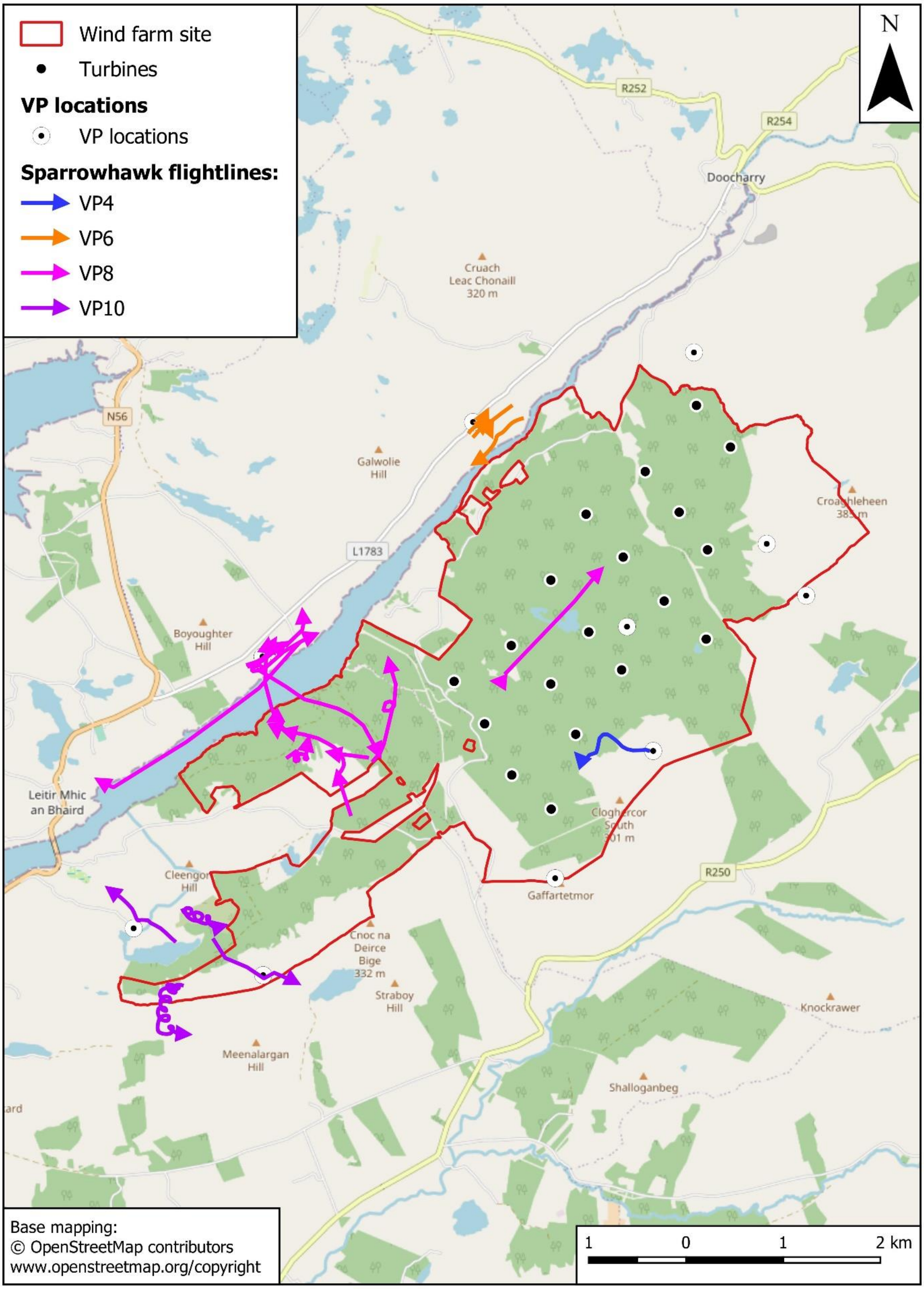

Figure 7-18 - Sparrowhawk flightlines recorded in the vantage point surveys.

7.3.4.3 Buzzard

Buzzard is a widespread, and rapidly increasing, species in Ireland. At the time of the BirdAtlas 2007-11 survey, breeding evidence was recorded in 51% hectads in Ireland (Balmer *et al.*, 2013), but it has continued its spread over the last decade. It is widespread in Donegal and breeding evidence was recorded in all six of the hectads around the wind farm site in the BirdAtlas survey.

After the first winter, it was recorded regularly in the vantage point surveys (Appendix 7.2). Most of the records occurred between February and July, coinciding with its display and breeding periods. The flightlines were concentrated in the western section of the site, indicating an association with more productive agricultural habitats and broad-leaved woodland around the north-western margins of the wind farm site (Figure 7-19).

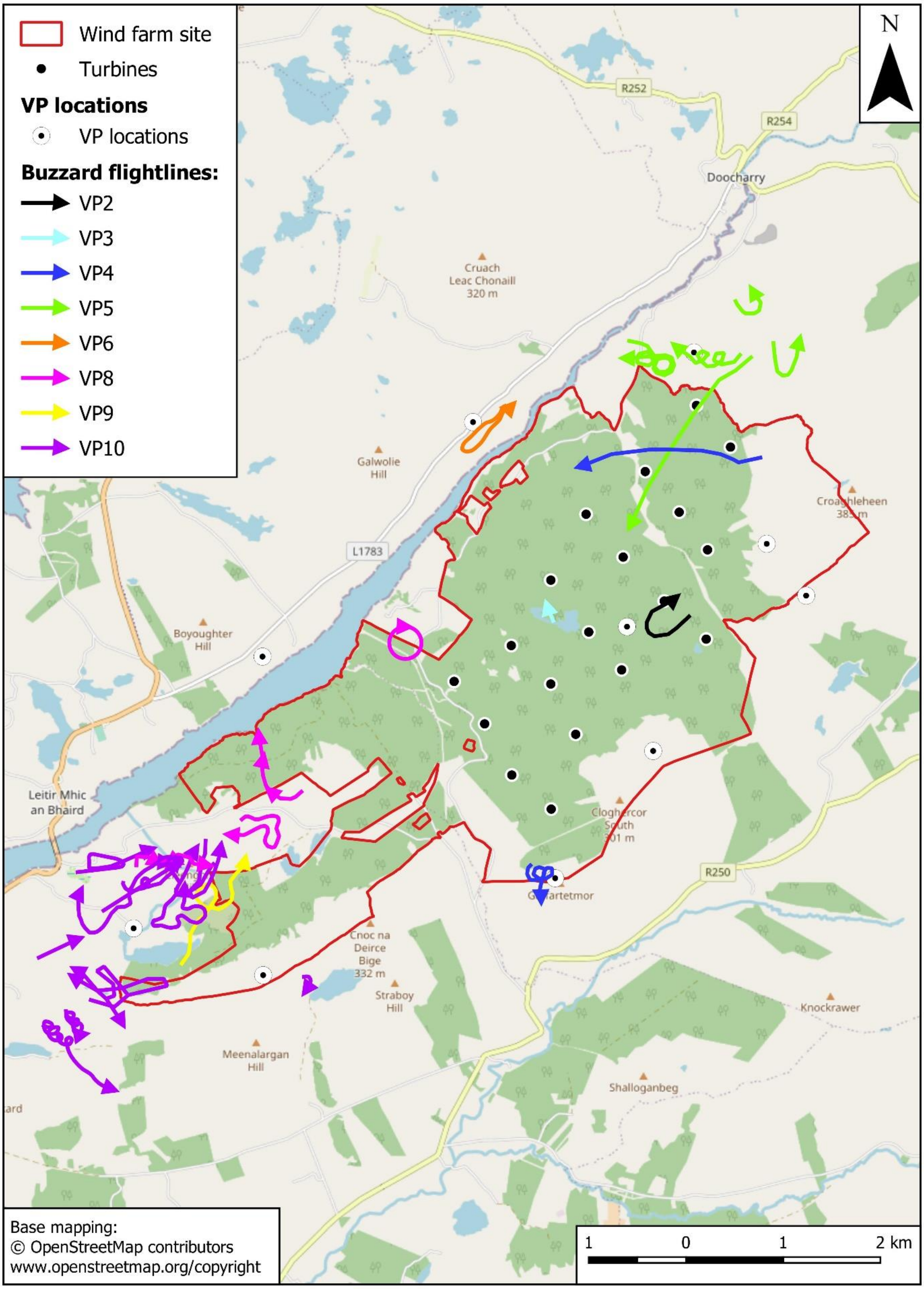

Figure 7-19 - Buzzard flightlines recorded in the vantage point surveys.

7.3.4.4 Common Gull

Common Gull is a widespread breeding species in the north-west of Ireland. Breeding, or suspected breeding, by Common Gull was recorded in five of the six hectads around the wind farm site during the BirdAtlas 2007-2011 surveys (Balmer *et al.*, 2013) surveys. These included records from tetrads within 2-6 km of the wind farm site.

Common Gulls were recorded at Lough Aneane More in the wind farm site during the breeding gull surveys in both 2020 and 2021, and during the Merlin survey in 2022. These included records of both a pair and single birds. There were also frequent records of Common Gull flightlines moving between Lough Aneane More and the Gweebarra Estuary in the vantage point watches during the Common Gull breeding season (Figure 7-20). No definite evidence of Common Gull breeding at Lough Aneane More was recorded. However, the occurrence of a pair in suitable habitat during the breeding season constitutes probable breeding.

There were no records of Common Gull at any other lakes covered by the breeding gull survey, or records from vantage point surveys and other surveys indicating breeding at any other lakes in the vicinity of the wind farm site.

Apart from the flightlines to/from Lough Aneane More, the other breeding season flightlines were either along the Gweebarra Estuary, or to the west of Derkbeg Hill. The latter were associated with movement to/from a mink farm. This mink farm is located along the Stracashel River, around 4 km east of Glenties. Mink farms provide attractive foraging resources for gull populations, which feed on the fish waste generated by the farms.

During the non-breeding season, all the Common Gull flightlines were along the Gweebarra Estuary.

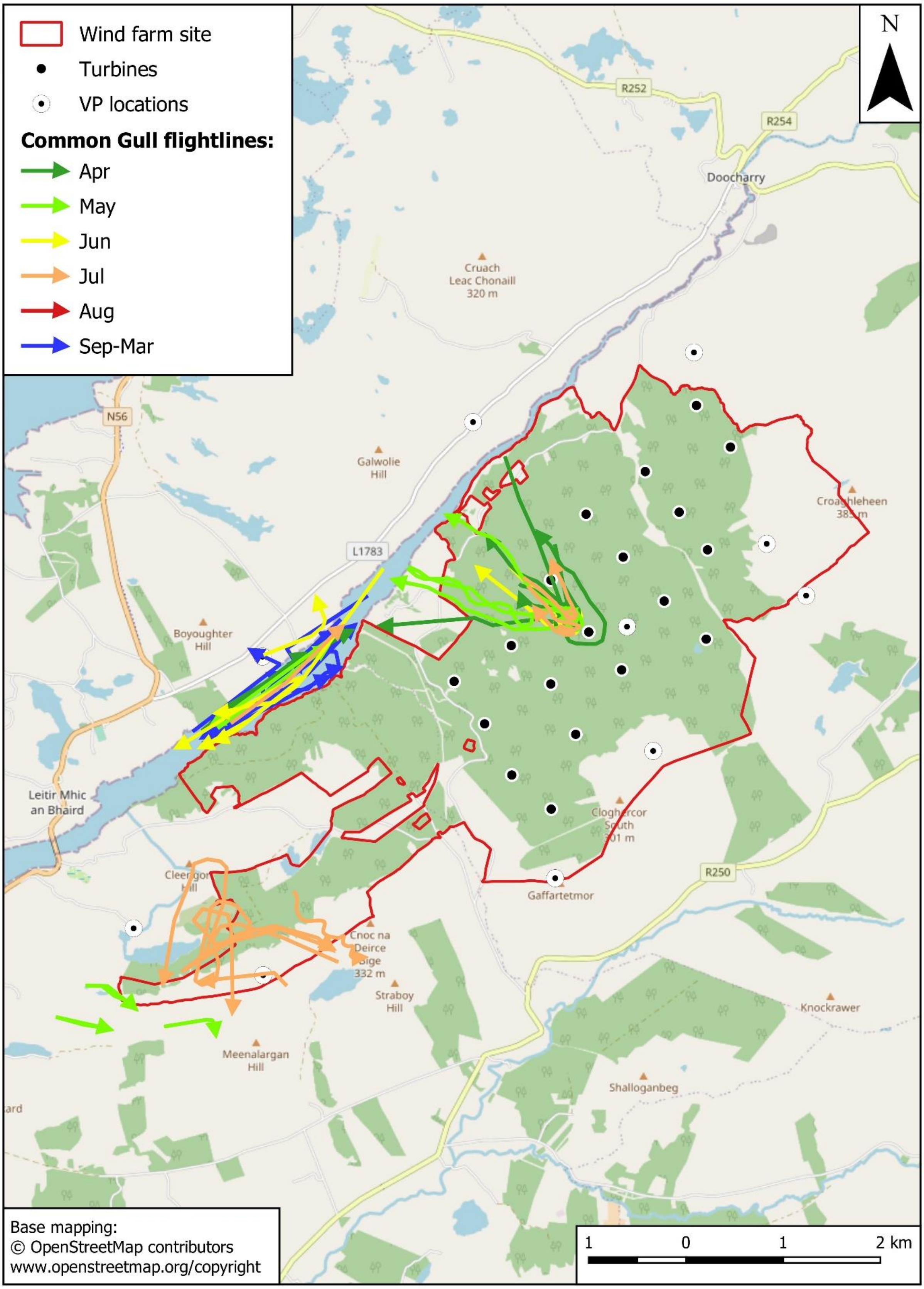

Figure 7-20 - Common Gull flightlines recorded during the vantage point surveys.

7.3.4.5 Lesser Black-backed Gull

Lesser Black-backed Gull is a widespread breeding species around the Irish coastline, while there are scattered inland colonies.

Lesser Black-backed Gulls often commute long distances from coastal breeding colonies to inland feeding areas. Woodward *et al.* (2019) reported a mean foraging range for Lesser Black-backed Gull of 43 km, and a mean maximum foraging range of 127 km. There are eight Lesser Black-backed Gull colonies within 43 km of the wind farm site, and another eight colonies within 127 km, mapped by Cummins *et al.* (2019). These include a colony that forms the Qualifying Interest of the Inishbofin, Inishdooey and Inishbeg SPA.

Inland Lesser Black-backed Gull colonies are mainly associated with large lakes, such as Lough Corrib, Lough Mask and Lough Ree. There was formerly a large Lesser Black-backed Gull colony at Lough Derg in Donegal, but this colony is no longer extant (Cummins *et al.*, 2019). During the BirdAtlas 2007-2011 surveys, possible and probable breeding by Lesser Black-backed Gull was recorded in two tetrads around 4-5 km east of the wind farm site (Balmer *et al.*, 2013). These records were probably associated with Lough Finn, which runs through these tetrads. Lough Finn was not included in the breeding gull survey for the wind farm project, due to its distance from the site.

There were no records of Lesser Black-backed Gulls at any of the lakes covered by the breeding gull survey, or records from vantage point surveys and other surveys indicating breeding at any other lakes within 2 km of the wind farm site. However, the vantage point survey flightlines show a broad pattern of movement of Lesser Black-backed Gulls across the wind farm site during the breeding season (Figure 7-21). This mainly occurred in a NW-SE corridor through the middle of the eastern part of the wind farm site, and to the west of Derkbeg Hill in the western part of the wind farm site. Most flightlines only involved one or two birds, with a maximum of nine birds on one flightline.

The movement corridor across the eastern part of the site would be consistent with Lesser Black-backed Gull commuting to/from a breeding colony at Lough Finn. However, most of the flightlines involved birds commuting north-west in the evening. As Lesser Black-backed Gulls are generally not active at night, this direction of flight in the evening would not be expected for birds breeding at Lough Finn. Therefore, it seems more likely that the breeding season Lesser Black-backed Gull flightlines across the eastern part of the site involved birds commuting from coastal breeding colonies to the north-west of the site. The peak movement occurred in June when birds at these colonies would have been provisioning chicks.

The flightlines across the western part of the wind farm site were probably associated with movements to/from the mink farm. During the non-breeding season, the Lesser Black-backed Gull flightlines were mainly along the Gweebarra Estuary, and in the western part of the wind farm site.

During the waterbird surveys of the upper Gweebarra Estuary in October 2019 and October 2020-March 2021, there were two records of 1-2 Lesser Black-backed Gulls, while there was a single record of 2 Lesser Black-backed Gulls during the estuary vantage point watches.

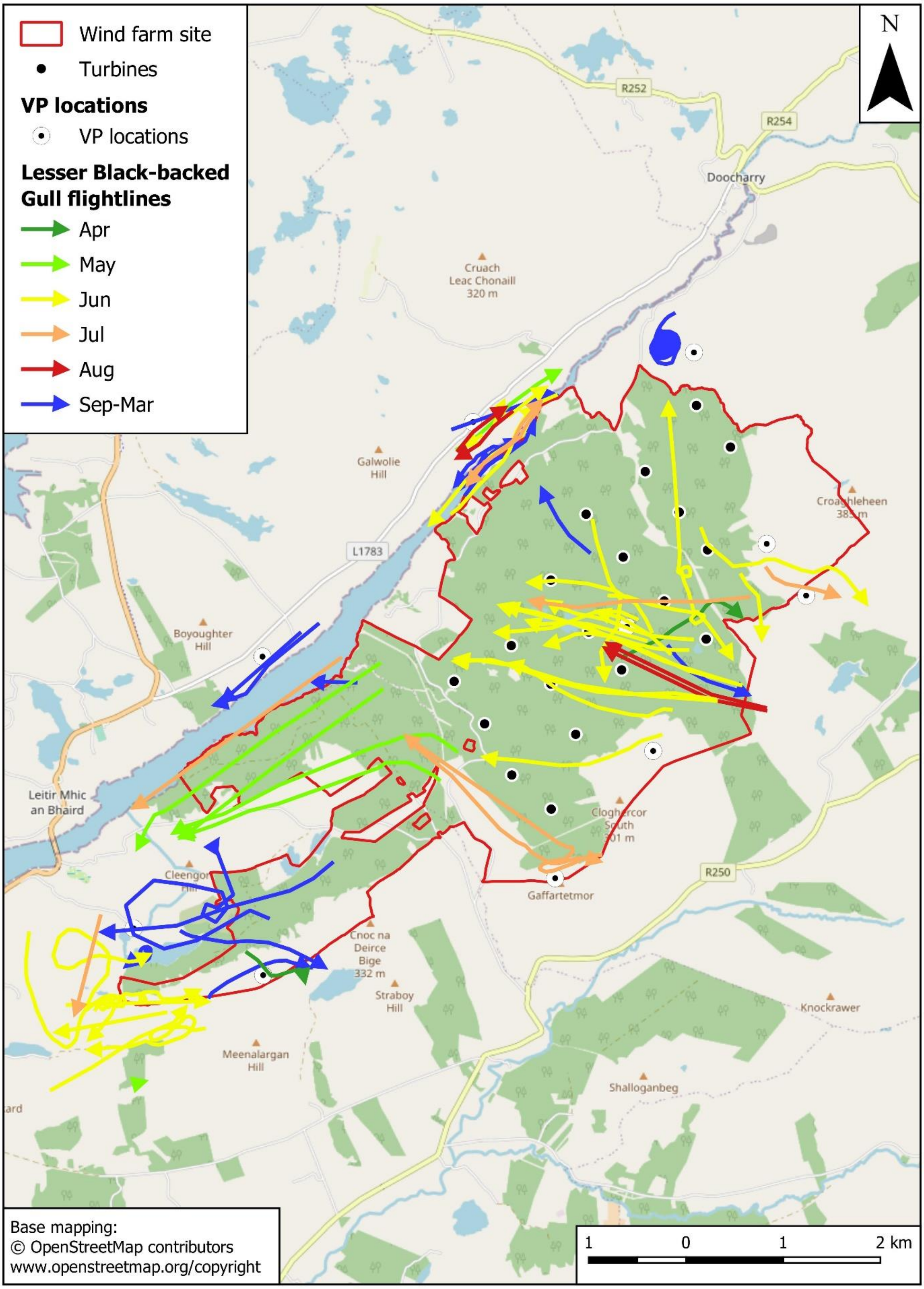

Figure 7-21 - Lesser Black-backed Gull flightlines recorded during the vantage point surveys.

