7.0 ORNITHOLOGY

7.1 INTRODUCTION

7.1.1 Project description

The Scart Mountain Wind Farm site is located at the south-eastern end of the Knockmealdown Mountains around 4 km north of Cappoquin in County Waterford (Figure 7.1).

A full project description is included in Chapter 2 of this Environmental Impact Assessment Report.

7.1.2 Scope and content

This chapter presents an assessment of the likely impact of the proposed Scart Mountain Wind Farm on bird populations of conservation importance.

The chapter (apart from Sections 7.7 & 7.8) was prepared by Tom Gittings. It is primarily based on bird surveys carried out between the winter of 2022/23 and the summer of 2024. Reference is also made to previous relevant bird survey data dating back to the winter of 2017/18. Section 7.7 and 7. 8 of this chapter was prepared by FuturEnergy Ireland in-house ecologist Elaine Dromey.

Scientific names of bird species mentioned in this chapter are included in Appendix 7.1.

7.1.3 Turbine specifications

Five turbine specifications were assessed for this wind farm. These specifications had rotor diameters ranging from 149-163 m, hub heights ranging from 103.5-110.5 m and tip heights of 185 m. The collision risk modelling included all five turbine specifications (see Section 7.2.8.7).

The variation in turbine specifications 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. These assessments are not affected by the variation in turbine specifications.

7.1.4 Limitations

A data request was made to the National Parks and Wildlife Service for information on Hen Harrier nest sites in the vicinity of the proposed wind farm site. The information provided in response to this request was a simple tabulation of the number of nest sites at various distances from the proposed wind farm site. The lack of information on precise nest site locations means that it is not possible to assess the potential impact on historical nest sites that were not occupied in 2018-2024, but which could potentially be reoccupied in the future.

The access for the bird surveys was limited to the proposed wind farm site, Coillte land and publicly accessible lands. This may have affected coverage of some potentially suitable breeding habitat for Red Grouse and Snipe outside the site boundary but within the 500 m buffer.

As far as possible, surveys were timed to coincide with suitable weather conditions, particularly during the breeding season, however periods of poor weather (e.g. rain, strong winds and reduced visibility) were occasionally encountered during the surveys, which was unavoidable due to the number of surveys required and the frequent, inclement weather encountered on the proposed wind farm site throughout the surveys. As the majority of surveys were completed in suitable weather conditions it is considered that a small number of surveys undertaken in poor weather conditions are not a constraint.

There is no information available on the overall size of the local Golden Plover population and on the foraging and roosting areas used by this population. This limits the evaluation of the importance of this population, and the assessment of potential barrier effects.

There was limited site-specific data collected on Woodcock roding heights. Therefore, data on Woodcock roding heights from a comparable site was used for collision risk modelling.

For several of the key bird populations potentially affected by the Scart Mountain Wind Farm, there is potential for cumulative displacement or collision risk impacts from the Scart Mountain Wind Farm in-combination with other wind energy projects in Co. Waterford. However, for most of the other projects, there is limited relevant information available, and, in some cases, no collision risk modelling or appropriate surveys were carried out.

7.2 METHODOLOGY

7.2.1 Study area

The study area for the ornithological assessment comprised the proposed wind farm site and various buffers around this site. These buffers were based on the guidance in SNH (2017). The buffers were 500 m for the vantage point surveys, and the breeding Red Grouse and wader surveys, and 2 km for the breeding raptor surveys (Figure 7.1). Some survey work was also carried out outside these buffers.

The study area also included the proposed grid connection route (GCR) and proposed turbine delivery route (TDR).

7.2.2 Desk review

Initial desk reviews were carried out at the start of the bird surveys for the proposed project. These desk reviews were updated at various stages during the development of the project. The final update was carried out in September 2024.

The study area for the final desk review was defined as a 2 km buffer around the proposed wind farm site (Figure 7.1). However, the desk review for Hen Harrier covered the Knockmealdowns, Kilworth, and Comeraghs Region Hen Harrier Region (Figure 7.2).

A review was carried out of Special Protection Areas and designated and proposed Natural Heritage Areas. This review identified any Qualifying Interests of Special Protection Areas or ornithological features listed for Natural Heritage Areas that might interact with the study area.

All bird records held by the National Biodiversity Data Centre for the four hectads (10 km squares) overlapping the study area (S00, S10, S11 and X19; Figure 7.1) were reviewed. These included records from the four national bird atlas surveys (Sharrock *et al.*, 1976; Lack, 1980; Gibbons *et al.*, 1993; Balmer *et al.*, 2013).

A larger study area was used for the desk review of Hen Harrier records. This comprised the Knockmealdowns, Kilworth, and Comeraghs Region Hen Harrier Region (Figure 7.2). This region was used by Ruddock *et al.* (2024) in their review of population trends of regional Hen Harrier populations. Ruddock *et al.* do not define the spatial extent of this region. For the present assessment, the region was mapped using the 200 m contour around the Knockmealdown Mountains (including the associated uplands extending to Flagstaff Hill) and the Comeragh Mountains. Contiguous areas of forestry and moorland habitat (based on CORINE mapping) extending below the 200 m contour were also included (Figure 7.2). This study area is referred to in this chapter as the Knockmealdowns, Kilworth, and Comeraghs Region. This area comprises two discrete units of Hen Harrier breeding habitat that are separated from other areas of Hen Harrier breeding habitat.

The reports of the national Hen Harrier surveys carried out in 1998-2000, 2005, 2010, 2015 and 2022 were reviewed (Norriss *et al.*, 2022; Barton *et al.*, 2006; Ruddock *et al.*, 2012, 2015, 2024). These reports include maps showing Hen Harrier breeding status and number of pairs in the hectads that were covered in each survey.

Other data sources used included: information from rare and protected species records supplied by the National Parks and Wildlife Service; information on site coverage from the Irish

Wetland Bird Survey; information contained in Environmental Impact Assessment Reports for other wind farm projects in this area; and other relevant papers and technical reports.

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 7.3.1-7.3.4.

7.2.3 Habitat data

The habitat data used for the assessments in this chapter come from two sources. The habitats within the wind farm site were surveyed for the proposed project (see Chapter 6). The CORINE 2018 dataset[1] was used for habitats outside the wind farm site.