7.3.4.6 Herring Gull

Herring Gull is a widespread breeding species around the Irish coastline, while scattered inland breeding occurs, mainly in urban areas. Unlike Lesser Black-backed Gull, it generally does not have large breeding colonies on inland lakes (but see below).

Herring Gulls can commute considerable distances from coastal breeding colonies to feeding areas. Woodward *et al.* (2019) reported a mean foraging range for Herring Gull of 15 km, and a mean maximum foraging range of 59 km. There is one Herring Gull colony within 15 km of the wind farm site, and another 13 colonies within 59 km, mapped by Cummins *et al.* (2019). These include colonies that are Qualifying Interests of the Inishmurray, Roaninish, West Donegal Coast, and West Donegal Islands SPAs. There was formerly an inland Herring Gull colony at Lough Derg in Donegal. However, this colony is not included in the map in Cummins *et al.* (2019) and is, therefore, presumed to no longer exist.

There were no breeding records of Herring Gulls in the hectads around the wind farm site during the BirdAtlas 2007-2011 surveys (Balmer *et al.*, 2013). There were no records of Herring Gulls at any of the lakes covered by the breeding gull survey, or records from vantage point surveys and other surveys indicating breeding at any other lakes in the vicinity of the wind farm site.

The Herring Gull flightlines recorded during the vantage point surveys were concentrated almost entirely in the western part of the wind farm site and along the Gweebarra Estuary (Figure 7-22). This is in marked contrast to the pattern of Lesser Black-backed Gull flight activity but is consistent with differences in the ecology of the two species. Unlike Lesser Black-backed Gull, Herring Gulls do not generally commute inland from their breeding colonies to feed on agricultural land. The flightlines across the western part of the wind farm site were probably associated with movements to/from the mink farm.

Most flightlines involved less than ten birds, but several much larger flocks were recorded. These mainly occurred on two vantage point watches in October and November 2020 when four flocks of 35-250 birds, and seven flocks of 10-35 birds, respectively, were recorded. These all involved birds moving north through the valley that forms the boundary between the eastern and western sections of the wind farm site.

During the waterbird surveys of the upper Gweebarra Estuary in October 2019 and October 2020-March 2021, small numbers of Herring Gulls were recorded at low tide (median = 4; range = 0-47), while no Herring Gulls were recorded at high tide. However, during the estuary vantage point watches, large flocks of Herring Gulls were recorded on two dates, commuting and resting on sandbanks: 147 Herring Gulls were recorded in November 2019; and a minimum of 514 Herring Gulls were recorded in December 2019.

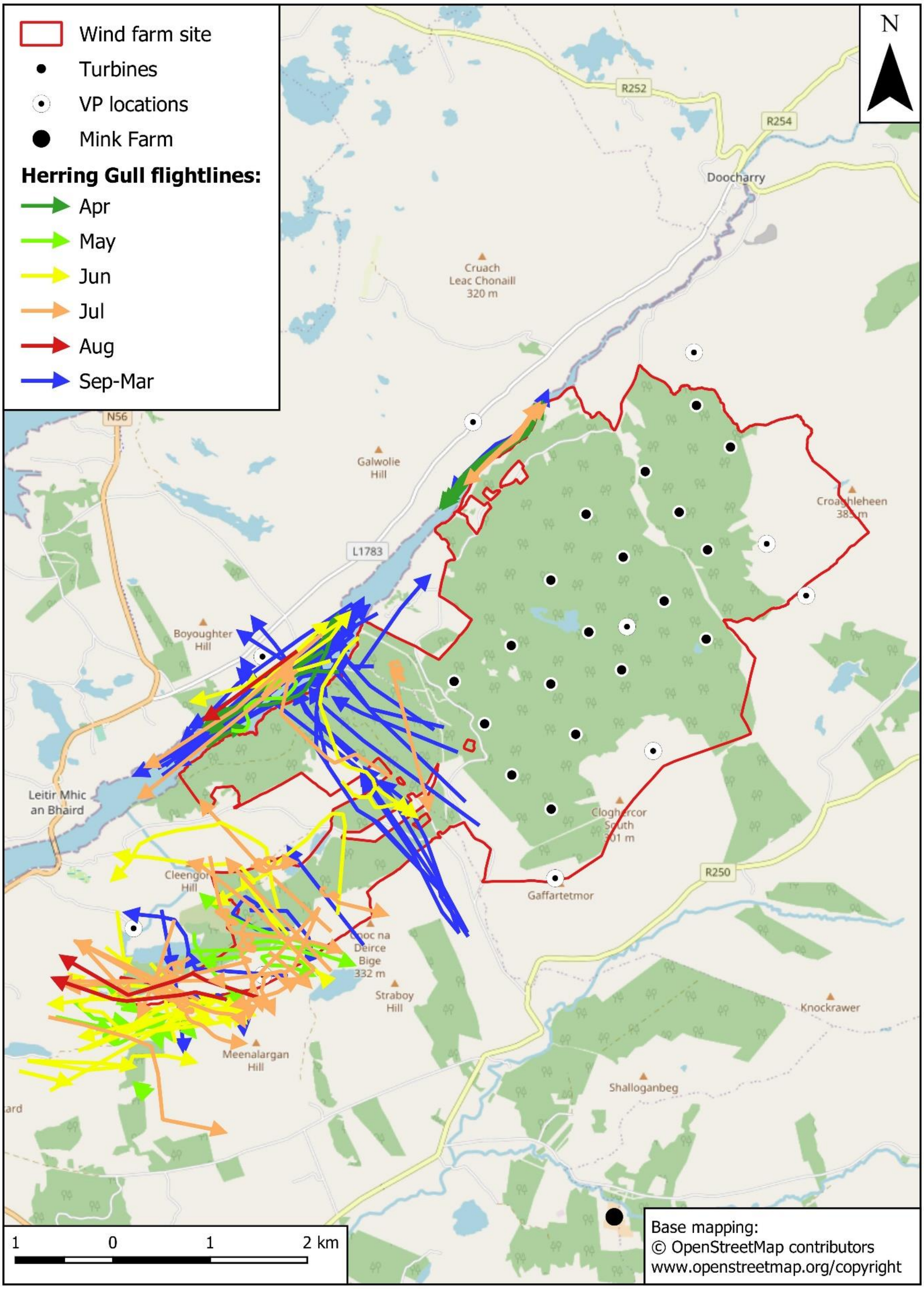

Figure 7-22 - Herring Gull flightlines recorded during the vantage point surveys.

7.3.4.7 Great Black-backed Gull

Great Black-backed Gull is a widespread breeding species around the Irish coastline but does not generally breed inland. Its winter distribution is also largely restricted to the coastal fringes.

Woodward *et al.* (2019) reported a mean foraging range for Great Black-backed Gull of 17 km, and a mean maximum foraging range of 73 km. However, these figures are based on a single study, so there is low confidence attached to them. There is one coastal Great Black-backed Gull colony within 17 km of the wind farm site, and another 12 colonies within 73 km, mapped by Cummins *et al.* (2019).

Compared to Lesser Black-backed Gull and Herring Gull, Great Black-backed Gull flightlines were more widely distributed across the site (Figure 7-23). There were concentrations of activity along the Gweebarra Estuary and in the western part of the site, with the latter probably associated with movement to/from the mink farm. Most flightlines only involved one or two birds, with a maximum of eight birds on one flightline. The seasonal pattern of activity does not suggest strong connectivity with coastal breeding colonies, although the flightlines probably associated with movement to/from the mink farm did mainly occur during the period when birds would be provisioning young.

During the waterbird surveys of the upper Gweebarra Estuary in October 2019 and October 2020-March 2021, the only record of Great Black-backed Gull was of a single bird in February 2021. No Great Black-backed Gulls were recorded on the estuary vantage point watches.

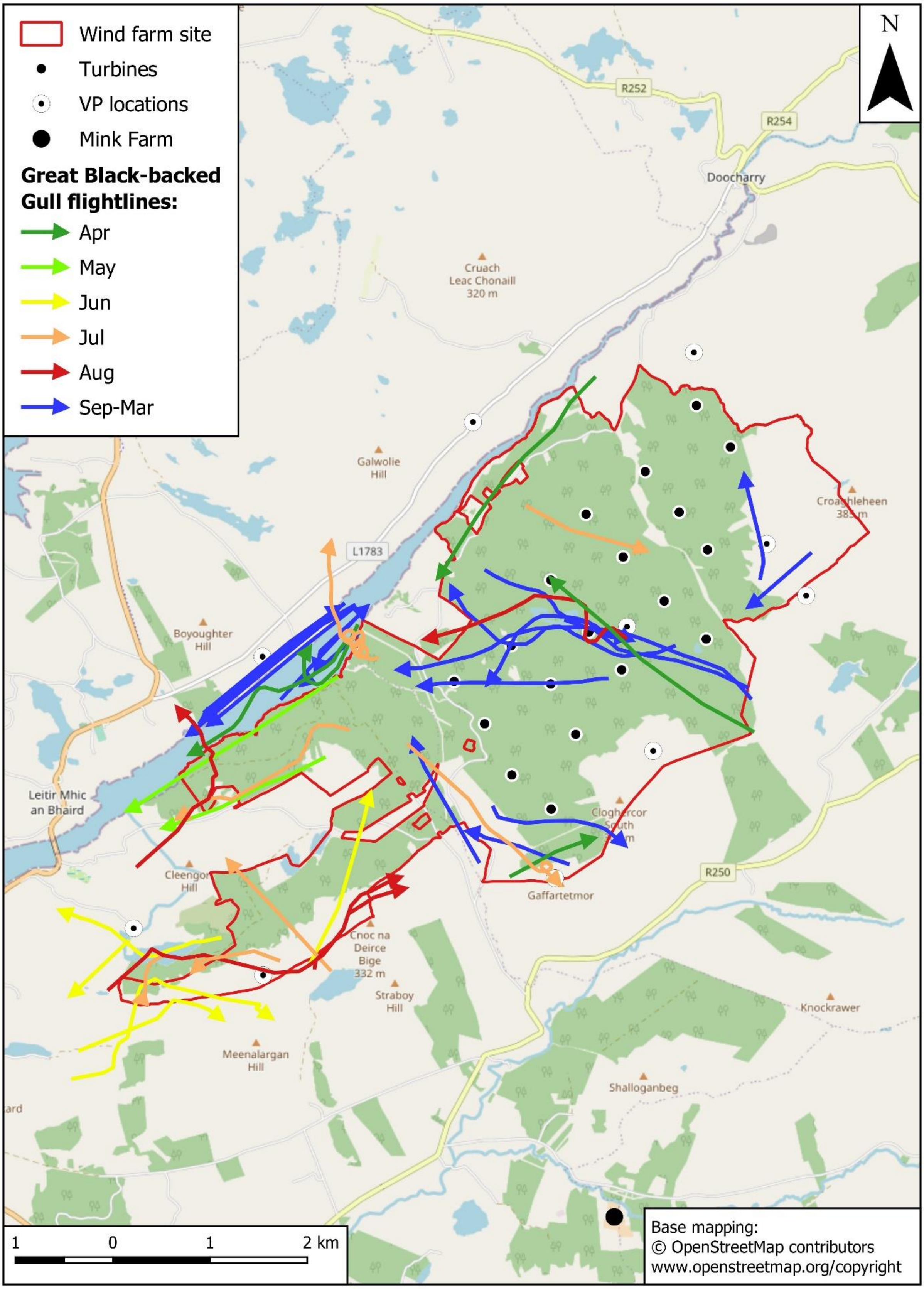

Figure 7-23 - Great Black-backed Gull flightlines recorded during the vantage point surveys.

7.3.5 Other species

7.3.5.1 Waterbirds

Excluding species only recorded in the Gweebarra Estuary corridor, the following additional waterbird species were recorded around the wind farm site during the vantage point survey and other surveys: Mute Swan, Greylag Goose, Barnacle Goose, Mallard, Cormorant, Grey Heron, Common Sandpiper, Woodcock, Black-headed Gull (Appendix 7.2).

Mallard, Grey Heron and Common Sandpiper were recorded quite regularly and probably have small breeding populations in the area. Mallard and Common Sandpiper probably breed on lakes within and/or around the wind farm site.

Cormorant and Black-headed Gull were regularly recorded in the Gweebarra Estuary corridor, but were only occasionally recorded outside this corridor. The latter records mainly involved birds commuting over the site, but there were also occasional records of Cormorants on lakes around the site.

Woodcock were occasionally recorded in winter, when birds were flushed during walkover surveys, or while accessing vantage points. There were no breeding season records.

There were only single records of Greylag Goose and Barnacle Goose, both of which involved small numbers of birds commuting over the site in autumn.

7.3.5.2 Other raptors

The following additional raptor species were recorded during the vantage point surveys and other surveys carried out around the wind farm site: Red Kite, White-tailed Eagle, Hen Harrier and Osprey (Appendix 7.2).

Osprey was the most frequently recorded of these species with records on six dates during the vantage point surveys. These records occurred in spring (April-May) and autumn (August). Most of the records occurred along the Gweebarra Estuary, but there were some records of flightlines over the interior of the site away from the Gweebarra Estuary.

Red Kite was not recorded during the vantage point surveys, but there were single records from around the wind farm site during Golden Eagle and Merlin surveys (both in June 2022).

White-tailed Eagle was recorded on two dates during the vantage point surveys (September 2020 and June 2022). There were additional records during the Golden Eagle surveys, but these were all from EA vantage points that were long distances from the wind farm site.

Hen Harrier was recorded on single dates during vantage point surveys (October 2021) and Merlin surveys (May 2022).

7.3.5.3 Other species

A total of 46 other species were recorded during survey work around the wind farm site (Appendix 7.2). Of these, the only notable species was Snow Bunting, which was recorded at VP1 in November 2021.

7.3.6 Evaluation

7.3.6.1 Potential Important Avian Features

7.3.6.1.1 Whooper Swan

Whooper Swan was mainly recorded in autumn (October-November) with a few records in February and March. All the records involved birds commuting over the site. No Whooper Swans were recorded on lakes within, or around, the site. Small numbers of Whooper Swan have been recorded in other surveys at Finn Lough and Lough Nambraddan, which are both about 3 km south-east of the site. However, there does not appear to be any local Whooper Swan population that regularly uses lakes around the wind farm site, or which commutes across the site.

The flight directions of the birds commuting over the site were generally consistent with southward migration in autumn and northward migration in spring. Therefore, most, or all, of the records probably involved birds on direct migration.

7.3.6.1.2 Red-throated Diver

All lakes within 1 km of the wind farm site were covered by the Red-throated Diver surveys. There were no records of Red-throated Diver from any of these lakes, or records of Red-throated Diver commuting over the site during the vantage point surveys, or records of Red-throated Diver from any of the other surveys carried out around the wind farm site. Therefore, as the wind farm site does not form part of the core range of a resident or regularly occurring Red-throated Diver population, it does not qualify for rating under the NRA evaluation criteria.

7.3.6.1.3 Golden Eagle

A Golden Eagle pair nested at the edge of the wind farm site in 2020, may have nested close to the site in 2021, and attempted to nest close to the site in 2022. The wind farm site was almost wholly contained within the indicative home range of the Golden Eagle pair in 2022.

The total Golden Eagle breeding population in Ireland in 2018 was five pairs. This did not include the Cloghercor pair. While the current population total is not known, a single Golden Eagle breeding pair clearly qualifies for a rating of international importance under the NRA criteria. The open habitats along the southern and eastern margin of the wind farm site are likely to form a significant component of habitat used by this breeding pair.

7.3.6.1.4 Golden Plover (breeding population)

A single pair of Golden Plover were recorded holding territory in the south-eastern corner of the wind farm site in 2020-2022 and can be assumed to have been breeding there. Golden Plover is a very rare breeding species in Ireland. The national population was estimated as 150 pairs by Lauder and Donaghy (2008), with an estimated decline of 73% since 1993. As the breeding population is likely to have continued to decline since 2008, a single breeding pair may now represent 1% or more of the national population. Therefore, the Golden Plover breeding population of the Cloghercor Wind Farm site is assessed as being of international importance.

Golden Plover is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA. However, the Golden Plover breeding pair in the Cloghercor Wind Farm site is outside the SPA. The core foraging range for breeding Golden Plover is defined as 3 km by SNH (2016). The territory of the Golden Plover breeding pair is more than 3 km distant from the nearest section of the SPA. Therefore, this breeding pair does not form part of the Golden Plover Qualifying Interest of the Derryveagh and Glendowan Mountains SPA.

7.3.6.1.5 Merlin

Merlin is an Annex I species. It is a rare breeding species in Ireland with an estimated population in 2008-2011 of 200-400 pairs. It is amber-listed in Ireland due to declines in its breeding range.

No evidence of breeding Merlin was recorded during the Merlin surveys carried out in 2020-2022, and there was a very low incidence of Merlin sightings in the breeding season during vantage point surveys and other surveys carried out around the wind farm site. Merlin is a notoriously difficult species to survey (Lusby *et al.*, 2011). However, it is notable that at the Graffy Wind Farm site, where there was a breeding Merlin pair present, a relatively high incidence of Merlin sightings were recorded during the vantage point survey (RPS, 2021). Therefore, given the level of Merlin survey effort, and the very low incidence of vantage point survey records, it seems unlikely that there are Merlin nesting within, or close to, the Cloghercor Wind Farm site.

Merlin is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA. The foraging range of breeding Merlin is defined as within 5 km by SNH (2016). Around one-third of the wind farm site is within 5 km of the Derryveagh and Glendowan Mountains SPA (excluding the outlying section of the SPA at Lough Finn, which is presumably included for Red-throated Diver not Merlin). There were no breeding season Merlin records within this section of the wind farm site, and the adjoining 500 m buffer. Instead the pattern of the breeding season Merlin records suggest a possible breeding pair somewhere to the south or west of the wind farm site.

A single breeding pair would represent well under 1% of the national Merlin population, but would represent a lot more than 1% of the Donegal population. Therefore, a breeding pair to the south or west of the wind farm site would be of county importance. However, a breeding pair within the Derryveagh and Glendowan Mountains SPA would be of international importance. Therefore, the wind farm site is likely to form part of the foraging range of a Merlin population of county importance, but it is possible that it also forms part of the foraging range of a Merlin population of international importance.

The SNH foraging range of 5 km represents a theoretical area of nearly 80 km^2, while the Merlin foraging habitat within the wind farm site is less than 4 km^2. While not all of the theoretical foraging area will be suitable Merlin foraging habitat, it is clear that the wind farm site only represents a small fraction of the likely foraging range of any Merlin pair breeding in the vicinity.

7.3.6.1.6 Peregrine

Peregrine is an Annex I species. However, it is a widespread species in Ireland with an increasing population and is green-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020). The most recent national survey in 2017 recorded a minimum of 425 occupied sites, which is an increase from 390 in the previous survey (Wilson-Parr and O'Brien, 2018).

There were occasional records of Peregrine during the vantage point surveys. However, no evidence of breeding Peregrine was found in any of the surveys carried out around the wind farm site. There was a suspected nest site recorded in the Golden Eagle surveys around 6 km from the wind farm site. However, the wind farm site is well outside the likely core foraging range of 2 km (SNH, 2016) from this nest site. Similarly, while Peregrine is a Qualifying Interest of the Derryveagh and Glendowan Mountains SPA, no part of the wind farm site is within 2 km of the Derryveagh and Glendowan Mountains SPA.

Therefore, as the wind farm site does not seem to form part of the core range of a resident or regularly occurring Peregrine population, it does not qualify for rating under the NRA evaluation criteria.

7.3.6.1.7 Red Grouse

Red Grouse is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to a greater than 50% long-term decline in its breeding population. The most recent population estimates are of 4,200 adult birds in the Republic of Ireland in 2008 and 202 breeding pairs in Northern Ireland in 2004 (NRGSC, 2013).

Red Grouse were recorded in open bog and heath habitats along the southern margin of the wind farm site in the moorland surveys and other surveys. While the nature of the survey methods do not allow precise population estimates, the total number of birds will have been a lot less than 46 (1% of the national population), but are likely to be more than 1% of the Donegal population. Therefore, the Red Grouse population of the Cloghercor Wind Farm site is assessed as being of county importance.

7.3.6.1.8 Snipe

Snipe is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to large declines in its breeding population. Its breeding population in the Republic of Ireland was estimated as 5,000 pairs in 2008 and it is considered that the population had declined by 50% since 1993 (Lauder and Donaghy, 2008). In Northern Ireland, its breeding population was estimated as 1,123 pairs in 2013, which represented a decline of 80% since 1987 (Colhoun *et al.*, 2015).

Snipe were recorded in the breeding season at several locations around the western section of the wind farm site, as well as in the bog habitat adjacent to the north-eastern boundary of the site. These included records of displaying or chipping birds (behaviours indicating breeding) at three locations around the western section of the site. If all the other records are also considered to represent breeding pairs, the population of breeding Snipe within the wind farm site and its 500 m buffer would be eight pairs. Given the extent of suitable habitat, the overall population in the local area as defined in Figure 7-5, is likely to be multiples of the above figure.

The Irish breeding Snipe population was estimated at around 6,000 pairs in 2008-2013 (see above). While the population may have declined since that estimate, the breeding Snipe population in the local area around the wind farm site is clearly well below the 1% threshold for national importance.

Possible, probable, or confirmed breeding records of Snipe were recorded in 43 hectads in Co. Donegal during the BirdAtlas surveys (including edge hectads with at least 50% of their land area in Donegal). This is around 10% of the Republic of Ireland hectads with Snipe breeding evidence. This would imply, on a pro rata basis, a Donegal breeding population of around 500 pairs of Snipe in 2008. This is likely to be an underestimate of the Donegal breeding population in 2008, as the average Donegal hectad with breeding Snipe is likely to have larger areas of suitable Snipe breeding habitat, than hectads with breeding Snipe in intensively farmed landscapes in the south and east of Ireland. Nevertheless, given the likely continued decline since 2008, the breeding Snipe population within local area around the wind farm site is likely to be more than 1% of the Donegal population. Therefore, the breeding Snipe population of the Cloghercor Wind Farm site is assessed as being of county importance.

7.3.6.1.9 Kestrel

Kestrel is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to large declines in its breeding population. The Republic of Ireland population of Kestrel was estimated at 12,100-21,220 individuals in 2006-2011 (Crowe *et al.*, 2014).

Kestrels were regularly recorded in open habitats around the margins of the wind farm site during the vantage point surveys and other surveys, but there were very few records inside large blocks of forestry. From the distribution patterns and the typical Kestrel territory sizes, the Kestrel breeding population in the wind farm site and its 500 m buffer is likely to have been around 5-10 pairs. Therefore, this population is clearly not of national importance. The total area of the wind farm site and its 500 m buffer is slightly less than 1% of the total land area of Donegal. However, this area does not appear to represent high quality Kestrel habitat as indicated by the absence of Kestrel activity from large parts of the wind farm site, so it is unlikely to hold 1% or more of the Donegal population. Therefore, the Kestrel population of the wind farm site and its 500 m buffer has been evaluated as being of local importance (higher value).

7.3.6.1.10 Teal (breeding population)

Teal is amber-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to moderate declines in its breeding population. The Republic of Ireland population of Teal was estimated at 531-885 pairs in 2008-2011 (NPWS, undated).

Up to four pairs of Teal were recorded breeding within the wind farm site and its 500 m buffer. Therefore, the population is of county importance.

7.3.6.1.11 Sparrowhawk

Sparrowhawk is green-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020). The Republic of Ireland population of Sparrowhawk was estimated at 9,100-14,830 individuals in 2006-2011 (Crowe *et al.*, 2014).

Sparrowhawk were rather sparsely distributed around the wind farm site, with most records associated with more productive agricultural habitats and broad-leaved woodland along the Gweebarra Estuary and around the north-western margins of the wind farm site. From the distribution patterns and the typical Sparrowhawk territory sizes, the Sparrowhawk breeding population in the wind farm site and its 500 m buffer is likely to have been less than five pairs. Therefore, this population is clearly not of national importance. The total area of the wind farm site and its 500 m buffer is slightly less than 1% of the total land area of Donegal. However, this area does not appear to represent high quality Sparrowhawk habitat as indicated by the absence of Sparrowhawk activity from large parts of the wind farm site, so it is unlikely to hold 1% or more of the Donegal population. Therefore, the Sparrowhawk population of the wind farm site and its 500 m buffer has been evaluated as being of local importance (higher value).

7.3.6.1.12 Buzzard

Buzzard is green-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020). The Irish population of Buzzard was estimated at 3,312 pairs by Rooney (2013), with over half the population in Northern Ireland, reflecting the spread of the species from its initial recolonisation. The Irish Buzzard population has continued to rapidly increase and expand its distribution, so its current population is likely to be significantly higher.

The Buzzard distribution was associated with the more productive agricultural habitats and broad-leaved woodland around the north-western margins of the wind farm site. From the distribution patterns and the typical Buzzard territory sizes, the Buzzard breeding population in the wind farm site and its 500 m buffer is likely to have been less than five pairs. Therefore, this population is clearly not of national importance. The total area of the wind farm site and its 500 m buffer is slightly less than 1% of the total land area of Donegal. However, this area does not appear to represent high quality Buzzard habitat as indicated by the absence of Buzzard activity from large parts of the wind farm site, so it is unlikely to hold 1% or more of the Donegal population. Therefore, the Buzzard population of the wind farm site and its 500 m buffer has been evaluated as being of local importance (higher value).

7.3.6.1.13 Common Gull (breeding population)

Common Gull is amber-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to moderate declines in its breeding population. The Republic of Ireland population of Common Gull was estimated at 1,948 pairs in 2015-2018 (Cummins *et al.*, 2019).

Probable breeding by a single pair of Common Gull was recorded at Lough Aneane More in 2020-2022. This represents less than 1% of the national population. The distribution map in Cummins *et al.* (2019) indicates a minimum size of 150 pairs for the Donegal population. Therefore, the Common Gull breeding population of the wind farm site and its 500 m buffer has been evaluated as being of local importance (higher value).

7.3.6.1.14 Lesser Black-backed Gull (breeding population)

Lesser Black-backed Gull is amber-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to its localised breeding population. The Republic of Ireland population of Lesser Black-backed Gull was estimated at 7,112 pairs in 2015-2018 (Cummins *et al.*, 2019).

Lesser Black-backed Gulls were not recorded breeding in any of the lakes within, or around, the wind farm site. However, regular movement corridors across the wind farm site were probably associated with birds commuting from coastal breeding sites to inland feeding areas. Given the typical foraging ranges of Lesser Black-backed Gulls, these birds could have originated from a number of colonies. One of these colonies is a Qualifying Interest of the Inishbofin, Inishdooey and Inishbeg SPA. Therefore, the Lesser Black-backed Gulls commuting across the wind farm site have been given a precautionary evaluation as being part of an internationally important population. However, it should be noted that the mean foraging range from the SPA colony includes over 2,000 km^2 of terrestrial habitat.

7.3.6.1.15 Herring Gull (breeding population)

Herring Gull is amber-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2020) due to moderate declines in its breeding population. The Republic of Ireland breeding population of Lesser Black-backed Gull was estimated at 10,333 pairs in 2015-2018 (Cummins *et al.*, 2019).

Herring Gulls were not recorded breeding in any of the lakes within, or around, the wind farm site. However, a regular movement corridor across the wind farm site were probably associated with birds commuting between coastal breeding sites and the mink farm to the south of the wind farm site. Given the typical foraging ranges of Herring Gulls, these birds could have originated from a number of colonies. Some of these colonies are Qualifying Interests of SPAs.

Therefore, the Herring Gulls commuting across the wind farm site in the breeding season have been given a precautionary evaluation as being part of an internationally important population. Unlike Lesser Black-backed Gulls, Herring Gulls generally do not commute significant distances inland to feed. Therefore, the Herring Gulls commuting across the wind farm site may comprise a more significant part of their source population(s).

7.3.6.1.16 Herring Gull (non-breeding population)

There are no reliable overall estimates of the Irish wintering Herring Gull population, because the waterbird monitoring through the I-WeBS scheme does not effectively cover gull species. However, the mean annual peak of I-WeBS counts in the Republic of Ireland for 2009/10-2015/16 was 11,524 (Lewis *et al*., 2019). The Non-Estuarine Coastal Waterbird Survey, which covers samples of coastal areas not covered by I-WeBS, recorded an all-Ireland total of 19,681 in 2015/16 (Lewis *et al*., 2017). Therefore, allowing for estuarine sites in Northern Ireland, and other sites not monitored by either scheme, the total all-Ireland wintering population is likely to be in excess of 30,000 birds.

A significant level of Herring Gull flight activity was recorded in winter, again mainly associated with the movement corridor to/from the mink farm. The waterbird counts and the vantage point watches in the upper Gweebarra Estuary generally recorded low numbers of Herring Gulls, with occasional records of large flocks. It is likely that the mink farm draws in Herring Gulls from a wide area, and the occasional records of large flocks in the upper Gweebarra Estuary involve birds stopping off while commuting to/from the mink farm.

Adult Herring Gulls tend to remain close to their breeding colonies throughout the year with a median distance of 34 km between breeding and wintering areas in Ireland (Wernham *et al*., 2002). Therefore, some of the Herring Gulls recorded in winter commuting over the Cloghercor Wind Farm site are likely to be associated with local Herring Gull breeding colonies. However, they are also likely to include Herring Gulls that are winter visitors to the area from more distant colonies elsewhere in Ireland, or across the Irish Sea. Therefore, it is not possible to assign the Herring Gulls commuting over the Cloghercor Wind Farm site to a specific population.

7.3.6.1.17 Great Black-backed Gull (breeding population)

Great Black-backed Gull is green-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al*., 2020). The Republic of Ireland breeding population of Lesser Black-backed Gull was estimated at 3,081 pairs in 2015-2018 (Cummins *et al*., 2019).

Great Black-backed Gulls do not nest in lakes in Ireland. The level of flight activity across the site was lower than for Lesser Black-backed Gull and Herring Gull. Nevertheless there is still potential for Great Black-backed Gulls commuting across the western part of the site to/from the mink farm to be linked with coastal breeding colonies. There are no Great Black-backed Gull colonies that are Qualifying Interests of SPAs whose potential foraging range includes the wind farm site. However, some of the colonies have populations of national importance. Therefore, the Great Black-backed Gulls commuting across the wind farm site in the breeding season have been given a precautionary evaluation as being part of a nationally important population.

7.3.6.1.18 Great Black-backed Gull (non-breeding population)

There are no reliable overall estimates of the Irish wintering Great Black-backed Gull population, because the waterbird monitoring through the I-WeBS scheme does not effectively cover gull species. However, the mean annual peak of I-WeBS counts in the Republic of Ireland for 2009/10-2015/16 was 4,010 (Lewis *et al.*, 2019). The Non-Estuarine Coastal Waterbird Survey, which covers samples of coastal areas not covered by I-WeBS, recorded an all-Ireland total of 3,528 in 2015/16 (Lewis *et al.*, 2017). Therefore, allowing for estuarine sites in Northern Ireland, and other sites not monitored by either scheme, the total all-Ireland wintering population is likely to be around, or greater than, 10,000 birds.

A moderate level of Great Black-backed Gull flight activity was recorded in winter, again mainly associated with the movement corridor to/from the mink farm. However, there was only a single record of Great Black-backed Gull from the waterbird counts and vantage point watches in the upper Gweebarra Estuary.

Adult Great Black-backed Gulls tend to remain close to their breeding colonies throughout the year with a median distance of 54.5 km between breeding and wintering areas in Ireland (Wernham *et al.*, 2002). Therefore, some of the Great Black-backed Gulls recorded in winter commuting over the Cloghercor Wind Farm site are likely to be associated with local Great Black-backed Gull breeding colonies. However, they are also likely to include Great Black-backed Gulls that are winter visitors to the area from more distant colonies elsewhere in Ireland, or across the Irish Sea. Therefore, it is not possible to assign the Great Black-backed Gulls commuting over the Cloghercor Wind Farm site to a specific population.

7.3.6.2 Other species

7.3.6.2.1 Waterbirds

Three additional waterbird species (Mallard, Grey Heron and Common Sandpiper) may have local breeding populations within, or in the vicinity of the Cloghercor Wind Farm. However, these are all widespread species and, given the habitat within the wind farm site, and the number of records of these species, the wind farm site is not of significant conservation importance for these species.

There were occasional incidental records of Woodcock during the non-breeding season, and there is likely to be a regular wintering population within the wind farm site. Wintering populations of Woodcock are not considered to be of significant conservation concern, so the importance of the potential Woodcock wintering population is not evaluated here. Breeding Woodcock surveys were not carried out because the wind farm site is outside the main range of the Irish population. In the BirdAtlas 2007-11 surveys (Balmer *et al.*, 2013), there were no breeding records from the hectads around the wind farm site, and, apart from three hectads around Glenveagh National Park, there were no breeding records north-west of a line between Donegal Bay and Lough Swilly.

The other waterbird species recorded away from the Gweebarra Estuary corridor, were only recorded occasionally. Therefore, as the wind farm site does not seem to form part of the core range for populations of these species, they do not qualify for rating under the NRA evaluation criteria.

Apart from the non-breeding Herring Gull and Great Black-backed Gull populations (see above), the waterbird populations along the Gweebarra Estuary corridor did not show any significant interaction with the wind farm site.

7.3.6.2.2 Raptors

The additional raptor species were only recorded occasionally. Osprey is a passage migrant in Ireland, and the records from the wind farm site reflect a pattern of increased frequency of this species in Ireland, associated with the expansion of the British population. The wind farm site is outside the current Irish breeding range of the other three species (Red Kite, White-tailed Eagle and Hen Harrier). Therefore, as the wind farm site does not seem to form part of the core range for populations of these species, they do not qualify for rating under the NRA evaluation criteria.

7.3.6.2.3 Other species

The only other notable species recorded was Snow Bunting. This is a scarce winter visitor to coastal areas in the northern half of Ireland and can also occur in upland areas (particularly on migration). There was only a single record of this species. Therefore, as the wind farm site does not seem to form part of a core range for a populations of this species, it does not qualify for rating under the NRA evaluation criteria.

Whinchat is a rare red-listed summer migrant that was recorded from one of the hectads around the wind farm site in the BirdAtlas 2007-11 surveys (Balmer *et al.*, 2013), and was also recorded at the Graffy Wind Farm site (RPS, 2021). It is associated with lowland wet grassland and upland heaths. The potentially suitable habitat around the Cloghercor Wind Farm site was covered in the moorland surveys and there were no records of Whinchat.

The other species recorded included three red-listed species (Redwing, Grey Wagtail and Meadow Pipit) and ten amber-listed species (Goldcrest, Skylark, Swallow, House Martin, Willow Warbler, Starling, Spotted Flycatcher, Greenfinch, Linnet and Wheatear). However, these are widespread/abundant species, and their amber/red-listing is not relevant to site-scale assessments.

7.3.6.3 Summary

Table 7-6 summarises the evaluation of the conservation significance of the potential Important Avian Features species populations in the Cloghercor Wind Farm site.

Based on the evaluations above, Red-throated Diver and Peregrine are not Important Avian Features and, therefore, do not require detailed impact assessments as per the guidance in the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2019). All the other potential Important Avian Features were confirmed as Important Avian Features and were subject to detailed impact assessments.

The Whooper Swan, Herring Gull (non-breeding) and Great Black-backed Gull (non-breeding) Important Avian Features were not assigned to specific populations for the reasons explained in their species accounts above. Therefore, they have not been given an evaluation as the evaluation method (NRA, 2009) refers to specific populations.

Table 7-6: Evaluation of the conservation significance of the potential Important Avian Features.