7.2.4 Bird surveys

7.2.4.1 Scope

The target species for this assessment comprised all wild swan, duck and goose species except Mallard, all diver and grebe species, all raptor and owl species except Sparrowhawk and Buzzard, all wader species, and all Qualifying Interest species of nearby Special Protection Areas and Ramsar sites.

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).

The bird surveys included vantage point surveys to monitor flight activity over the proposed wind farm site and other surveys that recorded the distribution and abundance of bird species of interest within and around the proposed wind farm site.

The core datasets used for this assessment are four seasons of vantage point surveys, and two seasons of breeding surveys. These were carried out between winter 2022/23 and summer 2024.

Additional bird surveys carried out between the winter of 2017/18 and the summer of 2022 were used to provide context and to examine longer-term trends in occurrence patterns.

The following sections provide summaries of the bird survey methods and coverage. Full details of the methods used for all the bird surveys are included in Appendix 7.2 – Appendix 7.6.

[1] https://data.gov.ie/dataset/corine-landcover-2018.

7.2.4.2 Vantage point surveys

The core vantage point survey dataset used in this assessment comprises surveys that were carried out over two summers and two winters between the winter of 2022/23 and the summer of 2024.

The surveys in the winter of 2022/23 used thirteen vantage point locations (Figure 7.3), while the remaining surveys used a different set of eight vantage point locations (Figure 7.3).

The viewshed coverage at 20 m above ground level from each vantage point is shown in Figure 7.4 and Figure 7.5.

Each vantage point received a minimum of 36 hours of coverage in each surveyed season, except BM8 in the winter of 2022/23 and SC7 in the summer of 2023 (33 hours).

Full details of the methods used for these vantage point surveys are included in Appendix 7.2 – Appendix 7.6.

For some assessments, supplementary data has been used from vantage point surveys that were carried out over nine seasons between the winter of 2017/18 and the summer of 2022 (see Appendix 7.1).

7.2.4.3 Distribution and abundance surveys

Breeding raptor surveys

Breeding raptor surveys were carried out in 2023 and 2024. involved six survey visits between late March and early August. The survey covered raptor breeding habitat in a 2 km buffer around the proposed wind farm site (1 km for Goshawk and owls other than Short-eared Owl). The survey methods were based on Hardey *et al.* (2013). The surveys involved completing a series of short watches over areas of suitable breeding habitat from suitable *ad-hoc* vantage point locations, and walkover surveys to identify any evidence of breeding.

Full details of the breeding raptor survey methods are included in Appendix 7.4 and 7.6.

Additional information on breeding Hen Harriers is also available from various surveys that were carried out each year between 2018 and 2022 (see Appendix 7.1).

Breeding wader and grouse surveys

Breeding distribution surveys focussing on waders and other non-passerine species of conservation concern were carried out in 2023 and 2024. These involved monthly survey visits between April and July. The survey covered the proposed wind farm site and a 500 m buffer around it, although there were some access limitations to lands outside the site boundary (see Section 7.1.4). The survey combined elements of the Smith and O'Brien (1992) method (designed to census lowland breeding waders) and Brown and Shepherd (1993) method (designed to survey moorland species). Full details of the survey methods are included in Appendix 7.4 and Appendix 7.6.

Some information on breeding waders and grouse is also available from various surveys that were carried out each year between 2018 and 2022 (see Appendix 7.1).

Breeding Woodcock surveys

Breeding Woodcock surveys were carried out in the summer of 2024, while additional information is available from nocturnal surveys carried out in the summers of 2019-2022.

The breeding Woodcock surveys were carried out between May and July 2024, following the methods outlined in Gilbert *et al.* (1998), whereby suitable woodland within 500 m of the proposed wind farm site were surveyed. A minimum of five visits were undertaken to suitable habitats, of which at least three were undertaken between May and June, with surveyors following five predetermined transect routes from one hour before sunset to one hour after sunset (or until it became too dark to see). Maps of the transect routes, and full details of the survey methods are included in Appendix 7.6.

The nocturnal surveys were carried out in 2019-2022. In the first three years, 1-2 surveys were completed each year. In 2022, six surveys were completed. The surveys generally started before sunset and continued for around 2.5 hours (range 80-200 minutes). Full details of the nocturnal survey methods are included in Appendix 7.1.

7.2.5 Grid connection route and turbine delivery route

The potential ornithological value of habitats along the proposed GCR and proposed TDR were assessed.

7.2.6 Assessment and analysis of survey results

The survey results were analysed to assess the spatial and temporal occurrence patterns of sensitive species around the proposed wind farm site. Details of these analyses are included in the relevant species accounts in Sections 7.3.1-7.3.4.

7.2.7 Evaluation

The purpose of the evaluation was to identify the bird populations that required assessment of the potential impacts from the proposed project. 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 proposed wind farm site and the 2 km buffer (raptors) or 500 m buffer (other species) around the proposed wind farm site. Populations of conservation importance were defined as populations of Annex I species, populations of red or amber-listed species, populations that are Qualifying Interests of Special Protection Areas, populations that are important features of Natural Heritage Areas or proposed Natural Heritage Areas, or populations of species that are nationally rare / scarce or rare / scarce in Co. Waterford.

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 NRA evaluation scheme includes a large number of criteria. The criteria used in this assessment are shown in Table 7.1.

Table 7.1. NRA evaluation criteria used in this assessment.

Value	Criteria
National Importance	Resident or regularly occurring populations (assessed to be important at the national level) ofthe following: species protected under the Wildlife Acts; and/or species listed on the relevant Red Data list
County Importance	Resident or regularly occurring populations (assessed to be important at the county level) of the following: species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; species protected under the Wildlife Acts; and/or species listed on the relevant Red Data list.
Local Importance (higher value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared. Resident or regularly occurring populations (assessed to be important at the local level) of the following: species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; species protected under the Wildlife Acts; and/or species listed on the relevant Red Data list.
Local Importance (lower value)	No relevant criteria.

The threshold for "assessed to be important" at each geographical scale is defined in the guidance as 1% of the population at that scale. However, the guidance notes that "a smaller population may qualify as … important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle". Source: NRA (2009).