Species	International status	National status	Population	Occurrence	Important Avian Feature	Evaluation	
						NRA	Percival
Whooper Swan	Annex I	Amber	Wintering	Migrant crossing the site	Yes	-	
Red-throated Diver	Annex I	Red	-	No records	No	-	-
Golden Eagle	Annex I	Red	Resident	Within home range of 1-2 breeding pairs; one pair nests adjacent / close to the site	Yes	International Importance	High
Golden Plover	Annex I	Red	Breeding	One breeding pair	Yes	International Importance	Medium
Merlin	Annex I	Amber	Breeding	Probably within foraging range of one breeding pair; no evidence of nesting	Yes	County / International Importance	High / Medium
Peregrine	Annex I	Amber	-	Occasional records	No	-	-
Red Grouse	-	Red	Resident	Several breeding pairs in open bog and heath habitats around the site	Yes	County Importance	Medium
Snipe	-	Red	Breeding	Up to eight breeding pairs	Yes	County Importance	Medium
Kestrel	-	Red	Resident	Several breeding pairs in open habitats around the margins of the site	Yes	Local Importance (Higher Value)	Low
Teal	-	Amber	Breeding	Up to four pairs in lakes within and around the site	Yes	County Importance	Medium / High
Sparrowhawk	-	Green	Resident	A few breeding pairs mainly along the Gweebarra Estuary and around the north-western margins of the site	Yes	Local Importance (Higher Value)	Low
Buzzard	-	Green	Resident	A few breeding pairs mainly around the north-western margins of the site	Yes	Local Importance	Low

Species	International status	National status	Population	Occurrence	Important Avian Feature	Evaluation	
						NRA	Percival
						(Higher Value)	
Common Gull	-	Amber	Breeding	One probable breeding pair at Lough Aneane	Yes	Local Importance (Higher Value)	Low
Lesser Black-backed Gull	-	Amber	Breeding	Regular commuting route over the site, probably associated with one or more coastal colonies	Yes	International Importance	Very High
Herring Gull	-	Amber	Breeding	Regular commuting route over the site, probably associated with one or more coastal colonies	Yes	International Importance	Very High
Herring Gull	-	-	Wintering	Regular commuting route over the site	Yes	-	-
Great Black-backed Gull	-	Green	Breeding	Regular commuting route over the site, probably associated with one or more coastal colonies	Yes	National Importance	High
Great Black-backed Gull	-	Green	Wintering	Regular commuting route over the site	Yes	-	-

7.4 POTENTIAL EFFECTS

7.4.1 Impacts on Whooper Swan

As the wind farm site does not form part of the core range of a regularly occurring Whooper Swan population, the only potential impacts that need to be assessed are barrier effects and collision risk.

The wind farm site appears to be on a regular spring and autumn migration route for Whooper Swan.

If barrier effects caused migrating Whooper Swan to divert around the wind farm site, the increase in the distance travelled would be negligible in relation to the total length of their migration route.

The predicted collision risk is around 0.16-0.23 collisions per year, which equals around 6-8 collisions over the 35 year lifespan of the wind farm (Appendix 7.7). This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 1.6). This should be taken into account when comparing this collision risk with collision risks from other wind farm projects (which generally do not include correction for detectability effects). Also, as Whooper Swan migrate by night as well as during the day, the collision risk includes a correction for nocturnal flight activity (which increases the risk by a factor of around 2.5).

As Whooper Swans migrating through Donegal in spring and autumn may be wintering anywhere in Ireland, the only relevant scale at which to consider the significance of the collision risk is the national population. The calculations in Appendix 7.7 indicate that this level of collision risk would cause a negligible increase in annual mortality to the national Whooper Swan population. Note that these calculations overestimate the likely increase as they do not take account of juvenile birds, which have higher annual background mortality rates.

7.4.2 Impacts on Golden Eagle

7.4.2.1 Do-nothing impact

In the absence of any development, the continued occupation of the home range around the wind farm site, and the productivity of the birds occupying the home range will depend upon the management of the open bog and heath habitats, and the frequency of disturbance to nest sites.

The projected growth of the Irish Golden Eagle population under the do-nothing scenario is discussed in Section 7.4.2.6.

7.4.2.2 Construction disturbance

7.4.2.2.1 Construction disturbance to breeding Golden Eagles

Breeding Golden Eagles are considered to be very sensitive to human disturbance, and an incident of nest failure due to disturbance was recorded by the Golden Eagle survey carried out for this project. However, a lot of the information on Golden Eagle sensitivity to disturbance is anecdotal, or based on expert opinion. Also, caution needs to be applied to information from continental Europe or North America: forest nesting Golden Eagles in Europe are likely to be less sensitive than cliff-nesting Golden Eagles in Scotland and Ireland, while

Golden Eagles in North America are likely to be more habituated to disturbance (Goodship and Furness, 2022). Also, there is relatively little information available that is relevant to the potential disturbance impacts from major construction projects, with disturbance from forestry operations and aircraft activity being the closest analogues.

A recent review for NatureScot (Goodship and Furness, 2022) recommended a breeding season buffer zone of 750-1000 m, but stated that "for activities with a high potential for visual and audial disturbance (e.g. forestry operations), a buffer zone ≥1500m may be necessary". Previously, specific guidance documents for activities that are broadly comparable to wind farm construction have recommended a safe working distance of 750-1000 m for forestry operations (Currie and Elliot, 1997; Forestry Commission Scotland, 2006), or a disturbance free zone for forestry operations of 900 to 1100m (Petty, 1998), or safe working distances of 1000 m (lateral) and 500 m (vertical) for aircraft disturbance in Scotland (SNH, 2015).

Of the three nest sites / suspected nest sites recorded around the wind farm site, the 2020 nest site is clearly close enough to be potentially disturbed by wind farm construction work (Table 7-7). The other two sites are well outside any potential disturbance zone. However, there may also be other suitable nest sites that could be occupied in future years within the potential disturbance zone.

Table 7-7: Distances of Golden Eagle nest sites from the wind farm site, the proposed wind farm infrastructure, and the proposed turbine locations.

Nest site	Distance from		
	Wind farm site	Wind farm infrastructure	Turbine locations
2020	20 m	520 m	560 m
2021	1,500 m	5,400 m	6,200 m
2022	400 m	2,800 m	3,500 m

Values are rounded to the nearest 10 m for distances up to 1,000 m, and to the nearest 100 m for larger distances. The distances from the wind farm infrastructure include the met mast its access road.

Construction disturbance could have three types of impacts on nesting Golden Eagles, depending on the timing of the construction work in relation to the Golden Eagle nesting activity.

If construction work begins while Golden Eagles are nesting at a nest site within the potential disturbance zone, then construction disturbance may cause the Golden Eagles to abandon the nest site. As Golden Eagles do not usually make second nesting attempts in the same season, this would result in a reduction in the recruitment of young Golden Eagles to the Irish Golden Eagle population (assuming that the nest would have been successful). Given the small size of the population and its low recruitment rate, this would be a very significant short term negative impact at the international scale. However, given the results of the modelling of the potential impact of operational disturbance (see below), the construction disturbance impact would not be likely to have an adverse effect on the Golden Eagle population trend.

If construction work is ongoing before the Golden Eagles begin their nesting attempt, it may deter them from using the nest site. The impact would then depend on whether the birds could find a suitable alternative nest site that would be as productive as the site that they were displaced from.

Construction work could also deter Golden Eagles from using suitable foraging areas and decrease their likelihood of initiating breeding or breeding successfully.

Breeding Golden Eagles in Scotland may have up to 13 (usually up to six) alternative nest sites in their home range (Hardey *et al.*, 2013). The Golden Eagle pair around the wind farm site have already been documented as using at least two sites, with a third suspected. As this appears to be a newly established home range, there is not a long history of Golden Eagle nesting attempts against which the success rate of different sites can be evaluated. The nesting attempt at the 2020 site was successful, while the nesting attempts at the 2022 site, and probably also the 2021 site, were unsuccessful. There are also likely to be other suitable sites within the home range.

The three nest sites / suspected nest sites were all located in areas with high scores from the Golden Eagle Topography model (GET scores of 7-10). This reflects the fact that the type of topography that produces suitable Golden Eagle nesting habitat has the characteristics required to score highly in the Golden Eagle Topography model. Excluding forestry areas, which are not used for nesting by Golden Eagles in Scotland or Ireland, 32% of the areas of very high quality Golden Eagle topography (GET scores of 9-10), and 28% of the areas of high quality Golden Eagle topography (GET scores of 6-8), in the Golden Eagle home range are within the 1500 m buffer around the wind farm site (Table 7-8). However, some of these areas are unlikely to be affected by construction work: e.g., areas where there are existing regular disturbance sources that are closer than the areas where the construction work will take place, and areas on the southern side of the ridge, where construction work will not be visible and any noise generated will be substantially attenuated by the topography. Also, construction work will be phased, so not all of the 1500 m buffer will be affected at any one time. Therefore, it seems likely that, if construction work causes displacement of the Golden Eagles from a nest site they would have otherwise occupied, they will be able to find a suitable alternative site elsewhere in their home range. The proposed monitoring programme will allow early detection of nest sites and implementation of appropriate mitigation (Section 7.5.1).

Table 7-8: Potential construction displacement impact to potentially suitable topography for Golden Eagle nests.

Suitability	GET scores	Total area in indicative home range (ha)	% in 1.5 km buffer		
			all of buffer	eastern section	eastern section, north of ridge
High	6-8	1,416	28%	18%	5%
Very High	9-10	1,770	32%	25%	13%

The eastern section of the 1.5 km buffer is the section to the east / south of the public road. The eastern section, north of ridge excludes the area to the south / east of the ridgeline between Gafarrettcor and Croaghleheen.

7.4.2.2.2 Construction disturbance to non-breeding Golden Eagles

Golden Eagles are generally considered to be less sensitive to disturbance in the non-breeding season. They use large numbers of roost site. For example, a Scottish study found that two birds used 87 and 120 roosts over the course of a year, although they seemed to favour specific roosts in certain weather conditions (Ford et al., 2019). Therefore, there is less likely to be the same focal activity as when they have an active nest, as they are not constrained by the need to habitually return to a spot, as they would when they are nesting.

The NatureScot review (Goodship and Furness, 2022) recommended a non-breeding season buffer zone of 250-500 m. This is based on disturbance responses to pedestrians and motorised vehicles in North America, rather than comparable activities to wind farm construction in Ireland. However, none of the guidance documents cited above make any reference to buffer zone requirements outside the breeding season, indicating that disturbance in the non-breeding season is not considered to be a significant issue.

7.4.2.3 Displacement (foraging and commuting birds)

7.4.2.3.1 Potential effects

Until recently, there was very limited evidence available about the displacement impacts to Golden Eagles (Humphreys *et al.*, 2015b). There are two Scottish studies, which examined Golden Eagle flight activity before, during and after wind farm construction, but these showed somewhat contrasting results.

Walker *et al.* (2005) reported strong avoidance of a wind farm by a territorial pair in Kintyre, compared to their ranging distribution before construction. However, forest clearance and moorland management to increase prey resources were carried out in areas close to the wind farm, as mitigation for the wind farm. This may have affected the eagles ranging behaviour. They do not report displacement distances. However, they include maps showing the overall distribution of Golden Eagle flight activity in relation to the turbines. In the post-construction map[4], the closest point of the main polygon representing the Golden Eagle flight activity to the turbines is around 250 m.

Haworth Conservation (2015) did not find strong evidence for displacement impacts from the construction of two wind farms on the island of Skye. There was high variability in flight activity patterns and they reported many observations of Golden Eagles flying inside the wind farms. At both wind farms, there were decreases in flight activity within the wind farms during and shortly after the construction period. However, at one of the wind farms, the flight activity recovered within three years of completion of construction work. The maps of the distribution of Golden Eagle flight activity in each year are interpreted by Humphreys *et al.* (2015b) as showing evidence of an initial displacement effect of up to 500 m. This study does not include formal statistical analysis of the data, which makes it difficult to assess the displacement effects due to the high variability in the flight activity patterns.

While the results of these studies may seem contrasting, they highlight the plasticity and variation of responses. Skye is a very densely populated Golden Eagle population, so it would be likely that birds would be more constrained and have less option for avoidance. The pair in the Kintyre study did not have particularly close neighbours and the habitat enhancement likely played a role in their displacement.

Recently, two studies have been published based on a large dataset derived from GPS tracking of dispersing juvenile Golden Eagles in Scotland (Fielding *et al.*, 2021, 2022). These studies modelled the eagles distribution in relation to the topographical suitability, as indicated by the Golden Eagle Topography model, and the presence and operation of wind farms. Fielding *et al.* (2021) examined the distribution patterns before, during and after construction at two wind farm sites, while Fielding *et al.* (2022) examined the distribution patterns across the whole of Scotland. Both studies showed that Golden Eagles largely avoided the interior of the wind farm sites. However, the displacement distance from the outer turbines was small. Fielding *et al.* (2022) reported a modelled displacement distance of 70 m and found that the eagles were closer to the turbines in areas with more suitable topography (higher GET scores). Fielding *et al.* (2021) do not report a displacement distance, but their Figure 2 suggests a displacement

[4] The lower map in their Figure 4.

distance of up to around 200 m in areas with GET scores up to eight, with these distances becoming very small in areas with GET scores of nine or ten.

Fielding *et al.* (2022) note that they may have underestimated the displacement distance, because the pre-operational phase wind farm sites that were used as the before component of their study included an unknown number of sites where construction had started. Similarly, Fielding *et al.* (2021) in citing an earlier version of the displacement distance (75 m instead of 70 m) from Fielding *et al.* (2022), caution that "on a precautionary basis the buffer should be larger" than the cited distance. However, Fielding *et al.* (2022) state that it is likely "that a 500-m displacement distance assumed in Scotland is too precautionary for Golden Eagles, especially when arbitrarily based".

The Fielding *et al.* studies involved dispersing juvenile birds, rather than territorial adults. Displacement effects on adult flight activity may be affected by avoidance of wind farms in selecting nest sites, which is a macro-avoidance effect (SNH, 2010). However, there does not seem to be any compelling reason to expect that behavioural avoidance of wind farms by commuting or foraging birds will be any greater for territorial adults compared to dispersing juvenile birds. Indeed the territorial adults might be expected to habituate over time to the wind farms, unlike juvenile birds dispersing through unfamiliar landscapes.

7.4.2.3.2 Impact assessment

A 600 m buffer around the proposed turbine locations was used to assess the maximum likely displacement impact. This distance was based on the maximum displacement distance of 500 m from the studies reviewed above, plus 100 m to represent the outer edge of the turbine rotation[5]. As noted by Fielding *et al.* (2022), this is likely to result in a very precautionary assessment of the actual displacement impact.

The habitat suitability for Golden Eagles was classified using habitat survey data for the turbine buffer, and CORINE land cover data, which is derived from satellite imagery classification, for the Golden Eagle indicative home range. For the turbine buffer, all open terrestrial habitats, including open habitat within forestry areas, was classified as suitable for Golden Eagles. For the Golden Eagle indicative home range, all terrestrial CORINE land cover types within the indicative home range were classified as suitable for Golden Eagles with the exception of coniferous forest. These two datasets were then intersected with the Golden Eagle Topography model, and the areas calculated for three groupings of GET scores: low – medium suitability (GET scores of 1-5), high suitability (GEST scores of 6-8) and very high suitability (GET scores of 9-10).

The results of this analysis show that even this precautionary definition of the displacement distance would have a small impact on the total availability of suitable Golden Eagle habitat within the Golden Eagle indicative home range (Table 7-9). Also, while Golden Eagles may be completely excluded from the interior of the wind farm, most of the suitable Golden Eagle habitat is in the buffer around the outer edge of the turbines. The displacement impact in this buffer will not be complete exclusion, but, instead, will occur as reduced usage. So even if the 600 m displacement distance was correct, the displacement impact would be significantly less than the percentages in Table 7-9. Therefore, the potential displacement impact will be less than 5% and is a long-term slight negative impact at the international scale.

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[5] The maximum turbine diameter of the turbine models being considered is 164 m.

Table 7-9: Areas of suitable Golden Eagle habitat in the Golden Eagle indicative home range, and in the 600 m buffer around the turbine locations, grouped by topographical suitability for Golden Eagle flight activity..

Suitability	GET scores	Total area in indicative home range (ha)	Area in 600 m buffer	
			ha	%
Low - Medium	1-5	1,269	92	7%
High	6-8	1,416	72	5%
Very High	9-10	1,770	82	5%

7.4.2.4 Displacement and operational disturbance (nest sites)

Operational wind farms could cause displacement impacts to Golden Eagle nest sites through the birds being deterred by the presence of the turbines, or through disturbance to potential nest sites by increased human activity generated by the wind farm.

There does not appear to be any information available about the effects of turbine presence on Golden Eagle nest sites. In general, birds habituate over time to new structures in the landscape, but there does not appear to be any evidence relating to whether such habitation occurs between Golden Eagles and wind turbines. However, the increased human activity generated by wind farms may also cause nesting Golden Eagles to avoid areas close to operational wind farms.

The activity generated by the wind farm will include routine maintenance, occasional repair works to faulty turbines, and increased public recreational activity. The nature of these activity types mean that the generic breeding season buffer distance of 750-1000 m recommended by Goodship and Furness (2022) is applicable, rather than the 1500 m buffer distance used for assessment of construction disturbance.

There is one turbine within 1000 m of the 2020 nest site, while the access road to a second turbine passes within 1000 m of this nest site. The recreation plan includes one trail which passes within 1000 m of the nest site. However, all the proposed wind farm infrastructure and trails are over 500 m from the nest site.

The visibility of the proposed wind farm infrastructure within 1000 m of the 2020 nest site to eagles on the nest site was analysed using the Visibility analysis plug-in in QGIS 3.22.13. People and vehicles on the access road and recreational trail will not be visible to eagles on the nest, due to the topography, although they may be visible to eagles approaching / leaving the nest site, depending on their flight paths. The turbine hub will be just below the viewshed of eagles on the nest site, so the upper half of variable parts of the rotation space of the turbine blades (depending on their angle) will be visible.

The wind farm access roads and trail network will not provide direct access to open ground on the ridge along the southern side of the wind farm.

The proximity of turbines to the 2020 nest site may lead to a reduction in its use if there is a displacement effect. The increase in human activity (particularly during the construction phase) would be likely to reduce the appeal of the 2020 nest site. However, it should be noted that, unlike the disturbance that caused the abandonment of the 2022 nest site, which was in open ground very close to the nest site, all the human activity generated by the wind farm will be within the forest plantation as distances of over 500 m from the nest site.

The potential impact of disturbance to the 2020 nest site during the operational period of the wind farm was assessed by applying the Golden Eagle Population Model (see Section 7.4.2.6 and Appendix 7.8). The disturbance impact was modelled as a worst-case scenario by assuming that every three years during the operational period of the wind farm, one territorial pair of Golden Eagle would fail to breed as a result. The results of the modelling indicated that this impact would reduce the growth rate of the Irish Golden Eagle population by around 0.3% (see Appendix 7.8). This would not be considered to be a significant impact under the criteria applied in Scottish wind farm projects (see Section 7.4.2.6).

7.4.2.5 Barrier effects

Golden Eagles appear to be more or less completely excluded from the interior of wind farm sites (Fielding *et al.*, 2021, 2022), although there may be exceptions (Haworth Conservation, 2015). Therefore, there is potential for the construction of the Cloghercor Wind Farm to cause a barrier to Golden Eagle commuting between the ridge along the southern edge of the wind farm site and suitable habitat on the northern side of the Gweebarra Estuary.

The indicative home range of the Golden Eagle pair in 2022 only extended across the Gweebarra Estuary to the west of the wind farm site. The analysis of Golden Eagle flightlines density indicates that the Golden Eagles use the high ground around Cleengort Hill as a stepping stone to commute across the Gweebarra Estuary. Therefore, the wind farm is not likely to create a significant barrier to this Golden Eagle pair.

There were flightlines recorded in the eastern part of the wind farm site that indicated movement across the Gweebarra Estuary. These may have involved atypical movements by the Golden Eagle pair, birds from other home ranges, or non-territorial birds. However, the analysis of Golden Eagle flightlines density indicates that, in this area, the Golden Eagles normally use the high ground around the eastern side of the wind farm site, outside the proposed locations of the outermost turbines, to commute across the Gweebarra Estuary. Therefore, the wind farm is not likely to create a significant barrier to Golden Eagle movements around the eastern part of the wind farm site.

7.4.2.6 Collision risk

7.4.2.6.1 Collision risk predictions

Two collision risk models were developed to assess the Golden Eagle collision risk: one using altitudinal bands to structure the model, and one using the scores from the Golden Eagle Topography model to structure the model. Various other factors that could influence Golden Eagle flight activity were also considered in developing the collision risk models, but, because there was high collinearity between the relevant explanatory factors, only the above univariate models were developed.

The altitudinal bands model divided the viewsheds into three altitudinal bands: 0-150 m, 160-210 m, and > 210 m. This division was based on the analysis shown in Figure 7-11. The flight activity recorded in each band was used to calculate the collision risk for the turbines located in that band. As no turbines are located in the > 210 m band, the flight activity in this band did not contribute to the collision risk model.

The Golden Eagle Topography bands model divided the viewsheds into three landscape categories: low – medium suitability (GET scores of 1-5); high suitability (GET scores of 6-8); and very high suitability (GET scores of 9-10). The flight activity recorded in each landscape category was used to calculate the collision risk for the turbines located in that landscape category.

The collision risk models included a correction for detectability effects (which increased the risk by a factor of around 1.6). This should be taken into account when comparing this collision risk with collision risks from other wind farm projects (which generally do not include correction for detectability effects).

Variants of the above models were also tried which excluded the 0-250 m distance band around each vantage point and excluded data from 2020 (due to potential avoidance effects; see Section 7.3.2.3). However, these variants did not differ significantly from the base models (see Appendix 7.7).

The collision risks predicted by these models would result in around 1-2 Golden Eagle fatalities over the lifespan of the wind farm (Table 7-10).

Table 7-10: Minimum and maximum Golden Eagle collision risk predictions using collision risk models that were spatially structured by altitudinal band or the Golden Eagle Topography model.

Model	Value type	Turbine	Collisions / year	Collisions / 35 years
Altitudinal bands	min	V150	0.03	1.2
	max	GE164	0.06	2.0
Golden Eagle Topographical model	min	V150	0.04	1.4
	max	GE164	0.07	2.4

Full details of the Golden Eagle collision risk models are included in Appendix 7.7.

7.4.2.6.2 Impact of predicted collision risk on the Irish Golden Eagle population

The Golden Eagle Population Model was used to assess the potential impact of the predicted collision risk on the Irish Golden Eagle population. This model was first developed by O'Toole *et al.* (2002) and subsequently refined by Whitfield *et al.* (2006, 2008) and Haworth Conservation (2010). It uses productivity and survival rates to track the growth of a population until it achieves full occupancy of all available home ranges. It also includes random variation in the population parameters. The model is widely used in Scottish wind farm assessments (e.g., MacArthur Green, 2018, 2021).

For this assessment, a starting population of six pairs was used, based on the population size of five territorial pairs in 2018 (Burke *et al.*, 2020), and the occupancy of a new home range around the wind farm site in 2020-2022. The number of available home ranges was set at 23 (O'Toole *et al.*, 2002). The fledgling rate was set at 0.4, which is the cumulative fledgling rate for home ranges occupied by territorial pairs in Ireland across the years 2008-2018, based on the data in Hillis (2009-2012), Perry (2013), Perry and Newton (2014), Newton (2015, 2016) and Burke *et al.* (2020). No Irish data was available for survival rates, so the values used in Scottish wind farm assessments were used. These were a single value of 0.9512 for adults, and a range of values from 0.25 to 0.45 for juvenile survival to year four (MacArthur Green, 2018, 2021).

The model was run using the worst-case scenario collision rate from the collision risk model of 0.068 collisions / year. To allow for the uncertainty that is inherent collision risk modelling, the model was also run with a precautionary doubling of the above rate. The model was run 1000 times for each scenario tested. The collisions were incorporated in the model in a probabilistic manner: i.e., the collision risk was taken to be the probability of a collision occurring each year. The mean number of collisions across all runs of the model was equivalent to the actual value of the collision rate, but the number of collisions per run varied. This procedure was considered to be a more accurate reflection of the meaning of a collision risk value than applying a fixed collision rate.

The worst-case collision rates caused decreases in the growth rate by about 0.2-0.5 for the predicted collision rate, and 0.5-1.1% for the precautionary doubling of this predicted rate (Table 7-11). Despite these reductions in growth rates, the population still continued to increase under the collision scenarios, except at the lowest juvenile survival rates.

Table 7-11: Results of simulations of the growth of the Irish Golden Eagle population under worst-case collision risk scenarios, compared to the do-nothing scenario.

Juvenile survival rate	Collision rate	Growth rate	Number of territory holding pairs at Year 35	Years to reach favourable conservation status
0.25	0	1.001	6.3	> 100
	0.068	0.996	5.2	-
	0.136	0.990	3.2	-
0.30	0	1.009	8.4	100
	0.068	1.005	7.2	> 100
	0.136	1.000	6.0	> 100
0.35	0	1.017	11.0	56
	0.068	1.014	9.7	63
	0.136	1.009	8.4	71
0.40	0	1.024	14.1	39
	0.068	1.021	12.7	44
	0.136	1.018	11.1	49
0.45	0	1.031	18.0	31
	0.068	1.029	16.4	33
	0.136	1.026	14.7	37

The collision rate of 0.068 is the maximum rate predicted by the collision risk model. The collision rate of 0.136 is a precautionary doubling of that rate to allow for uncertainty in the collision risk model. The growth rates are the mean ratios of population sizes between consecutive years during the lifespan of the wind farm but exclude the first three years as these reflect the starting conditions of the model. Positive growth rates represent population growth and negative rates represent population decline. Favourable condition was defined as 66% occupancy of the available home ranges (Whitfield et al., 2008).

Modelling of the Irish population growth across the period for which data was available (2008-2018) indicated that high juvenile survival rates are required to match the observed increased in the three-year running mean of territory holding pairs (see Appendix 7.8). Therefore, to compare the turbine models that are being considered for this project, the model was run using the 0.40 juvenile survival rate, and the maximum collision rates for each turbine model. There was only a 0.2% difference in growth rates across the turbine models (Table 7-12). It was also notable that the order of the growth rate values and territory holding pairs at Year 35 did not always match the order of the collision rate values. This reflects the random component to the model, which is designed to reflect the stochastic variation in the demographic parameters, as well as the probabilistic method used to simulate collisions. Therefore, these simulations indicate that the small differences in collision risk between the turbine models can be outweighed by the natural variability of the population and stochastic variation in collision rates.

Table 7-12: Results of simulations of the growth of the Irish Golden Eagle population using the maximum collision risks from the various turbine models under consideration, compared to the do-nothing scenario, and with juvenile survival rates of 0.40.

Turbine model	Collision rate	Growth rate	Number of territory holding pairs at Year 35
Do-nothing	0	1.024	14.1
V150	0.040	1.023	13.4
N149	0.042	1.023	13.5
SG155	0.055	1.022	13.3
GE158	0.059	1.022	13.2
E160	0.061	1.022	13.2
V162	0.061	1.022	13.0
N163	0.064	1.022	12.9
GE164	0.068	1.021	12.7

The growth rates are the mean ratios of population sizes between consecutive years during the wind farm lifespan but exclude the first three years as these reflect the starting conditions of the model. Positive growth rates represent population growth and negative rates represent population decline.

7.4.2.6.3 Empirical evidence about Golden Eagle collision risk

Fielding et al. (2022) discuss Scottish observations on Golden Eagle, and other raptor, collision fatalities. They note that, despite the presence of over 1000 territorial Golden Eagles and additional non-territorial birds, and over 20 years of wind farm development including many in Golden Eagle habitat, they are only aware of three recorded Golden Eagle fatalities. While this is known to be an underestimate, they also note that more fatalities have been recorded of other raptors that are less common and less likely to interact with wind farms. The apparently very low collision rates in Scotland, compared to elsewhere (particularly the USA), are likely to reflect the effects of persecution in Scotland that make eagles more wary of human activity, and habitat differences that make wind farms more attractive elsewhere. The latter factor reflects site selection choices that have resulted in the avoidance of wind farm developments in areas of high quality eagle habitat.

The avoidance rate of 99% recommended by SNH (2018) for Golden Eagles is based on data from four wind farms in the USA (Whitfield, 2009). Given the differences discussed above between Scotland and the USA in some factors that may significantly affect Golden Eagle collision risk, avoidance rates based on USA data are likely to be very precautionary in a Scottish context.

Irish Golden Eagles were reintroduced using Scottish stock. The habitats around Irish wind farms are much more similar to those around Scottish wind farms, than to those around wind farms in the USA. Therefore, the collision risk to Golden Eagles in Ireland is likely to be more similar to Scotland than to the USA.

The predicted collision risk for the Cloghercor Wind Farm is 1-2 collisions over 35 years. This compares with only three known Golden Eagle collision fatalities from Scotland, which has an eagle population around two orders of magnitude higher than the Irish population and had

3760 turbines operating in 234 wind farms by 2019 (Fielding et al., 2022). Given the evidence from Scotland discussed above, the predicted collision risk for the Cloghercor Wind Farm is likely to be very precautionary.

7.4.2.6.4 Conclusions

The wind farm design has reduced the Golden Eagle collision risk by placement of all the turbines in forestry habitat, and avoidance of the areas with most suitable topography for Golden Eagle flight activity (areas with high GET scores).

Most of the results from the Golden Eagle Population Models indicate that, with the additional collision mortality, the Irish Golden Eagle population will continue to grow, but at a lower rate. The only scenarios where the additional collision mortality would cause population decreases are when the lowest juvenile survival rates are applied. However, the application of the Golden Eagle Population Model to the recorded growth of the Irish Golden Eagle population indicates that the higher end of the range of juvenile survival rates apply to the Irish Golden Eagle population. Low juvenile survival rates are most likely when there are high levels of persecution. The use of poison baits to control foxes caused some fatalities during the initial reintroduction phase in Ireland, but this practice has now been banned. The absence of intensive grouse management in Ireland means that the persecution risk to Golden Eagles is generally lower than in Scotland.

The Golden Eagle Population Model, or equivalent modelling, does not appear to have been applied to previous Irish wind farm projects. In Scottish wind farm assessments, the test that is applied to the results of Golden Eagle Population Models to assess the significance of the impact of the predicted collision risk is the effect of the additional collision mortality on attaining favourable conservation status. The latter is defined as 66% occupancy of the available home ranges (Whitfield et al., 2008). In the assessments that were available for review (MacArthur Green, 2018, 2021), delays in reaching favourable conservation status of up to seven years were not considered to be a significant impact.

Using the juvenile survival rates that appear to be relevant to the Irish Golden Eagle population, the additional collision mortality would delay the Irish Golden Eagle population reaching 66% occupancy of Irish home ranges by around two-five years under the worst-case collision risk scenario, or six-ten years under precautionary doubling of that collision risk scenario. In comparing, these figures to those quoted for Scottish wind farm assessments above, it should be noted that the latter do not appear to consider uncertainty in the collision risk predictions: i.e., the Golden Eagle Population Models are based on the exact predicted collision risk without any precautionary increase in this figure to allow for uncertainty in the collision risk prediction.

Evidence from Scotland indicates that the 99% avoidance rate used for Golden Eagle collision risk modelling is likely to overestimate the collision risk, so the predicted impacts described above are also likely to overestimate the likely effects on the Irish Golden Eagle population.

7.4.2.7 Cumulative Effects

The relevant scales at which to consider potential cumulative effects to Golden Eagles are the existing distribution of Irish Golden Eagle home ranges, and the potential future expansion of these home ranges over the lifespan of the wind farm project.

There is limited information available on the current distribution of Irish Golden Eagle home ranges. Wilson-Parr and O'Brien (2019) described the home ranges occupied by territorial pairs in 2018 as including South Derryveagh, North Derryveagh / Glenveagh National Park, the

Inishowen Peninsula, the Bluestack Mountains and the Glencolumbkille Peninsula / Slieve Toohey. However, in previous years up to six home ranges have been occupied by territorial pairs and additional home ranges have been occupied by single birds.

7.4.2.7.1 Wind farms (local)

The Loughderryduff Wind Farm is located just outside the western edge of the indicative home range of the Cloghercor Golden Eagle pair. However, this wind farm is in an area of low topographical suitability for Golden Eagle (GET scores of around 3). Golden Eagles were not recorded in bird surveys carried out for the Loughderryduff Wind Farm extension (planning reference 0831039) in 2008. There was a single record in 2016 of a Golden Eagle in the bird surveys carried out for the proposed Mass Wind Farm (planning reference 2251393), which is adjacent to Loughderryduff.

The proposed Graffy Wind Farm (planning reference 2151990) is around 2.5 km to the south-east of the indicative home range of the Cloghercor Golden Eagle pair. There were 19 observations on 16 dates of Golden Eagles in the 500 m buffer around the proposed turbine locations in the bird surveys carried out between 2018 and 2020. No evidence of nesting was recorded around the wind farm site, or in wider hinterland surveys. The Graffy Wind Farm site lies between the Cloghercor and Bluestacks Golden Eagle home ranges.

Both the Graffy Wind Farm and the Maas Wind Farm have been refused planning permission by Donegal County Council. The decisions are currently being appealed to An Bord Pleanála.

7.4.2.7.2 Wind farms (Donegal)

The operational wind farms in the general area of the Golden Eagle home ranges listed by Wilson-Parr and O'Brien (2019) are listed in Table 7-13. This table also includes the Cloghercor home range, as discussed above. The distribution of these wind farms in relation to suitable topography for Golden Eagle flight activity as indicated by the Golden Eagle Topography model is shown in Figure 7-24.

There are operational wind farms in the general area of three of the home ranges listed by Wilson-Parr and O'Brien (2019). However, as detailed information on the extent of these home ranges is not available, it is not possible to assess the actual proximity of the wind farms to the home ranges. In particular, the large number of wind farms listed for the Inishowen Peninsula in Table 7-13 may well overestimate the number of wind farms that are close to the Inishowen Peninsula home range.

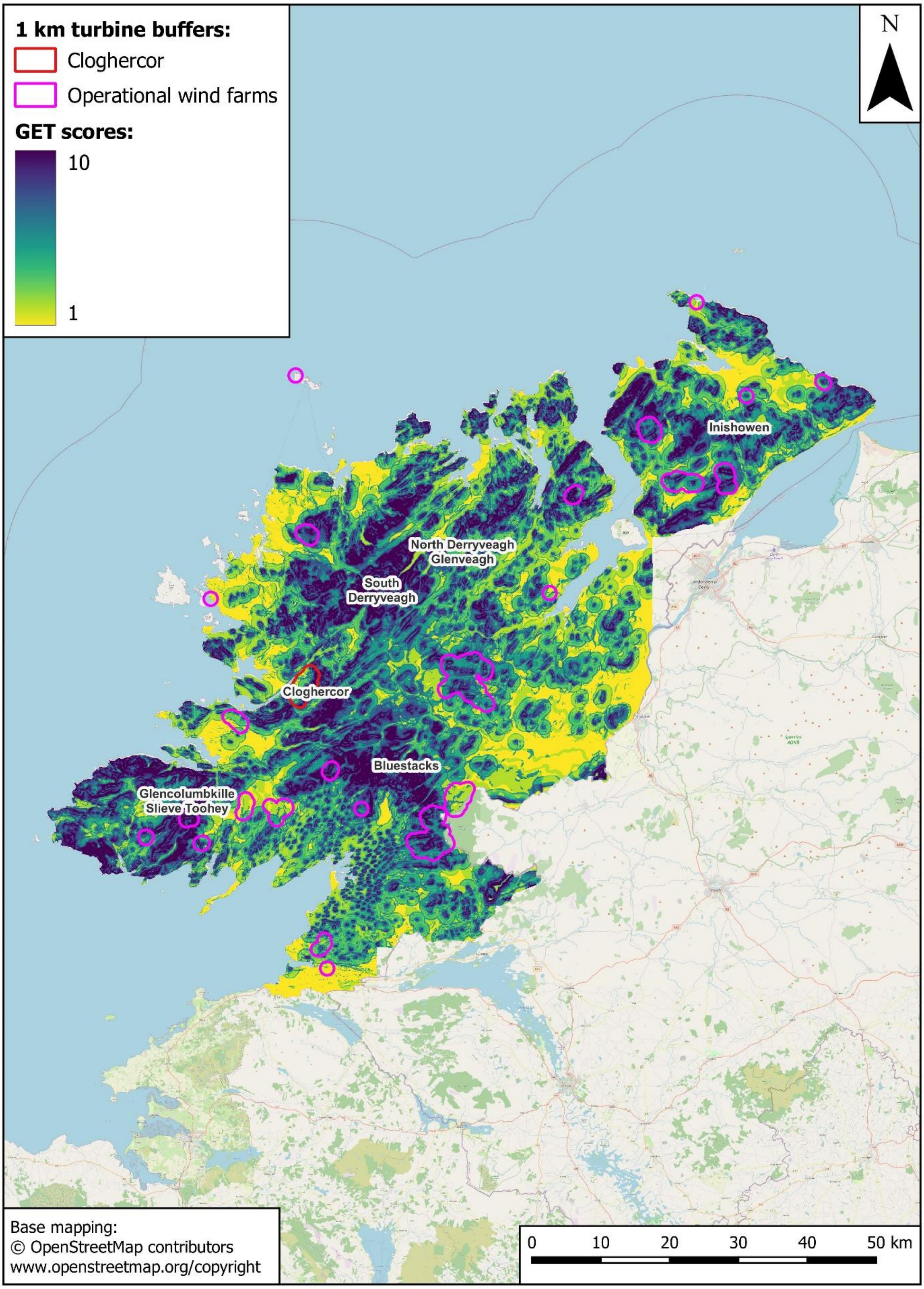

Figure 7-24 - Distribution of operational wind farms in Donegal in relation to suitable topography for Golden Eagle flight activity and general locations of Golden Eagle home ranges.

Table 7-13: Wind farms in the vicinity of the general areas of Golden Eagle home ranges in Donegal.

Home range	Wind farm	Start of operation	Assessment available
Bluestacks	Anarget	2000-2011	no
Cloghercor	Loughderryduff	2008	yes
Glencolumbkille Peninsula / Slieve Toohey	Shannagh (Kilcar)	2010	no
	Meenachullan	2008	no
Inishowen Peninsula	Beam Hill	2006	yes*
	Cooly	2017	yes
	Corvin	2018	yes
	Crockahenny	1998	no
	Drumlough	1997-2011	
	Flughland	2010	no
	Glackmore Hill	2009	no
	Meenaward	2017	no
	Meenkeeragh	2009-2013	no
	Mossedge	2019	no
	Sorne Hill	2006-2009	yes*
	Three Trees	2019	yes
North Derryveagh / Glenveagh National Park	none	-	
South Derryveagh	none	-	

Assessments are Environmental Impact Statements, Environmental Impact Assessment Reports, Environmental Reports, Ecological Impact Assessment Reports, or Ornithological Reports included in the online planning files. An asterisk indicates that the assessment refers to a later extension of the wind farm after its initial development.