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 (Table 7.2).

Table 7.2. Percival evaluation criteria.

Value	Criteria
Very high	Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	Species that contribute to the integrity of an SPA but which are not cited as species for which the site is designated. Ecologically sensitive species including the following: divers, Common Scoter, Hen Harrier, Golden Eagle, Red-necked Phalarope, Roseate Tern and Chough. Species present in nationally important numbers (>1% Irish population).
Medium	Species on Annex 1 of the EC Birds Directive. Species present in regionally important numbers (>1% regional (county) population). Other species on BirdWatch Ireland's red list of Birds ofConservation Concern.
Low	Any other species of conservation interest, includingspecies on BirdWatch Ireland's amber list of Birds ofConservation Concern, not covered above.

Source: Percival (2003).

The local scale is not defined in the NRA criteria. For the purposes of this assessment, the local scale was defined as the 2 km buffer around the proposed wind farm site (Figure 7.1) The total extent of this local area is around 80 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, where possible, the combined Republic of Ireland and Northern Ireland populations are used for the evaluations in this chapter.

7.2.8 Impact assessment

7.2.8.1 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, and displacement impacts, and the collision risk. Barrier effects and operational disturbance were only assessed when relevant (see Sections 7.2.8.5 and 7.2.8.6).

The potential collision risk impacts were also assessed for all other target waterbird and raptor species recorded during the vantage point surveys.

Impacts from turbine replacement during the operational period, the proposed GCR, the proposed TDR and decommissioning are discussed collectively for all receptors at the end of the impact assessment section.

7.2.8.2 Habitat loss

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

7.2.8.3 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.

7.2.8.4 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, 2006). 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, 2017). 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.

7.2.8.5 Operational disturbance

Operational disturbance impacts were generally included within the assessment of displacement impacts. However, for Hen Harrier, the potential operational disturbance to nest sites was assessed, including potential displacement impacts to nest sites, separately from the assessment of potential displacement impacts to foraging birds.

7.2.8.6 Barrier effects

Most work on the ornithological impacts on barrier effects from wind farms focuses on commuting or migrating birds (Humphreys *et al.*, 2015). For populations of birds that are centred around a proposed 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 Feature for which a separate assessment of barrier effects is included is Golden Plover, which had potential commuting routes across the proposed wind farm site.

7.2.8.7 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 modelling used data from the vantage point surveys carried out in winter 2022/23, summer 2023, winter 2023/24, and summer 2024.

The survey results from the winter of 2022/23 used for the collision risk modelling did not include the data for the BM1, BM7 and KN2 vantage points. The BM1 vantage point was excluded because the viewshed was outside the proposed wind farm site. The MB7 and KN2 vantage points were excluded because the mapped viewshed coverages at 20 m above ground level were very limited (Figure 7.4).

The collision risk modelling was carried out for the five different turbine configurations that represent all the scenarios being considered for this proposed wind farm site. These had ground clearances ranging from 22-36 m, and rotor diameters ranging from 149-163 m (see 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 a spatially structured model for Hen Harrier that accommodated heterogeneity in their flight activity across the wind farm site. A bespoke model was also developed to generate predicted collision risks for roding Woodcock.

Two sets of collision risk models were prepared for each species. One set used a single height band covering the entire potential collision height zone for modelling predicted transits. The other set modelled predicted transits separately for two height bands: 20-50 m and 50-190 m. The one height band model usually produces more conservative results and is the standard model used in most collision risk modelling. However, the two height band model allows comparison of the effects of different turbine ground clearances on the collision risk. The results from the one height band model were used for assessment of the significance of the predicted collision risk. However, the results from the two height band model are also presented in this chapter to allow comparison of the relative collision risk between the different turbine configurations that were assessed.

Full details of the collision risk modelling methodology are included in Appendix 7.7.

7.2.8.8 Aviation lighting

The proposed wind farm will include 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.

7.2.8.9 Cumulative impacts

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

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

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

The turbine locations included in the cumulative assessment are shown in Figure 7.6 and are listed in Table 7.3.

The online planning files were searched for all the wind energy projects associated with the turbine locations identified in Figure 7.6, and any available ecological assessments were reviewed (Table 7.3). However, some wind farms did not have available assessments, while, for others that did, the scope of the bird surveys was quite limited. Collision risk predictions were available for 45 out of the 67 wind turbines in Waterford considered in the cumulative assessment (Table 7.3).

Table 7.3. Wind turbines included in the cumulative assessment.

Project	Turbines	Status	Documentation	CRM
Ballycurreen	2	operational	Environmental Report	no
Barranafaddock	12	operational	Ecological Impact Assessment	yes
Bellalough	2	operational	none	no
Coumnagappul	10	undecided	Environmental Impact Assessment Report	yes
Dyrick Hill	12	refused	Environmental Impact Assessment Report	yes
Kilnagrance	1	operational	Environmental Report	no
Knocknamona	8	consented	Environmental Impact Assessment Report	no
Lyrenacarriga	11	in development	Environmental Impact Assessment Report	yes
Tierney	1	operational	none	no
Woodhouse	8	operational	Environmental Impact Statement	no

The proposed Dyrick Hill Wind Farm has been refused planning consent, but this decision is subject to judicial review, so it has been included in the cumulative assessment. The Lyrenacarriga Wind Farm has a total of 17 turbines, but six of the turbines are in Co. Cork.

A dataset of other planning applications within a 2.5 km buffer around the wind farm site covering the period 2014 – 2023 were also reviewed for the cumulative assessment.

7.2.8.10 Assessment of significance

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 7.2.7). The magnitude of the predicted impact is then categorised using the scale shown in Table 7.4. 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 7.4). The evaluation and impact magnitude were then combined to describe the significance using the terminology from the EPA Guidelines (2022): e.g., a moderate negative impact 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 7.4. A significant impact is an impact 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.

Table 7.4 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 (2022).

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.

(EC, 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 impacts. 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).

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.

Collision risk (species assessments)

The potential increase in annual mortality, as a percentage of the background annual mortality, was assessed for all the Important Avian Features (except Hen Harrier) where relevant source populations could be defined. For Golden Plover, Peregrine, Red Grouse, Woodcock, Snipe and Kestrel, 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 and the details of the methods used to calculate the increases in annual mortality are included in Appendix 7.7.