Most of the existing wind farms were developed in the 1990s or 2000s, so the ecological assessments would have been carried out before, or at an early stage in the Golden Eagle reintroduction programme. Where ecological assessments were available for review, they generally did not contain any information about Golden Eagles. However, the level of bird survey effort was quite low in some of these assessments.

The Ecological Impact Assessment Report for the Three Trees Wind Farm (planning reference 1651334) refers to Golden Eagles being recorded in surveys for the Mossedge (Aught) Wind Farm extension (planning reference 1170191). The Environmental Impact Statement in the online planning file for the latter appears to have not been fully scanned. The Three Trees Wind Farm report states that “Golden Eagle flightlines were recorded within and immediately north of the wind farm site at Three Trees”. However, the report does not include any specific assessment of potential impacts to Golden Eagles.

There is a current planning application for another wind farm in the Inishowen Peninsula: the Glenard Wind Farm (An Bord Pleanála case reference: PA05E.312659). The Environmental Impact Assessment Report reported a collision risk of 0.02-0.05 collisions/year, with the lower end of the range considered the more accurate estimate. The nearest known Golden Eagle territory was around 13 km from the wind farm site, so disturbance, displacement and barrier effect impacts were assessed as imperceptible.

Overall, there is little information available about Golden Eagle activity at operational wind farms in the general area of their home ranges. Also, for most of these wind farms, any assessments of Golden Eagle activity carried out for these wind farms are not likely to be representative of current levels of activity. However, the distribution of these wind farms in relation to suitable Golden Eagle habitat provides some indication of the likely cumulative effect.

The cumulative total area of suitable Golden Eagle habitat with high, or very high topographical suitability of Golden Eagles within 600 m buffers around the turbines at these wind farms is around 3% of the total area of such habitat in Donegal. This indicates that the cumulative effect of displacement from wind farm development to date in Donegal is not likely to significantly affect the overall availability of suitable Golden Eagle habitat for foraging and commuting Golden Eagles. However, the cumulative effect on actual Golden Eagle home ranges cannot be assessed due to lack of information on such home ranges.

The cumulative total area of suitable Golden Eagle habitat with high, or very high topographical suitability of Golden Eagles within 1 km buffers around the turbines at these wind farms is around 5% of the total area of such habitat in Donegal (Table 7-14). This suggests that the cumulative effect of operational disturbance from wind farm development to date in Donegal is not likely to significantly affect the overall availability of suitable Golden Eagle nesting habitat. However, the cumulative effect on actual Golden Eagle nest sites cannot be assessed due to lack of information on such nest sites.

Table 7-14: Areas of suitable Golden Eagle habitat in Donegal, and in the 600 m and 1000 m buffer around the turbine locations of operational wind farms, grouped by topographical suitability for Golden Eagle flight activity.

Suitability	GET scores	Total area in Donegal (km^2)	Area in 600 m buffer (km^2)	Area in 1000 m buffer (km^2)
Low - Medium	1-5	2,060	34	73
High	6-8	1,252	41	73
Very High	9-10	879	27	49

Suitable Golden Eagle habitat was defined using CORINE landcover mapping and included the following landcover codes: 231, 242, 243, 321, 322, 324, 331, 332, 333, 334, 411, 412, 421.

Collision risk modelling was not generally carried out for wind farm planning applications at the time of the development of most of the existing wind farms in Donegal. This means that it is not possible to carry out an assessment of the cumulative effect of collision risk from the proposed Cloghercor Wind Farm in combination with the collision risk from existing wind farms in Donegal.

7.4.2.7.3 Other developments in the Cloghercor Golden Eagle indicative home range

Most of the planning applications reviewed for this Environmental Impact Assessment Report within a 10 km radius of the wind farm site are small scale residential and rural developments (see Chapter 4).

The planning applications within the Cloghercor Golden Eagle indicative home range are mainly located along existing public roads. The nearest planning applications to the three Golden Eagle nest sites / suspected nest sites are 800-1000 m from the nest sites.

There were planning applications for telecommunication masts on top of Cleengort Hill, which have now been constructed. This is an area where a high density of Golden Eagle flight activity was recorded during the vantage point surveys, so the telecommunication masts do not appear to have influenced the eagles' usage of their home range.

There have been a number of planning applications relating to the water supply infrastructure located in the valley to the north-west of Derkmore Lake and works on upgrading this infrastructure are taking place at the time of writing. These works are over 1.5 km from the nearest Golden Eagle nest site.

7.4.2.7.4 Other cumulative effects

The conservation status of the Irish Golden Eagle population depends on the availability of large areas of open, relatively undisturbed habitats, with sufficient prey resources, and located in areas with suitable topography. The principal influences on the availability of such habitat are agricultural management and afforestation.

7.4.3 Impacts on Golden Plover (breeding population)

7.4.3.1 Do-nothing impact

In the absence of any development, there may be some uncertainty about the continued presence of breeding Golden Plover in the wind farm site. There is only one pair present, and it appears to be isolated from other breeding Golden Plover. Therefore, given the probable continued decline in the Irish Golden Plover population, the long-term persistence of breeding Golden Plover in the wind farm site is uncertain.

7.4.3.2 Construction disturbance

The nearest proposed wind farm infrastructure is over 900 m from the 2022 nest site and from the centroid of the 2020 and 2021 observations. The nearest Golden Plover record in the territory of the breeding Golden Plover pair was around 500 m from the proposed infrastructure, but apart from this record, all the other records were at least 650 m away.

Goodship and Furness (2022) recommended a breeding season buffer zone of 200-500 m. Therefore, construction work is not likely to cause disturbance to the breeding Golden Plover pair.

7.4.3.3 Habitat loss

The only bog/heath habitat that will be removed by the wind farm development is along the access road, which is over 4 km from the territory of the Golden Plover pair. This is outside the likely core foraging range of 3 km, as defined by SNH (2016).

7.4.3.4 Displacement

Pearce-Higgins *et al.* (2009) recorded a 39% reduction in density of breeding Golden Plover within 500 m of turbines, although most of the avoidance probably occurred within 200 m of the turbines. Other studies have reported mixed evidence on the sensitivity of breeding Golden Plover to displacement by turbines.

The nearest turbine is over 1 km from the 2022 nest site location, and over 600 m from the nearest Golden Plover record in the territory of the breeding Golden Plover pair. Therefore, no displacement impacts are likely to occur.

7.4.3.5 Operational disturbance

The nearest proposed trails in the recreation plan are around 1km from the Golden Plover territory, although some informal public access may take place along the access roads to the nearest turbine locations. The wind farm access roads and trail network will not provide direct access to the open ground on the ridge along the southern side of the wind farm, which includes the Golden Plover territory.

7.4.3.6 Collision mortality

In Britain, breeding Golden Plover typically commute from their moorland breeding areas to feed in more productive grasslands. This behaviour does not appear to have been documented in Ireland. Therefore, there is potential for collision risks to arise if the breeding Golden Plover pair commutes across the wind farm site to feed on grasslands along the Gweebarra Estuary.

No evidence of commuting Golden Plover was recorded in the vantage point watches carried out during the likely Golden Plover incubation period. Targeted watches of the Golden Plover breeding area in 2022 indicated that the Golden Plovers were not commuting after every changeover, but instead remaining in the moorland habitat to feed. However, the possibility of some commuting occurring cannot be ruled out.

As no Golden Plover flight activity at potential collision height was recorded, the collision risk from the collision risk model is zero. However, due to the very short time window during which commuting is likely to occur, there is a possibility of flight activity being missed by the vantage point watches. To allow for this possibility, calculations were carried out to assess the implications of a worst-case scenario. This scenario involved the incubating Golden Plovers commuting before/after every changeover to the section of the Gweebarra Estuary within 3 km of the breeding territory, with all flight activity occurring at potential collision height. This would involve four commuting flights per day across the incubation period. Even with this unrealistic worst-case scenario, the collision risk is very low (Appendix 7.7) and would only result in one collision every 50-52 years. It should also be noted that these calculations use the default avoidance rate of 98%, because the guidance (SNH, 2018) does not include species-specific avoidance rates for Golden Plover. However, a review of collision fatality monitoring studies by Gittings (2020) indicated that the non-avoidance rate for wintering Golden Plover is around an order of magnitude higher. If, as seems likely, this also applies to breeding Golden Plover populations, the collision risk from the worst-case scenario would be an order of magnitude lower: i.e., around one collision every 400-500 years.

7.4.3.7 Cumulative effects

No potential impacts to Golden Plover require cumulative assessment.

7.4.4 Impacts on Merlin

7.4.4.1 Do-nothing impact

In the absence of any development, the usage by Merlin of the area around the wind farm site will depend on the condition and management of the open bog and heath habitats. These factors will affect the availability of suitable nesting habitat and prey resources.

7.4.4.2 Construction disturbance

No nesting Merlin were recorded in the wind farm site, or the 500 m buffer around the site.

Apart from a short section of access road, the wind farm infrastructure is located in forestry areas. Therefore, construction disturbance will have negligible impacts on Merlin use of foraging habitat around the wind farm site.

7.4.4.3 Habitat loss

The wind farm will remove around 6 ha of bog and heath habitat. This will have a negligible impact on the availability of Merlin foraging habitat, given a theoretical foraging range for a breeding pair of nearly 80 km^2 (see Section 7.3.6.1).

7.4.4.4 Displacement impacts

Very little is known about the impact of wind farms on Merlin populations (Humphreys *et al.*, 2015c). However, it is generally assumed that they are likely to be sensitive to displacement impacts. All the turbines are located within forestry, so any displacement impacts would only affect marginal areas of bog/heath close to the forest edge. Displacement impacts result in reduced use of the affected areas, not complete exclusion. Given the low level of Merlin activity recorded around the wind farm site, and theoretical foraging range for a breeding pair of nearly 80 km^2 (see Section 7.3.6.1), any displacement impacts are unlikely to significantly affect the availability of a Merlin foraging habitat for a local breeding pair.

7.4.4.5 Collision risk

The predicted collision risk is negligible (less than one collision every thousand years). This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 3.1).

7.4.4.6 Cumulative effects

No potential impacts to Merlin require cumulative assessment.

7.4.5 Impacts on Red Grouse

7.4.5.1 Do-nothing impact

In the absence of any development, the usage by Red Grouse of the area around the wind farm site will depend on the condition and management of the open bog and heath habitats. These factors will affect the availability of suitable nesting habitat and prey resources.

7.4.5.2 Construction disturbance

Pearce-Higgins *et al.* (2012) found a significant reduction in Red Grouse densities at wind farm sites during construction periods. Therefore, Red Grouse appear to be sensitive to disturbance impacts from construction work. However, no construction work will take place in, or near, the areas of bog and heath habitat occupied by Red Grouse around the Cloghercor Wind Farm site.

7.4.5.3 Habitat loss

None of the wind farm infrastructure is located in areas of Red Grouse habitat.

7.4.5.4 Displacement impacts and operational disturbance

Red Grouse do not appear to be sensitive to displacement impacts from wind farms. In a large-scale study across 12 wind farms, Pearce-Higgins *et al.* (2009) did not find any evidence of displacement from turbines, or other wind farm infrastructure. In fact, they found a positive association with tracks, which may have been due to these providing a source of grit to aid with digestion (Douglas *et al.*, 2011). In a follow-up study, at one of the wind farms, Douglas *et al.* (2011) found that Red Grouse densities remained unaffected by displacement impacts three years later. Pearce-Higgins *et al.* (2012) did find reduced densities of Red Grouse during the construction period, but these recovered to the pre-construction levels following the completion of the construction work.

7.4.5.5 Operational disturbance

Development of the recreational trail network has the potential to cause disturbance to ground nesting birds from dogs being walked along the trails. However, all the recreational trails are over 350 m from the open moorland habitat. Therefore, the potential for disturbance to nesting Red Grouse from dogs being walked along the recreational trails is negligible.

7.4.5.6 Collision risk

Red Grouse generally fly at low heights well below the potential collision height zone. Therefore, it is not surprising that no Red Grouse were recorded flying at collision height during the vantage point surveys. This means that the risk of Red Grouse collisions with turbine blades is zero.

Red Grouse are potentially vulnerable to collision with the bases of the turbine towers (Stokke *et al.*, 2020). However, all the proposed turbines at the Cloghercor Wind Farm site will be located within forestry habitat, with the nearest turbines over 100 m from the forest edge. As Red Grouse do not occur within forestry, the risk of collision with turbine towers is effectively zero.

7.4.5.7 Cumulative effects

No potential impacts to Red Grouse require cumulative assessment.

7.4.6 Impacts on Snipe (breeding population)

7.4.6.1 Do-nothing impact

In the absence of any development, the occurrence of breeding Snipe in the area around the wind farm site will depend on the condition and management of the open bog and heath habitats. These factors will affect the availability of suitable nesting habitat and prey resources.

7.4.6.2 Construction disturbance

The infrastructure around the two turbines in the north-east corner of the wind farm site extends to within around 150 m of an area of open bog habitat that held 1-2 pairs of breeding Snipe. Therefore, it is possible that construction work will cause disturbance to Snipe breeding in this area. Under the NRA/EPA criteria, this is a short-term moderate negative impact at the county scale.

7.4.6.3 Habitat loss

None of the wind farm infrastructure is located in areas of Snipe breeding habitat.

7.4.6.4 Displacement

There is limited information available on displacement impacts to Snipe. However, the Pearce-Higgins *et al.* (2009) study found significant displacement impacts with a predicted reduction in breeding density within 500 m of turbines of 47.5% (95% CI: 8.1-67.7%). A further study by Pearce-Higgins *et al.* (2012), which monitored bird usage of wind farms and control sites before, during and after construction, found a 53% reduction in Snipe densities during construction, which persisted into the post-construction period.

The 500 m buffer zone from the two turbines in the north-east corner of the site (T1 and T2) includes most of the low-lying bog which is the potential Snipe breeding habitat in this area. Therefore, there is potential for displacement impacts to cause the loss of 1-2 breeding pairs of Snipe. This would probably represent around 5-10% of the local breeding population, so would be a moderate negative impact at the county scale.

7.4.6.5 Operational disturbance

Development of the recreational trail network has the potential to cause disturbance to ground nesting birds from dogs being walked along the trails. However, the recreational trail in the north-eastern part of the wind farm site is over 350 m from the potential Snipe breeding habitat in the open moorland. Therefore, the potential for dogs being walked along the recreational trails to cause disturbance to nesting Snipe is negligible.

7.4.6.6 Collision risk

There was only a single breeding season record of a Snipe flying at potential collision height during the vantage point surveys. However, vantage point surveys are not considered to provide representative data on Snipe flight activity. Snipe detectability is likely to decline rapidly with distance from the vantage point, and even the correction factors used in the collision risk model are likely to underestimate the detectability effect for Snipe. Also, Snipe have a high level of nocturnal flight activity, which will not be sampled by vantage point surveys.

A review by Humphreys *et al.* (2015d) found very few reported Snipe collision fatalities, although they note that Snipe corpses are likely to be hard to detect so the reported collision fatalities are likely to underestimate that actual collision risk.

The only location where there is likely to be collision risk for breeding Snipe is at the north-eastern edge of the wind farm at turbines T1 and T2. However, the potential displacement impact will reduce the potential collision risk.

Overall, while there is some uncertainty, it seems unlikely that the collision risk to breeding Snipe will be significant, particularly given the likely displacement impact.

7.4.6.7 Cumulative effects

The available information on breeding Snipe for other operational wind farms within Donegal is summarised in Table 7-15.

Breeding Snipe were recorded from four of the eight wind farm sites for which adequate breeding bird survey data is available. There were breeding season records of Snipe from two other sites.

One of the sites where Snipe were not recorded was a repowering project (Cronalaght), so any Snipe potentially breeding in the vicinity may already have been affected by displacement impacts from the existing wind turbines. However, high numbers of breeding Snipe were recorded in the surveys for another repowering project (Barnesmore), and they were recorded as close as 30 m from the existing turbines.

The only assessment of potential displacement impacts was a reduction of 7-22.5% in the local population from the Barnesmore repowering project, although it was considered that there “is considerable evidence of habituation at the site and populations are expected to recover post-construction”.

Table 7-15: Summary of information on breeding Snipe from other wind farms in Donegal.

Wind farm	Planning ref	Survey years	Snipe information
Barnesmore repowering		2017-2018	19 - 31 territories in the 500 m buffers of the existing and proposed turbines. Displacement impact of 7-25% to local population.
Corkermore	1250188	2012	2 breeding season records; no breeding activity recorded
Cronalaght repowering	2250813	2019-2020	Not recorded during breeding season surveys
Culliagh	1260076	2006-2007	Area appears to have relatively high numbers of Snipe and breeding was confirmed
Huntstown	0621459	not known	Breeding pair on cutover bog at Meenacummin
Loughderryduff extension	0831039	2008	One breeding pair recorded
Meenadreen	1250866	2009	One Snipe flushed during breeding bird surveys
Sorne Hill extension	1650335	2013	Not recorded during breeding season surveys

This table only includes wind farms for which sources were available in the online planning file. The sources are the Environmental Impact Statement, Environmental Impact Assessment Report, and / or Ornithology Report submitted for the cited planning reference. The Huntstown Environmental Impact Statement is not included in the online planning file; the information in this table is based on a review in the Environmental Impact Statement for planning reference 0920482. Negative data is only included when there is enough information in the relevant source to assess that an adequate level of breeding bird survey was carried out.

The significance of the cumulative effect of the potential displacement impacts from other wind farms in Donegal, in combination with the potential displacement impact of the Cloghercor Wind Farm, is assessed as a long-term moderate negative effect at the county scale.

The decline of breeding Snipe in Ireland is mainly due to the piecemeal impact of agricultural improvement and afforestation over many years, rather than the effects of large-scale infrastructure projects, such as wind farms. Continuing impacts from agricultural improvement and afforestation will have further impacts on Snipe breeding habitat.

7.4.7 Impacts on Kestrel

7.4.7.1 Do-nothing impact

Areas of pre-thicket forestry provide suitable foraging habitats for Kestrel, while they are generally absent from closed canopy forestry. Therefore, in the absence of the wind farm development, the distribution of Kestrel around the wind farm site may change over time due to the forestry management cycle. However, the influence of forestry management on Kestrel distribution may be relatively minor at this site, as the local Kestrel population seems to be more associated with marginal areas around the western section of the wind farm site.

7.4.7.2 Construction disturbance

Construction work may cause temporary disturbance impacts to Kestrel if there are any nest sites located close to areas where work is taking place. However, as the wind farm site is in an actively managed commercial forest, the local Kestrel population will be habituated to some degree of disturbance. Therefore, any disturbance impacts are likely to be limited to areas in close proximity to the construction works.

7.4.7.3 Habitat loss

Kestrel flight activity was generally associated with open habitats around the margins of the wind farm site, and away from the proposed wind farm infrastructure. Therefore, the habitat loss from the wind farm construction is not likely to affect the availability of Kestrel habitat around the wind farm site.