The predicted Hen Harrier collision risk indicated that there was uncertainty about whether or not any Hen Harrier collisions will occur within the lifespan of the proposed wind farm project (see Section 7.4.1.6). Therefore, using the collision risk to calculate potential increases in mortality rate was not appropriate. Instead, population modelling was used to assess the potential significance of the predicted collision risk (Appendix 7.7). The modelling examined the potential effects of the predicted collision risk on the dynamics of the Knockmealdowns, Kilworth, and Comeraghs Hen Harrier population.

The modelling approach was based on the Golden Eagle Population Model, which was first developed by O'Toole *et al.* (2002) and subsequently refined by Whitfield *et al.* (2006, 2008) and Haworth Conservation (2010). That model is widely used in Scottish wind farm assessments (e.g., MacArthur Green, 2018, 2021). The model used in the present assessment is also comparable to the model used by Sheridan *et al.* (2020) for the Hen Harrier population in the Slieve Bloom Mountains SPA.

The population model did not include density dependent factors, or immigration and emigration. Therefore, the results should not be regarded as realistic predictions of the likely population trends. Instead, the model provides a mechanism to examine the possible effects of counterfactual scenarios, such as various levels of collision risk.

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. Therefore, the significances of the predicted collision risks were categorised simply as either significant or not significant.

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 7.4.12). 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.

7.2.9 Personnel

The data analysis, including collision risk modelling, evaluation and assessment was carried out by Tom Gittings. The Environmental Impact Assessment Report chapter and appendices were written by Tom Gittings (excluding Appendices 7.3 – 7.6).

The bird surveys that comprise the core dataset used for this assessment were carried out by APEM in the summer of 2023, the winter of 2023/24 and the summer of 2024, and by Malachy Walsh & Partners in the winter of 2022/23. Additional bird surveys were also carried out by Malachy Walsh & Partners between the winter 2007/08 and the summer of 2022.

The APEM bird surveys were managed by Matthew Rea and Billy Gardener. The vantage point surveys were carried out by Paul Connaughton, Andre Robinson and Nick Veale. The breeding bird surveys were carried out by Marc Ruddock, who led the survey team, Jamie Bailey, Frank Connolly, Douglas Ruddock and Craig Swenarton.

The Malachy Walsh & Partners bird surveys were scoped and designed by John N. Murphy and the survey work was carried out by Austin Cooney, Ciaran Cronin, Paidi Cullinan, Shane Cully, John Deasy, Eric Dempsey, Aidan Duggan, Ger Hayes, Ian Mc Dermott, Ger Mc Grath, Einne O Cathaisaigh, Michael O'Clery, and Tom Ryan.

A breeding Snipe survey was carried out by Noel Linehan under the direction of Tom Gittings in 2022.

Full details of the qualifications and experience of all the personnel are included in Appendix 7.8.

7.3 EXISTING ENVIRONMENT

7.3.1 Overview of bird survey results

A total of 24 waterbird, raptor, grouse and owl species were recorded during the vantage point surveys between the winter of 2022/23 and the summer of 2024. Six additional species were recorded during other survey work during this period.

The survey results between the winter of 2022/23 and the summer of 2024 were generally consistent with previous survey data from the site (see Appendix 7.1).

The following bird species were identified as potential Important Avian Features for this assessment: Red Grouse, Hen Harrier, Golden Plover (wintering population), Woodcock (breeding population), Snipe (breeding population), Kestrel, Merlin and Peregrine. These are species that regularly, or semi-regularly, occurred in the proposed wind farm site, and which may have populations of conservation importance. The Woodcock and Snipe wintering populations are not included as potential Important Avian Features, because these species are much more widespread and abundant in winter.

In the following sections, the potential Important Avian Features that are Annex I species under the Birds Directive are discussed first (Hen Harrier, Golden Plover, Merlin and Peregrine) followed by the non-Annex I red-listed species (Red Grouse, Woodcock, Snipe and Kestrel). 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 7.6.

7.3.2 Potential Important Avian Features (Annex I species)

7.3.2.1 Hen Harrier

Treatment of information on Hen Harrier nest sites

Due to the sensitivity of the Irish Hen Harrier 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 Hen Harrier 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 can be presented to An Bord Pleanála and relevant statutory consultees on request.

Hen Harrier breeding status (Knockmealdowns, Kilworth, and Comeraghs Region)

Information about Hen Harrier breeding status in the Knockmealdowns, Kilworth, and Comeraghs Region is available from the five national Hen Harrier surveys carried out in 1998-2000, 2005, 2010, 2015 and 2022 (Norriss *et al.*, 2002; Barton *et al.*, 2006; Ruddock *et al.*, 2012, 2015,2024).

Across this region, confirmed or possible breeding by Hen Harriers was recorded in 2-6 hectads (2-4, excluding hectads that overlap other regions) in each of these surveys, with 1-7 breeding pairs in 2005-2022 (Figure 7.7 and Figure 7.8; Table 7.5). The population in this region does not show any clear long-term trend fluctuating between peaks of up to 7 pairs in 1998-2000 and 2015 and troughs of 1 or 2 pairs in 2010 and 2022.

There were no Hen Harrier records from the hectad containing the proposed wind farm site in the 1998-2000 survey. Confirmed breeding was recorded in this hectad in 2005-2015, with single pairs in 2005 and 2010 and three pairs in 2015. In 2022, possible breeding by a single pair was recorded in this hectad.

In 2022, the Hen Harrier breeding status in the hectad to the north of the proposed wind farm site was recorded as possible by the national survey. However, the Hen Harrier survey carried out for the Scart Mountain Wind Farm Project recorded confirmed breeding in this hectad.

Table 7.5. Summary of Hen Harrier breeding status recorded in the Knockmealdowns, Kilworth, and Comeraghs Region by national Hen Harrier surveys, 1998-2022.