7.4.7.4 Displacement

Kestrel generally appears to have a low sensitivity to displacement impacts from wind farms. Based on a review of five studies, Madders and Whitfield (2006) classified the sensitivity of Kestrel to displacement as “Low”, while a review of 23 studies by Hötker (2017), found only 35% reporting negative displacement impacts. A large-scale study by Pearce-Higgins *et al.* (2009) compared Kestrel flight activity at 12 wind farms with matched control sites. They did not find any significant effect of turbines on Kestrel flight activity, although there was a significant reduction in flight activity close to tracks. At a Spanish wind farm, Barrios and Rodríguez (2004) found that Kestrel tended to occur closer to turbines than expected. In another Spanish study (Farfán *et al.*, 2009), Kestrel flight activity, compared to pre-construction data, increased significantly in the first year after construction, but then decreased significantly in the following year. An Italian study Campedelli *et al.* (2013) found a significant reduction in Kestrel flight activity during autumn, but not during spring, after construction of a wind farm, with the effect possibly extending 500-1000 m from the turbines. Overall, therefore, the evidence for displacement impacts to Kestrel from wind turbines is weak, with no peer-reviewed study reporting consistent negative impacts, and the large-scale study by Pearce-Higgins *et al.* (2009) not finding any displacement impact. Therefore, construction of the Cloghercor Wind Farm is unlikely to cause displacement impacts to the local Kestrel population.

7.4.7.5 Collision risk

The predicted collision risk is 0.02-0.06 collisions/year, which is around 1-2 collisions over the 35-year lifespan of the wind farm. This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 3.1). This would have a negligible impact on both the Irish and Donegal Kestrel populations (Appendix 7.7).

7.4.7.6 Cumulative effects

No potential impacts to Kestrel require cumulative assessment.

7.4.8 Impacts on Teal (breeding population)

7.4.8.1 Do-nothing impact

The Teal breeding population is associated with various small lakes around the wind farm site. In the absence of any development, these lakes are likely to remain suitable for breeding Teal.

7.4.8.2 Construction disturbance

One breeding pair of Teal occurred at Lough Aneane Beg. This lake is around 250 m from the nearest proposed wind farm infrastructure (the road to turbine T10). Therefore, it is possible that construction work will cause impacts to this breeding pair. The other lakes with breeding Teal are around the western section of the site and are long distances from any proposed wind farm infrastructure.

7.4.8.3 Habitat loss

Construction of the wind farm will not cause the loss of any Teal breeding habitat.

7.4.8.4 Displacement

There does not appear to be any information on the sensitivity of breeding Teal to displacement impacts from wind farm projects. Loesch *et al.* (2013) reported that five other species of dabbling ducks in North America showed 4-56% reductions in breeding densities in two wind farms compared to two paired control sites. However, Hötker (2017) reported that breeding ducks in general appear to have lower sensitivity to displacement impacts with 10 of the 18 studies he reviewed showing a positive response to the presence of turbines (but see Section 7.2.6.5 for the limitations of this review).

In the absence of any firm evidence, a precautionary assessment is that displacement impacts will cause the loss of this breeding pair. This would represent loss of 10-15% of the local breeding population, so would be a moderate negative impact at the county scale.

7.4.8.5 Operational disturbance

Development of the recreational trail network has the potential to cause disturbance to ground nesting birds from dogs being walked along the trails. However, the nearest recreational trail is over 450 m from Lough Aneane Beg. Therefore, the potential for dogs being walked along the recreational trails to cause disturbance to nesting Teal is negligible.

7.4.8.6 Collision risk

There were no records of Teal flying at potential collision height during the vantage point surveys. This may reflect the relative isolation of the breeding habitats, with Teal remaining in these lakes during the breeding season. Therefore, the collision risk to the breeding Teal population is effectively zero.

7.4.8.7 Cumulative effects

Apart from Lough Aneane Beg, breeding Teal were also recorded at three other lakes: Lough Doo, Lough Nacroaghy, and a small upland lake near VP4, and it is likely that they also occur at some of the surveyed lakes in the local area (see list in Section 7.4.11.7). There were no planning applications identified in the review of planning applications close to any of the lakes were breeding Teal were recorded. There was one planning application close to one of the unsurveyed lakes: an application for glamping pods next to Lough Nagarnaman.

Breeding Teal were not recorded at the two proposed wind farms within 20 km of the Cloghercor Wind Farm site: Graffy Wind Farm (planning reference 2151990) and Maas Wind Farm (planning reference 2251393).

There were no records of breeding Teal in the available ecological assessments for other operational wind farms in Donegal, although the bird survey effort in some of these assessments was very limited.

There are 40 lakes in Donegal, which are at least partly within the 500 m buffers around the turbines of operational wind farms. This is around 3% of the total number of lakes in Donegal.

The significance of the cumulative effect of the potential displacement impacts from other wind farms in Donegal, in combination with the potential displacement impact of the Cloghercor Wind Farm, is assessed as a long-term moderate negative effect at the county scale.

7.4.9 Impacts on Sparrowhawk

7.4.9.1 Do-nothing impact

In the absence of any development, the availability and distribution of Sparrowhawk habitat within the wind farm site will change as new habitat is generated by forest maturation and existing habitat is lost by clear-felling.

7.4.9.2 Construction disturbance

Very little Sparrowhawk flight activity was recorded in the eastern section of the wind farm, where all the proposed wind farm infrastructure will be located, apart from the met mast and its access track. The construction period for the latter will be very short (1-2 weeks). Therefore, construction disturbance is likely to have negligible effects on the local Sparrowhawk population.

7.4.9.3 Habitat loss

Very little Sparrowhawk flight activity was recorded in the eastern section of the wind farm, where all the proposed wind farm infrastructure will be located. Therefore, habitat loss is likely to have negligible effects on the local Sparrowhawk population.

Additional clearance of forestry for bat mitigation and to widen the open space corridors along forest roads will remove additional areas of potential Sparrowhawk foraging habitat. However, some of the scrub vegetation that will develop in these areas is likely to provide high quality Sparrowhawk foraging habitat, so the net habitat effect loss will be minor.

7.4.9.4 Displacement

There appears to be little evidence about the potential displacement impacts of wind farms on Sparrowhawk. One study in Italy did not find any significant reduction in Sparrowhawk flight activity following construction of a wind farm (Campedelli *et al.*, 2013). However, there was a reduction in the observation rate in the post-construction period, and the failure to detect a significant effect may be due to limited statistical power of the dataset.

The proposed turbine locations are within forestry habitat, which is potential Sparrowhawk foraging habitat. However, very little Sparrowhawk activity was recorded within the forestry areas around the proposed turbine locations during the vantage point surveys. Therefore, any displacement impacts are not likely to have significant impacts on the availability of Sparrowhawk foraging habitat and would not represent more than a long-term slight negative impact at the local scale.

7.4.9.5 Collision risk

The predicted collision risk is 0.02-0.04 collisions/year, which is around one collision every 24 years). This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 3.1). This would have a negligible impact on both the Irish and Donegal Sparrowhawk populations (Appendix 7.7).

7.4.9.6 Cumulative effects

No potential impacts to Sparrowhawk require cumulative assessment.

7.4.10 Impacts on Buzzard

7.4.10.1 Do-nothing impact

Buzzards generally forage in open habitats but will often nest within closed canopy woodland or forestry, but not within large blocks of these habitats. Therefore, in the absence of any development, the availability and distribution of Buzzard foraging habitat within the wind farm site will change as new habitat is generated by clear-felling and existing habitat is lost by forest maturation. The effects on the availability of nesting habitat will be more complex.

7.4.10.2 Construction disturbance

Very little Buzzard flight activity was recorded in the eastern section of the wind farm, where all the proposed wind farm infrastructure will be located, apart from the met mast and its access track. The construction period for the latter will be very short (1-2 weeks). Therefore, construction disturbance is likely to have negligible effects on the local Buzzard population.

7.4.10.3 Habitat loss

Very little Buzzard flight activity was recorded in the eastern section of the wind farm, where all the proposed wind farm infrastructure will be located. Therefore, habitat loss is likely to have negligible effects on the local Buzzard population.

7.4.10.4 Displacement

There is mixed evidence about the displacement impacts of wind farms to Buzzard. Based on a review of six of studies Madders and Whitfield (2006) classified the sensitivity of Buzzard to displacement as “Low-Medium”, indicating uncertainty about the exact level of sensitivity. A large-scale study by Pearce-Higgins *et al.* (2009) compared Buzzard flight activity at 12 wind farms with matched control sites. They found a 41.4% reduction in flight activity within 500 m of turbines, with 95% confidence intervals of 16.0-57.8%. Another study by Campedelli *et al.* (2013) found a significant reduction in Buzzard flight activity after construction of a wind farm, with the effect possibly extending 500-1000 m from the turbines. In contrast, a review of 24 studies by Hötker (2017), found approximately equal numbers reporting negative and neutral/positive displacement impacts. However, no details about the studies included in the review are provided.

The proposed turbine locations are within forestry habitat. Closed-canopy forestry is largely avoided by Buzzards, but pre-thicket forestry is suitable Buzzard foraging habitat. However, very little Buzzard activity was recorded within the forestry areas around the proposed turbine locations during the vantage point surveys. Therefore, any displacement impacts are not likely to have significant impacts on the availability of Buzzard foraging habitat and would not represent more than a long-term slight negative impact at the local scale.

7.4.10.5 Collision risk

The predicted collision risk is 0.07-0.1 collisions/year (around one collision every 8-24 years). This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 2.6). This collision risk would have a negligible impact on both the Irish and Donegal Buzzard populations (Appendix 7.7).

7.4.10.6 Cumulative effects

No potential impacts to Buzzard require cumulative assessment.

7.4.11 Impacts on Common Gull

7.4.11.1 Do-nothing impact

One probable breeding pair of Common Gull occurred at Lough Aneane More. In the absence of any development, this lake is likely to remain suitable for breeding Common Gull.

7.4.11.2 Construction disturbance

Lough Aneane More is around 75 m from the nearest proposed wind farm infrastructure (the road to turbine T10). Therefore, it is possible that construction work will cause disturbance impacts to Common Gull breeding at this lake. This would be a moderate-significant short-term negative impact at the local scale.

7.4.11.3 Habitat loss

Construction of the wind farm will not cause the loss of any Common Gull breeding habitat.

7.4.11.4 Displacement

There appears to be very little information on the sensitivity of breeding Common Gulls to displacement impacts from wind farm projects. Hötker (2017) reported that in 6 of the 9 studies he reviewed, Common Gulls showed a negative response to the presence of turbines (but see Section 7.2.6.5 for the limitations of this review).

In the absence of any firm evidence, a precautionary assessment is that displacement impacts will cause the loss of the Common Gull breeding pair at Lough Aneane More. As the local breeding Common Gull population is likely to be very small, this a significant long-term negative impact at the local scale.

7.4.11.5 Collision risk

The predicted collision risk is 0.02-0.09 collisions/year (around one collision every 11-41 years). This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 3.1). This collision risk would have a negligible impact on both the Irish and Donegal Common Gull populations (Appendix 7.7).

7.4.11.6 Operational disturbance

Development of the recreational trail network has the potential to cause disturbance to ground nesting birds from dogs being walked along the trails. The nearest recreational trail is around 200 m from Lough Aneane More. However, this trail gives access to the hardstanding around turbine T11, which is one higher ground overlooking the lake, and extends to within 80 m of the shoreline of the lake. As this will provide an attractive viewpoint, it seems likely that users of the recreational trail will access this area, and dogs may run down from the hardstanding to the lake shore. Therefore, it is possible that dogs being walked along the recreational trail will cause disturbance to the Common Gull pair nesting on Lough Aneane More (assuming that they have not been displaced; see above). As the local breeding Common Gull population is likely to be very small, this a significant long-term negative impact at the local scale.

7.4.11.7 Cumulative effects

The Common Gull breeding population was evaluated as being of local importance (higher value). Therefore, the relevant scale for the cumulative assessment is the local area. This has been taken to be the range of hills from Meenalargan Hill to Croaghleheen (see Figure 7-5).

The only breeding Common Gulls recorded within this local area were at Lough Aneane More. However, there are some lakes in the local area that were not covered by the breeding gull surveys (because they were more than 2 km from the wind farm site). These included Lough Drumaneany and other small lakes to the east of the R252), and Lough Laragh, Lough Nagarnaman and the Black Loughs in the western part of the local area.

Common Gulls were recorded commuting past the proposed Maas Wind Farm (planning reference 2251393), but no evidence of breeding was recorded. There were no records of Common Gull from the proposed Graffy Wind Farm (planning reference 2151990).

There is a planning application for glamping pods next to Lough Nagarnaman (ref 2151918). Apart from that application, there are no other planning applications included in the review of planning applications close to any of the lakes mentioned above.

The significance of the cumulative effect of the potential displacement impacts from other wind farms developments, in combination with the potential displacement impact of the Cloghercor Wind Farm, is assessed as significant long-term negative effect at the local scale.

7.4.12 Impacts on Lesser Black-backed Gull

Lesser Black-backed Gulls were only recorded commuting over the wind farm site, so the only relevant potential impacts are barrier effects and collision risk.

7.4.12.1 Barrier effects

A Lesser Black-backed Gull commuting route passes through the middle of the wind farm site. If Lesser Black-backed Gull are sensitive to barrier effects, the wind farm development could prevent Lesser Black-backed Gulls from using this commuting route. However, Lesser Black-backed Gull are considered to have low sensitivity to barrier effects (Humphreys *et al.*, 2015a). At a breeding colony in Belgium, Lesser Black-backed Gulls were observed regularly flying between onshore turbines on their commuting routes to/from their offshore feeding areas (Everaert *et al.*, 2003). Furthermore, the commuting route across the wind farm site is unlikely to be used by significant numbers of Lesser Black-backed Gulls from their source colonies. Therefore, the risk of barrier effects from the wind farm development to commuting Lesser Black-backed Gull is low, and, any effects that did occur, would be unlikely to have a high magnitude impact.

7.4.12.2 Collision risk

The predicted collision risk is 0.03-0.05 collisions/year (around one collision every 22-32 years). This collision risk includes a correction for detectability effects (which increases the risk by a factor of around 2.6). This collision risk would have a negligible impact on the Irish Lesser Black-backed Gull population (Appendix 7.7).

The predicted collision risk could cause an increase of 0.1-1.0% in annual mortality to the Donegal population (Appendix 7.7). Therefore, allowing for uncertainty in the predicted collision risk, the potential increase in annual mortality to the Donegal population could exceed the 1% threshold that Percival (2003) suggested for determining whether the impact is non-negligible. However, the calculated increase in annual mortality is likely to be a substantial overestimate, as the figure used for the Donegal population is a minimum from a wide range. Secondly, as discussed above (Section 7.2.6.10), the 1% threshold is very conservative, and an increase substantially greater than 1% is likely to be required to have a significant impact. Thirdly, the figures used for the Donegal population are based on the maxima and minima of the range of population sizes of the colonies mapped by Cummins et al. (2019). The potential increases in annual mortality only approach 1% when the minimum population sizes for all the colonies are used. Therefore, based on these factors, the potential increase in annual mortality to the Donegal population is not likely to be significant.

The potential impact of the predicted collision risk on Lesser Black-backed Gull Qualifying Interests of SPAs within the mean maximum Lesser Black-backed Gull foraging range distance of the Cloghercor Wind Farm is assessed in the Natura Impact Statement.

7.4.12.3 Cumulative effects

The potential cumulative effect of collision mortality from the Cloghercor Wind Farm, in combination with other wind farms, to the to Lesser Black-backed Gull colony in the Inishbofin, Inishdooey and Inishbeg SPA is assessed in the Natura Impact Statement and was not considered to be significant. Based on the population sizes of the colonies mapped by Cummins et al. (2019), the Inishbofin, Inishdooey and Inishbeg colony only comprises around 20% of the Donegal population. Therefore, it follows that if the cumulative impact to the Inishbofin, Inishdooey and Inishbeg colony is not significant, the cumulative effect to the Donegal population will not be significant.

7.4.13 Impacts on Herring Gull

Herring Gulls were only recorded commuting over the wind farm site, so the only relevant potential impacts are barrier effects and collision risk.

7.4.13.1 Barrier effects

A Herring Gull commuting route passes over the wind farm site. The main corridors of flight activity are along the valley between the eastern and western sections of the site, and to the west of Derkbeg Hill at the western end of the site. These corridors avoid the proposed turbine locations. Therefore, the wind farm development will not cause any barrier impacts to commuting Herring Gulls.

7.4.13.2 Collision risk

The predicted collision risk in the breeding season is 0.01-0.02 collisions/year (around one collision every 67 years). The predicted collision risk in the non-breeding season is 0-0.02 collisions/year (up to one collision every 50 years). These collision risks include corrections for detectability effects (which increase the risks by factors of around 2.6). These collision risks would have negligible impacts on the Irish and Donegal breeding populations (Appendix 7.7). As the non-breeding populations are larger (see Section 7.3.6.1), the impacts on them would also be negligible.

The potential impact of the predicted collision risk on Herring Gull Qualifying Interests of SPAs within the mean maximum Herring Gull foraging range distance of the Cloghercor Wind Farm is assessed in the Natura Impact Statement.

7.4.13.3 Cumulative effects

No potential impacts to Herring Gull require cumulative assessment.

7.4.14 Impacts on Great Black-backed Gull

Great Black-backed Gulls were only recorded commuting over the wind farm site, so the only relevant potential impacts are barrier effects and collision risk.

7.4.14.1 Barrier effects

Commuting Great Black-backed Gulls were recorded over the wind farm site. Unlike Herring Gull, the Great Black-backed Gull flightlines were widely distributed across the wind farm site. Therefore, if Great Black-backed Gulls are sensitive to barrier effects, the wind farm development could prevent Great Black-backed Gulls from using this commuting route. However, Great Black-backed Gulls are considered to have low sensitivity to barrier effects (Humphreys *et al.*, 2015a).

Great Black-backed Gulls do not generally commute inland to feed. Therefore, while there were some Great Black-backed Gull flightlines over the eastern section of the site, the only likely focus of Great Black-backed Gull activity in the area is the mink farm. Development of the wind farm will not interfere with potential commuting routes to/from the mink farm. Therefore, the wind farm development is not likely to cause significant barrier impacts to commuting Great Black-backed Gulls.

7.4.14.2 Collision risk

The predicted collision risk to Great Black-backed Gull during the breeding season is 0.0004-0.003 collisions/year (up to one collision every 300 years). The predicted collision risk to Great Black-backed Gull during the non-breeding season is 0.006-0.009 collisions/year (up to one collision every 100 years). These collision risks include corrections for detectability effects (which increase the risks by factors of around 2.6). These collision risks would have negligible impacts on the Irish and Donegal breeding Great Black-backed Gull populations (Appendix 7.7). As the non-breeding populations are larger (see Section 7.3.6.1), the impacts on them would also be negligible.

7.4.14.3 Cumulative effects

No potential impacts to Great Black-backed Gull require cumulative assessment.

7.4.15 Impacts on other species

The other bird species recorded in the survey work carried out for this assessment are not considered to have populations of conservation significance with the potential for significant interaction with the wind farm site. Therefore, these species were not identified as Important Avian Features. As these species do not have populations of conservation significance in the vicinity of the wind farm site, they are not potentially sensitive to disturbance or displacement impacts from the wind farm.