Survey	Number of hectads			Number of pairs
	confirmed	possible	seen	
1998-2000	4(2)	2	0	3-7
2005	4(2)	2	1	2-4
2010	4(2)	0	3(2)	2
2015	5(3)	0	2	5-7
2022	2(1)	2(1)	7	1-2

Numbers in parentheses exclude data from hectad R81 (which overlaps a section of the Galtee Mountains) and hectad X29 (which overlaps the East Cork & Waterford Hen Harrier region). Sources for number of hectads: Norriss *et al.*, (2002); Barton *et al.*, (2006); Ruddock *et al.*, (2012, 2015, 2022). Source for number of pairs: Table 9 in Ruddock *et al.*, (2022).

Hen Harrier breeding status (study area)

Up to five Hen Harrier territories were recorded during the bird surveys carried out for the wind farm project in 2023 and 2024 (Table 7.6). Breeding was confirmed at one location on the edge of the proposed wind farm site in 2023 and territorial activity was recorded at another location at the edge of the site in 2024 (Table 7.7). Breeding was also confirmed at separate locations at least 2 km from the site in 2023 and 2024, and territorial activity was recorded at another location around 1 km from the site in 2023 (Table 7.7).

In previous years, confirmed breeding was recorded within / adjacent to the proposed wind farm site in 2018-2020 (Appendix 7.1). In 2019, territorial activity was also recorded at two further sites, one at the edge of the wind farm site and the other around 1 km from the site. No occupied territories were recorded in 2021 (Appendix 7.1). In 2022, the only breeding activity recorded was a confirmed nest over 2 km from the site (Appendix 7.1).

Table 7.6. Hen Harrier territories recorded within / around the proposed wind farm site, 2023-2024.

Territory	Details
A	Nest sites on the edge of the proposed wind farm site
C	Territorial activity recorded over 1 km from the proposed wind farm site, but no nest site found
E	Nest site recorded over 2 km from the proposed wind farm site
F	Nest site recorded around 2 km from the proposed wind farm site
G	Territorial activity recorded at edge of the proposed wind farm site, but no nest site found

Table 7.7. Hen Harrier breeding status within / around the proposed wind farm site, 2023-2024.

Year	Territory	Details
2023	A	Breeding confirmed but no juvenile birds recorded, and nest considered to have failed. The nest site was around 300 m from the nest site used in 2018.
	C	Territorial activity recorded but no confirmed evidence of breeding.
	E	Confirmed nest; may have been same territory as D.
2024	F	Confirmed nest with two chicks in July; may have been same territory as E.
	G	Displaying males observed in April and birds were recorded carrying food in July. No nest wasidentified. May have been same territory as A.

Hen Harrier occurrence patterns around the proposed wind farm site

A total of 133 Hen Harrier flightlines were recorded the vantage point surveys between the winter of 2022/23 and the summer of 2024.

The highest levels of Hen Harrier flight activity occurred between April and July (Appendix 7.1). This reflected the presence of breeding Hen Harrier within / around the proposed wind farm site.

The Hen Harrier flightlines recorded during the vantage point surveys in the 2023-2024 breeding seasons and 2022/23-2023/24 non-breeding seasons are shown in Figure 7.9. During the breeding season, most Hen Harrier flight activity was recorded in the northern half of the survey area, which reflected the locations of the nest sites / territory centres recorded in those seasons. In the non-breeding season, Hen Harrier flightlines were more widely distributed around the site.

The overall distribution of Hen Harrier flight activity around the proposed wind farm site was similar in the vantage point surveys carried out between the winter of 2017/18 and the summer of 2022 (Appendix 7.1). In the 2021 breeding season, when no Hen Harrier breeding territories were found near the proposed wind farm site, very few Hen Harrier flightlines were recorded. In the 2022 breeding season, most Hen Harrier flightlines were recorded on the western side of Knockanask Hill. These flightlines may have been associated with the Hen Harrier nest site that was over 2 km from the site, as there was no breeding activity closer to the site. In the other breeding seasons, the Hen Harrier flightlines were likely to be mainly associated with the territories within / on the edge of the site.

Hen Harrier flight activity was much lower in winter, and no evidence of Hen Harrier winter roosts were recorded in any of the bird surveys carried out for the wind farm project.

7.3.2.2 Golden Plover (wintering population)

National and regional status

Golden Plover is a common non-breeding/winter visitor to Ireland. Large wintering aggregations occur in major coastal and inland wetlands, but it is also widespread in farmland habitats away from wetlands. There is also a very small Golden Plover breeding population in the north-west of Ireland.

The nearest Irish Wetland Bird Survey sites with wintering Golden Plover populations are the Lower Blackwater River (about 6 km south-west of the proposed wind farm site) and Dungarvan Harbour (around 11 km south-east of the proposed wind farm site). However, it is possible that some wintering Golden Plovers occur on the section of the Blackwater around Cappoquin (around 4 km south-west of the proposed wind farm site), which is not included in any Irish Wetland Bird Survey site.

There is little information available about the core foraging range of wintering Golden Plover from their roosts and SNH (2016) do not provide any guidance on this. However, Fuller and Youngman (1979) mapped the distribution of Golden Plover flock ranges in a lowland study area in southern England and the maximum dimensions of the ranges varied from around 5.5-8.3 km, while Gillings and Fuller (1999) noted regular movements by flocks in Norfolk between fields up to 10-12 km apart. Therefore, the Golden Plovers that occurred around the proposed wind farm site could possibly be associated with the Lower Blackwater River wintering population. There is unlikely to be any connectivity with the Dungarvan Harbour population as the main Golden Plover roost on Whitehouse Bank in Dungarvan Harbour is over 19 km from the focal areas of Golden Plover activity around the proposed wind farm site.

The five-year mean peak Golden Plover count for the Lower Blackwater River Irish Wetland Bird Survey site is 207 for the period 2016/17 – 2020/21[2]. However, there was wide variation in the annual peak counts ranging from zero in 2018/19 to 805 in 2016/17.

Occurrence patterns around the proposed wind farm site

A total of 50 Golden Plover flightlines were recorded during the vantage point surveys between the winter of 2022/23 and the summer of 2024. All these records occurred between October and April. In previous years, there were occasional records in early May and September and one record in July (Appendix 7.1). The Golden Plover records in spring and autumn are likely to have included birds on passage that were not associated with a local wintering population[3].

[2] Data were supplied by the Irish Wetland Bird Survey (I-WeBS), a joint scheme of BirdWatch Ireland and the National Parks and Wildlife Service of the Department of Arts, Heritage & the Gaeltacht.

[3] In the analyses of occurrence patterns in this section, records from April and May were allocated to the preceding winter, while records from July and September were allocated to the following winter.

The recording rate per winter was 19 records / 360 hours in 2022/23 and 31 records / 360 hours in 2023/24, compared to rates of 18-48 records / 360 hours in the winters of 2017/18 – 2021/22 (Appendix 7.1).

Most records involved flocks of less than 100 birds. The overall median flock size across the winters of 2022/23 and 2023/24 was 22 birds, which was similar to the median flock size of 28 birds across the winters of 2017/18 – 2021/22. However, the maximum flock sizes of 140 birds in 2022/23 and 48 birds in 2023/24 were smaller than the maximum flock sizes recorded in previous winters (160-649 birds). In the winters of 2022/23 and 2023/24, Golden Plover flightlines were widely recorded around the proposed wind farm site (Figure 7.10). The overall distribution of Golden Plover flight activity was similar in the vantage point surveys carried out between the winters of 2017/18 and the 2021/22 (Appendix 7.1). The highest concentrations of flightline densities occurred over open habitats, particularly Knockanask Hill and Broe Mountain.

All the records from the winters of 2022/23 and 2023/24 were of birds in flight, but there were 12 records during previous vantage point surveys of birds on the ground. All but one of these records were in two areas: in bog/heath on the southern side of Broe Mountain just outside the eastern boundary of the proposed wind farm site; and on improved grassland just outside the south-western boundary of the proposed wind farm site (Appendix 7.1).

7.3.2.3 Merlin

Treatment of information on Merlin nest sites

Due to the sensitivity of the Irish Merlin 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 Merlin 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 can be presented to An Bord Pleanála and relevant statutory consultees on request.

Merlin occurrence in the study area

Merlin is a rare breeding species in Ireland, occurring mainly in open moorland in the north and west. In the Bird Atlas 2007-2011 surveys (Balmer *et al.*, 2013), possible breeding evidence was recorded from the hectad containing the proposed wind farm site.

Merlin was recorded during vantage point surveys in the winter of 2022/23, the summer of 2023, and the winter of 2023/24, with a total of nine records across this period (Appendix 7.1). There were no records from vantage point surveys in the summer of 2024. However, there were three records from the breeding raptor surveys in each summer (Appendices 7.4 and 7.6). There were five additional records from previous vantage point surveys carried out between the winter of 2017/18 and the summer of 2022 (Appendix 7.1).

One of the records from summer 2023 involved a Merlin pair defending a suitable nest site (an old corvid nest) and an aggressive encounter with a Hooded Crow was observed. This was

considered to be a probable nest site and was located around 2 km west of the proposed wind farm site. However, no further activity was recorded at this location, and it is believed that breeding failed.

In 2024, a pair was observed displaying around 1 km north of the proposed wind farm site indicating that a territory was being held in April. However, there were no further records in this area.

No evidence of breeding Merlin was recorded in any of the other years surveyed. However, apart from 2022, there was limited survey coverage outside the proposed wind farm site in those years.

The distribution of the Merlin flightlines recorded within, and around, the proposed wind farm site is shown in Figure 7.11. This map excludes two flightlines that relate to the probable nest site recorded in 2023, and one flightline that relates to the displaying pair in 2024, due to the sensitivity of this species (see above). It also excludes the flightline for one record from 2018, which was not mapped. Most of the flightlines were around the northern section of the proposed wind farm site. The breeding season flightlines were mainly within the potential core foraging range of the probable nest site.

7.3.2.4 Peregrine

Peregrine is a widespread but scarce breeding species in Ireland, nesting on coastal cliffs and inland quarries and buildings. In the Bird Atlas 2007-2011 surveys (Balmer *et al.*, 2013), breeding evidence was recorded from the hectads to the west and north of the proposed wind farm site, but no breeding was recorded from the hectad containing the proposed wind farm site.

In 2023, a Peregrine nest was recorded at Mount Melleray Abbey. This nest site was around 2.5 km south-west of the proposed wind farm site, and around 3 km from the nearest turbine. The occupancy of this site was not assessed in 2024 as it was outside the breeding raptor survey area. A juvenile Peregrine was recorded in early June, although it was around 5 km from Mount Melleray.

No other evidence of Peregrine nesting was recorded in any of the surveys and the 2023-2024 breeding raptor surveys concluded that there was no suitable habitat for breeding Peregrine within the 2 km buffer around the proposed wind farm site.

A total of 34 Peregrine flightlines were recorded during the vantage point surveys between the winter of 2022/23 and the summer of 2024, while there were additional records from other surveys (Appendix 7.1). The recording rate per season over this period varied from 19 records / 360 hours in the summer of 2023 to 1 record / 360 hours in the summer of 2024, compared to rates of 0-10 records / 360 hours in between the winter of 2017/18 and the summer of 2022 (Appendix 7.1).

Most Peregrine flightlines from the vantage point surveys between the winter of 2022/23 and the summer of 2024 were recorded in the northern half of the proposed wind farm site and in open habitat to the north-east (Figure 7.12). However, a lot of the flightlines involved commuting birds, so the flight activity was not influenced by the openness of the habitat. In the 2024 breeding season, several flightlines were of birds flying towards the Mount Melleray nest site.

The overall distribution of Peregrine flight activity around the proposed wind farm site was similar in the vantage point surveys carried out between the winter of 2017/18 and the summer of 2022 (Appendix 7.1).

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. In southern Ireland, it has a fragmented distribution with isolated populations in upland areas, including the Knockmealdown Mountains. There were Red Grouse records from four hectads in the Knockmealdown Mountains during the Bird Atlas 2007-2011 survey (Balmer *et al.*, 2013). These included the hectad containing the proposed wind farm site and the hectad adjacent to the proposed wind farm site.

During the bird surveys for the proposed project, Red Grouse were recorded from Knockanask Hill, from the south-western slopes of Knocksculloge, the north-western slopes of Broe Mountain, and from the slopes around Knocknafalla (Figure 7.13). All the records were from open bog/heath habitat.