The predicted collision risk to the other species that were recorded flying at potential collision height during the vantage point surveys is shown in Table 7-16. All these collision risks included corrections for detectability effects, which increased the predicted collision risks by the correction factors shown in Table 7-16. The effect of the correction factors can be seen by multiplying the years / collision by the relevant factor: e.g., without the correction factor, the collision risk for White-tailed Eagle would result in one collision every 80 years.

The upper range of the collision risk predictions for White-tailed Eagle would result in one collision over the 35-year lifespan of the wind farm. The White-tailed Eagle collision risk was generated by flight activity in the western section of the wind farm site. While no turbines will be located in this section of the wind farm site, this flight activity was included due to the precautionary approach that was used for the collision risk modelling (see Appendix 7.7).

All the other predicted collision risks would result in less than one collision over the 35-year lifespan of the wind farm.

Table 7-16: Predicted collision risk to non-Important Avian Feature species recorded flying at potential collision height.

Species	Detectability correction factor	Collisions/year	Years /collisions
Barnacle Goose	2.6	0.0005	2,000-2,200
Mallard	3.1	0.006 - 0.01	83 - 170
Cormorant	2.6	0 - 0.006	≥ 160
Grey Heron	1.6	0.02	44-50
White-tailed Eagle	1.6	0.02-0.03	35-44
Osprey	2.6	0.005 - 0.01	90 - 190
Peregrine	3.1	0.003	290-320

The detectability correction factors are the mean of the weighted viewshed area divided by the actual viewshed area for each vantage point, and represent the increase in the calculated collision risk, compared to a collision risk calculated without any correction for detectability effects. The collisions/year and years/collisions are shown as ranges when there were differences in the maximum and minimum calculated collision risks at a precision level of one significant figure (collisions/year) or two significant figures (years/collisions). The minimum collision risk for Cormorant was zero, so the years/collision is shown as ≥ the reciprocal of the maximum collision risk. See Appendix 7.7 for full details.

7.4.16 Other impacts

Road widening along the turbine delivery route will cause minor impacts to roadside habitats at various locations along the turbine delivery route. None of the affected areas are of potential importance for bird populations of conservation importance.

If replacement of turbine blades is required during the operational phase, the work would take approximately one month on-site with the work occurring intermittently throughout that month and likely intensifying for one week where the majority of the changeover work would take place. The work would be localised to a specific turbine. Any impacts from replacement of turbine blades would similar in nature to the construction phase impacts but much smaller in magnitude.

The main impacts of decommissioning will be positive, as the cessation of operation of the turbines will remove the collision risk. There may also be some minor positive impacts from restoration of habitats, while there may be some temporary negative impacts from disturbance during the decommissioning works.

7.4.17 Impact assessment summary

The significance of the predicted impacts, including cumulative impacts where relevant, to the Important Avian Features is summarised in Table 7-17.

Table 7-17: Summary of the assessment of the predicted impacts (before mitigation) to the Important Avian Features.

Category	KAR	Evaluation	Impact significance					
			Construction disturbance	Habitat loss	Operational disturbance	Displacement	Barrier effects	Collision risk
Annex I species	Whooper Swan	-	-	-	-	-	imperceptible	not significant
	Golden Eagle	International Importance	very significant*	imperceptible	very significant*	slight	slight	not significant
	Golden Plover	International Importance	neutral	neutral	-	neutral	-	not significant
	Merlin	County / International Importance	very slight	imperceptible	-	slight	-	not significant
Red-listed species	Red Grouse	County Importance	imperceptible	neutral	-	neutral	-	not significant
	Snipe	County Importance	moderate	neutral	-	moderate	-	not significant
	Kestrel	Local Importance (Higher Value)	slight	very slight	-	neutral	-	not significant
Other species	Teal	County Importance	moderate	neutral	-	moderate	-	not significant
	Sparrowhawk	Local Importance (Higher Value)	slight	very slight	-	slight	-	not significant

Category	KAR	Evaluation	Impact significance					
			Construction disturbance	Habitat loss	Operational disturbance	Displacement	Barrier effects	Collision risk
Other species	Buzzard	Local Importance (Higher Value)	slight	very slight	-	slight		not significant
	Common Gull	Local Importance (Higher Value)	moderate-significant	neutral	-	significant	-	not significant
	Lesser Black-backed Gull	International Importance	-	-	-	-	slight	not significant
	Herring Gull (breeding)	International Importance	-	-	-	-	very slight	not significant
	Herring Gull (non-breeding)	-	-	-	-	-	very slight	not significant
	Great Black-backed Gull (breeding)	National Importance	-	-	-	-	slight	not significant
	Great Black-backed Gull (non-breeding)	-	-	-	-	-	slight	not significant

Barrier effects only assessed for Whooper Swan, Golden Eagle, Lesser Black-backed Gull, Herring Gull and Great Black-backed Gull (see Section 7.2.6.6). Collision risk significance assessed at the national scale for Whooper Swan and at the county scale for Kestrel , Sparrowhawk, Buzzard, Herring Gull (non-breeding) and Great Black-backed Gull (non-breeding).

* The construction and operational disturbance impacts for Golden Eagle refers to scenario where disturbance causes failure of a nesting attempt, and is a short-term impact. The modelling results indicate that these disturbance impacts would not have significant effects on the long-term population trends.

7.5 MITIGATION MEASURES

7.5.1 Construction disturbance mitigation

Breeding bird surveys will be carried out in the breeding season preceding the start of construction, and in every subsequent breeding season across the duration of the construction period. These surveys will include Golden Eagle surveys, Merlin surveys and moorland surveys. If nesting Golden Eagle, Merlin, or Golden Plover are found, no construction work will occur within the following specified distances of their nest sites, or centre of territory until the breeding attempt has been completed: i.e., the young have fledged, or the nest has failed. The distances are: 1.5 km for Golden Eagle; 500 m for Merlin; and 500 m for Golden Plover.

7.5.2 Mitigation of operational disturbance to breeding Golden Eagles

Breeding Golden Eagle surveys will be carried out annually to identify any occupied nest sites within 1 km of the wind farm infrastructure. If any such nest sites are identified, public access to any recreational trails and access tracks within 1 km of the nest site will be closed. Access to these sections of the wind farm for operational purposes will be restricted as far as possible.

7.5.3 Mitigation of displacement impacts to Golden Eagles

A Golden Eagle habitat management plan will be implemented to compensate for the potential displacement impacts to Golden Eagles (see Appendix 7.9). This will take place outside the wind farm site. On site mitigation is not desirable as this may attract eagles closer to the turbines and increase the collision risk.

The lands included in the Golden Eagle habitat management plan, comprise 252 ha of mainly open lands, including around 170 ha of bog and heath habitats (Figure 7-25). These lands are located in a to the west of the wind farm site and are over 5 km from the nearest proposed turbine location. They are entirely contained within the indicative home range of the Cloghercor Golden Eagle pair, and are close to the 2021 suspected nest site, and the 2022 nest site. Management agreements have been secured for all the lands included in the management plan.

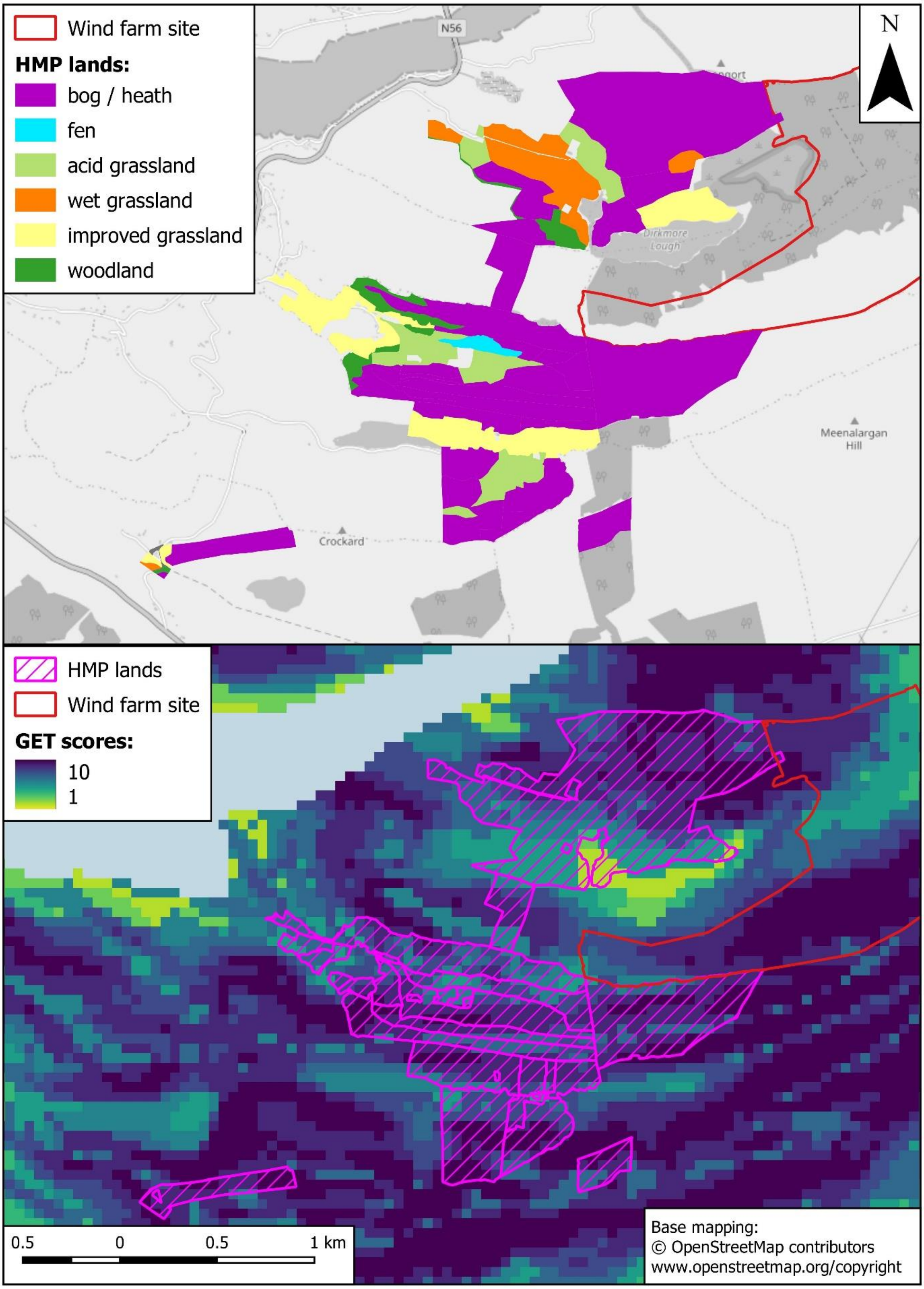

Figure 7-25 - Golden Eagle Habitat Management Plan lands.

The habitat composition of the Habitat Management Plan lands is compared to that of the lands affected by the potential displacement impact in Table 7-18. The overall area of open land is similar. However, around 40% of the open land included in the potential displacement impact comprises rides and small clearings within the forest plantation. The potential displacement impact only includes around 158 ha of open land on the ridge above the forest plantation, compared to around 240 ha of open land in the Habitat Management Plan lands.

The suitability of the topography for Golden Eagle flight activity in the Habitat Management Plan lands is compared to that of the lands affected by the potential displacement impact in Table 7-19. Most of the topography in the Habitat Management Plan lands has high, or very high, suitability. The lands affected by the potential displacement impact on the ridge above the forest plantation include 127 ha with high, or very high, suitability, compared to 229 ha in the Habitat Management Plan lands.

Table 7-18: Comparison of the habitat composition of the lands affected by the potential displacement impact with the habitat composition of the lands included in the Golden Eagle Habitat Management Plan.

Habitat	Potential displacement impact (ha)		Golden Eagle Habitat Management Plan (ha)
	all	ridge	
Forest / woodland	904	2	9
Bog / heath	237	152	172
Acid grassland	0	0	23
Wet grassland	1	0	17
Improved grassland	0	0	30
Other open habitats	12	6	0

The potential displacement impact is shown for all lands within the 600 m buffer of the turbines, and for the open land on the ridge along the southern /eastern boundary of the wind farm site outside the forest plantation.

Table 7-19: Comparison of the suitability of the topography for Golden Eagle flight activity in the lands affected by the potential displacement impact and the lands included in the Golden Eagle Habitat Management Plan.

Suitability	GET score	Potential displacement impact (ha)		Golden Eagle Habitat Management Plan (ha)
		all	ridge	
Low – Medium	1-5	585	34	24
High	6-8	398	46	99
Very High	9-10	182	81	130

The potential displacement impact is shown for all lands within the 600 m buffer of the turbines, and for the open land on the ridge along the southern / eastern boundary of the wind farm site outside the forest plantation.

The objective of the habitat management plan will be to enhance populations of Red Grouse and Irish Hare, which are key prey resources for the Irish Golden Eagle population. These are based on reviews of the relevant scientific literature (see Appendix 7.9). A lot of the work will be focussed on increasing heather cover and improving the condition of the heather in the bog / heath and acid grassland habitats. These measures will be benefit both Red Grouse and Irish Hare. However, additional measures will be implemented in the wet grassland and improved grassland habitat to improve the habitats for Irish Hares.

The outline habitat management plan in Appendix 7.9 includes details of the range of management measures that will be available to be implemented. A bespoke habitat management plan will be prepared for each landholding, which will select the relevant measures that are applicable to the land, based on the habitats present and their condition.

7.5.4 Mitigation of operational disturbance to breeding Common Gulls

There is potential for dogs being walked along the recreational trails to cause disturbance to the Common Gulls nesting on Lough Aneane More. Therefore, dog-proof fencing will be installed along the section of the recreational trail close to Lough Aneane More and around the hardstanding of turbine T11. This fencing will be inspected in April each year (before the Common Gull breeding season) and any necessary repairs made.

7.5.5 Mitigation of replacement of turbine blades

If replacement of turbine blades is required during the operational phase, the following mitigation protocol will be followed to prevent disturbance to sensitive species:

(1) If the work will take place during the Golden Eagle breeding season (January-August), the results of the annual Golden Eagle breeding surveys (see Section 7.5.2) will be reviewed to assess whether there is potential for disturbance impacts to occupied Golden Eagle nest sites. If the available information is inconclusive, additional Golden Eagle surveys will be carried out.

(2) If the work will take place during the Golden Plover or Merlin breeding seasons (April-July), surveys will be carried out of the 500 m buffer around the turbine location to locate any Golden Plover breeding territories, or Merlin nest sites.

(3) If active Golden Eagle or Merlin nest sites, or occupied Golden Plover breeding territories, are present within the relevant buffer distances (1.5 km for Golden Eagle, 500 m for Merlin, and 500 m for Golden Plover), no work will take place until the birds have completed breeding.

7.5.6 Post construction monitoring

A post-construction monitoring programme will be carried out. This will include carcass searches to monitor collision mortality, vantage point surveys to help interpret the results of the carcass searches, and various breeding surveys to assess displacement impacts to breeding Golden Eagle, Golden Plover, Snipe and Teal. The design of the monitoring programme will be based on the SNH's *Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms* (SNH, 2009).

The carcass searches will include trials of searcher efficiency and scavenger removal. The frequency of the searches will be weekly in October-November and late March / early April (the Whooper Swan migration period) and at least monthly for the rest of the year and will be reviewed after the completion of the first year of surveys to determine if a higher search frequency is required. The searches will continue each year until sufficient data has been collected to generate a statistically robust assessment of the collision mortality impacts to Whooper Swan. The vantage point surveys will take place in tandem with the carcass searches.

The other surveys will take place in Years 1, 2, 3, 5, 10 and 15. The Golden Eagle survey will follow the methods of Hardey *et al.* (2013). The Golden Plover and Snipe surveys will follow the moorland survey methods (SNH, 2017). The Teal survey will follow the methods of Gilbert *et al.* (1998) for breeding duck surveys. Note that these Golden Eagle surveys will cover the full 6 km buffer zone, while the annual Golden Eagle surveys specified for the purposes of mitigating operational disturbance (see Section 7.5.2) will only need to cover a 1 km buffer around the wind farm infrastructure.

7.5.7 Other mitigation measures

Construction-phase mitigation measures to protect retained habitats within the wind farm site, and to protect wetlands and watercourses, are described in Chapter 6 (Biodiversity) and Chapter 8 (Hydrology & Hydrogeology).

Where possible, tree felling and scrub clearance will not be carried out during the bird breeding season (1st March – 31st of August).

7.6 RESIDUAL EFFECTS

7.6.1 Golden Eagle

7.6.1.1 Construction and operational disturbance

Successful implementation of the mitigation measures will prevent disturbance to active Golden Eagle nests. Therefore, the potential for residual effects (after mitigation) will be eliminated. However, if nesting Golden Eagles are displaced by the presence of turbines, the mitigation measures will not reduce this impact.

7.6.1.2 Golden Eagle habitat management plan

Successful implementation of the Golden Eagle habitat management plan should offset the effects of any displacement impacts to foraging Golden Eagles. Large-scale habitat management for Golden Eagle prey resources does not appear to have been attempted in Ireland to date, so it is difficult to predict the likely results: it is likely to result in some degree of improvement in prey resources, but the scale of this improvement, and its effects on the productivity of the Golden Eagle pair are hard to predict. The potential displacement impact was calculated using very precautionary assumptions (see Section 7.4.2.3), and this displacement impact was used as the basis for determining the area of land required for the Golden Eagle habitat management plan. Therefore, it is possible that the successful implementation of the Golden Eagle habitat management plan will result in a net positive effect on Golden Eagle prey resources within the home range of the Cloghercor Golden Eagle pair.

The Golden Eagle habitat management plan may also reduce the Golden Eagle collision risk by concentrating the flight activity of the Golden Eagle pair within a section of their home range that is distant from the operational parts of the wind farm.

7.6.2 Common Gull (breeding population)

Installation and maintenance of the dog-proof fencing along around the hardstanding of turbine T9, and the adjacent section of recreational trail, should prevent any disturbance impacts to Common Gulls nesting on Lough Aneane More from dogs being walked along the recreational trails.

7.6.3 Other Important Avian Features

The mitigation measures will not materially alter the significance of the impacts assessed before mitigation.

7.6.4 Residual effect assessment summary

The residual effects are compared to the impacts assessed before mitigation in Table 7-20. This table only shows impacts where the mitigation measures will cause, or may cause, a material change in the predicted impact.

Table 7-20: Summary of the assessment of the predicted residual effects (after mitigation) to the Important Avian Features.

Important Avian Feature	Impact type	Impact before mitigation	Residual effect (after mitigation)
Golden Eagle	Construction disturbance to active nests	short-term very significant negative	neutral
	Operational disturbance to active nests	short-term very significant negative	neutral
	Displacement	long-term slight negative	(neutral / positive)
Common Gull (breeding population)	Operational disturbance	long-term significant negative	neutral

This table only shows impacts where the mitigation measures will cause, or may cause, a material change in the predicted impact. Parentheses indicate uncertainty about the likelihood of success of the mitigation measures.

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