Apart from two records in 2024, Red Grouse were not recorded from the open bog/heath on Broe Mountain in any of the surveys carried out for the proposed project, or in bird surveys carried out for the proposed Dyrick Hill Wind Farm (JOD, 2023).

In 2023 and 2024, the Knockanask Hill records from the breeding distribution survey were considered to represent single Red Grouse breeding territories (Appendix 7.4 and Appendix 7.6). In 2024, an additional Red Grouse territory was identified in the open bog/heath habitat around Knocksculloge (Appendix 7.6). There are likely to be additional Red Grouse territories in the open bog/heath habitat around the proposed wind farm site.

7.3.3.2 Woodcock (breeding population)

Woodcock is a widespread but localised breeding species in Irish woodland and forestry habitats. Its distribution is concentrated in the eastern half of Ireland. In the Bird Atlas 2007-2011 survey (Balmer *et al.*, 2013), there were breeding season records from 11 hectads in Co. Waterford[4]. These included possible breeding in the hectad containing the proposed wind farm site and in the hectad to the north of the proposed wind farm site and probable breeding in the hectad to the west of the proposed wind farm site.

Woodcock is a crepuscular species that is most active during twilight when the males perform display flights (roding). The highest frequency of roding activity occurs in the 40-minute period after sunset, with the frequency declining sharply afterwards, and with low levels before sunset (Hoodless *et al.*, 2006).

Woodcock are not strictly territorial and multiple males may carry out roding flights over the same area. Therefore, instead of mapping territories, Woodcock populations are assessed by the maximum number of roding birds recorded using standard survey methods (Hoodless *et al.*, 2006, 2009).

[4] Based on hectads with at least 50% of their land area in Co. Waterford.

The Woodcock surveys carried out in 2024 produced maximum counts of 1-6 roding Woodcock per transect but, apart from Transect 3, there were some surveys where no Woodcock were recorded (Table 7.8). The records were widely distributed around the proposed wind farm site. However, there were few records from Transect 1 at the southern end of the site, and this transect had the highest incidence of surveys with no records.

Table 7.8. Summary of Woodcock survey results, May – June 2024.

Transect	Number of surveys	Non-zero surveys	Roding Woodcock	
			Total	Maximum
1	6	3	3	1
2a	6	4	17	6
2c	5	4	8	2
3	5	5	10	4
4	6	4	9	3

See Appendix 7.6 for the full survey results. Surveys from July are not included because these were outside the recommended survey period.

Previous surveys carried out in 2019-2022 had more limited coverage of the proposed wind farm site, but also indicated that Woodcock were widely distributed around the site (Appendix 7.1). The level of roding activity recorded was broadly comparable to the 2024 surveys (Appendix 7.1).

Hoodless *et al.* (2009) includes a formula for converting maximum numbers of roding Woodcock into densities. This formula is based on results from point surveys, rather than transect surveys. However, because roding Woodcock range over wide areas, both survey methods should produce similar results in sites where roding Woodcock are widespread across the survey areas. This formula was used to calculate the density of male Woodcock in the proposed wind farm site. The densities were calculated separately for each transect with transects 2a and 2c grouped together (Appendix 7.7). The overall mean density across the transects was 1.6 roding males / km^2. There is around 10.7 km^2 of woodland and forestry habitat in the 500 m buffer around the proposed wind farm site, giving an estimate of a local population of around 17 roding males.

The flight heights of the roding Woodcock were estimated on six dates in 2019 and 2022 (Table 7.9). On four of these dates, the heights were all below 30 m. On the other two dates, heights of up to 40 m or 50 m were estimated. The observer for those records has commented that the higher flights involved birds crossing the valley between Broe Mountain and Knockanask or flying out over steep drops in other locations[5].

[5] Michael O'Clery, personal communication to Tom Gittings, 14/11/2023.

Table 7.9. Woodcock flight heights.

Date	Number of birds	Flight height (m)
11/06/2019	2	10-15 m
13/05/2022	1	20-50 m
03/06/2022	8	10-20 m
08/06/2022	1	20-30 m
16/06/2022	6	25-40 m
18/06/2022	3	20-30 m

See Appendix 7.1 for the full survey results.

7.3.3.3 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. In the Bird Atlas 2007-2011 survey (Balmer *et al.*, 2013), there were breeding season records from 12 of the 17 hectads in Co. Waterford[6]. These included probable breeding in the hectad containing the proposed wind farm site and possible breeding in the hectad to the west of the proposed wind farm site.

The distribution of Snipe breeding activity was assessed by plotting the location of all Snipe records from May and June, and records of displaying Snipe in April and July (Figure 7.14). Other Snipe records from April and July were not included as they may have referred to migrants / late wintering birds; Snipe are widespread in non-breeding sites in April and again from July in southern Ireland (T. Gittings, personal observations).

In 2023 and 2024, a breeding Snipe territory was identified on Knockanask Hill (Table 7.10). In 2023, another territory was identified on the south-western slope of Knockscullogе outside the proposed wind farm site (Table 7.10). There were six records on the slopes of Knockscullogе in 2024, but no territory was identified (Table 7.10).

In 2024, records of displaying Snipe were recorded from two additional locations during the Woodcock surveys: the northern side of Broemountain, and the southern section of the proposed wind farm site (Figure 7.14). The coverage of potential Snipe breeding habitat on Broemountain may have been affected by access limitations. The record from the southern section of the site was in an area of forestry habitat and it is likely that the displaying Snipe at this location came from outside the site.

[6] Based on hectads with at least 50% of their land area in Co. Waterford.

Table 7.10. Snipe breeding areas in 2023 and 2024.

Map reference	Location	Details
1	Knockanask Hill	1 territory in centre of hill. Territory centres in different locations in the two years.
2	Knockscullogе	1-2 territories in 2022 and 1 territory in a different location in 2023; all along the edge of proposed wind farm site. 6 records in 2024 but no territory identified.

In previous years, Snipe breeding activity was recorded at Knockscullogе, and at three other locations (Appendix 7.1). No breeding activity was recorded on Knockanask Hill, although this may have reflected limited coverage.

The most consistently occupied area was at the southern end of Broe Mountain, where there were tightly clustered records of Snipe breeding activity from 2018, 2019 and 2022 (Figure 7.14, map reference 4). However, there were no Snipe records from this area in 2023 and only a single record with no evidence of breeding activity in 2024. Most of the records from this area were within the proposed wind farm site, but this probably reflects the fact that the records derive from surveys at vantage points and along survey routes within the proposed wind farm site. The likely Snipe breeding habitat in this area is outside the proposed wind farm site: the habitat map in the Dyrick Hill Environmental Impact Assessment Report (JOD, 2023) shows an area of wet grassland and poor fen and flush adjacent to the Scart Mountain Wind Farm boundary in this area. However, the surveys reported by JOD (2023) did not record any evidence of breeding Snipe in this area.

There were no records in 2023 and 2024 from two other areas that were occupied in multiple previous years: the valley between Knockscullogе and Broe Mountain to the north-east of the proposed wind farm site, and an area near the southern end of the proposed wind farm site (Figure 7.14, map references 3 and 5). The former is an area of wet grassland. The latter is an area of forestry where displaying Snipe were recorded during vantage point and Woodcock surveys, but with no apparently suitable Snipe breeding habitat. It seems likely that the displaying Snipe at this location came from outside the proposed wind farm site.

The Dyrick Hill Environmental Impact Assessment Report (JOD, 2023) also refers to records of Snipe breeding activity at Knocknanask and Knockscullogе. In March 2022, the report states that three Snipe were "both drumming and calling at Knocknanask South". The Knockscullogе records occurred in April and May 2022. In May "drumming and singing was heard from three different locations, therefore at least three snipe were believed to be present". No details of the exact locations of these records are included in the report.

It is possible that the apparent loss of two or three local breeding sites since 2018 reflects a continuing declining trend in the national Snipe breeding population.

7.3.3.4 Kestrel

Kestrel is a widespread, but declining breeding species in Ireland. In the Bird Atlas 2007-2011 surveys (Balmer *et al.*, 2013), breeding evidence was recorded in 88% of hectads in Ireland (Balmer *et al.* 2013).

Breeding Kestrels were recorded in all four of the hectads around the proposed wind farm site in the Bird Atlas 2007-2011 surveys (Balmer *et al.*, 2013). Evidence of breeding behaviour was recorded during the vantage point surveys and other surveys in most years. In the 2023 breeding raptor survey, it was estimated that at least three Kestrel territories were present within the 2 km buffer around the proposed wind farm site. However, this may have been an underestimate and further territories may have been present.

A total of 347 Kestrel flightlines were recorded during the vantage point surveys between the winter of 2022/23 and the summer of 2024. The recording rate per season over this period varied from 49 records / 360 hours in the winter of 2022/23 to 171 records / 360 hours in the summer of 2023, compared to rates of 36-190 records / 360 hours between the winter of 2017/18 and the summer of 2022 (Appendix 7.1).

There were distinct seasonal patterns of Kestrel flight activity (see Appendix 7.1). The highest record rates occurred in late summer / autumn (July-September), presumably reflecting the presence of recently fledged juveniles. For example, on one vantage point watch in August 2020, a total of 12 separate Kestrels were recorded, including both adults and juveniles. There was also a smaller peak in record rates in spring (March-May), which may have reflected display behaviour.

The Kestrel flight activity recorded in the vantage point surveys between the winter of 2022/23 and the summer of 2024 was concentrated around the northern half of the proposed wind farm site and along the edges of the site (Figure 7.15). In the southern part of the proposed wind farm site, little flight activity was recorded in the interior of the site. A lot of the interior of the proposed wind farm site is closed-canopy forestry, which is not favoured Kestrel foraging habitat. However, as most of the interior of the site was over 1000 m from the nearest vantage point, this pattern may also have been influenced by the effects of distance from vantage points on detection rates (see Gittings, 2024).

7.3.4 Other species

7.3.4.1 Waterbirds

The other waterbird species recorded in the vantage point surveys were Whooper Swan, Mallard, Black-throated Diver, Cormorant, Grey Heron, Lapwing, Whimbrel, Curlew, Black-headed Gull, Common Gull, Herring Gull, Lesser Black-backed Gull and Great Black-backed Gull. Most of these species were recorded very infrequently (Appendix 7.1). Grey Heron was recorded more regularly (Appendix 7.1), possibly indicating the presence of a local breeding population.

No other waterbird species were recorded in the 500 m buffer around the proposed wind farm site in the other bird surveys carried out for the proposed project.

7.3.4.2 Raptors and owls

The other raptor species recorded during the vantage point surveys and other surveys were Red Kite, White-tailed Eagle, Goshawk, Sparrowhawk, Buzzard and Hobby, while Osprey was recorded in the 2023 breeding raptor survey. The owl species recorded during the vantage point surveys and other surveys were Long-eared Owl, Short-eared Owl and Barn Owl.

Sparrowhawk and Buzzard were regularly recorded in the vantage point surveys and both have breeding populations in / around the proposed wind farm site (Appendix 7.1). In 2023 and 2-2024, based on the results of the breeding raptor surveys, it was estimated that there were at least three Sparrowhawk territories and five Buzzard territories within the 2 km buffer around the proposed wind farm site. Long-eared Owl was not regularly recorded but this reflects its nocturnal behaviour (Appendix 7.1). It was also considered to have a breeding population in the area around the proposed wind farm site.

The single Barn Owl record was from a nocturnal survey in 2021 and was recorded near a farm building in a valley to the south of the proposed wind farm site.

The other raptor and owl species were only recorded infrequently or rarely (Appendix 7.1) and were not considered to have established populations in the area around the proposed wind farm site.

7.3.4.3 Other species

A total of 60 other species were recorded during survey work around the proposed wind farm site (Appendix 7.1). Of these, the most notable species were Great Spotted Woodpecker and Chough.

Great Spotted Woodpecker is a recent colonist to Ireland (Coombes and Wilson, 2015) and its range has been rapidly expanding. It was first recorded at the proposed wind farm site in the summer of 2021 and was recorded in every subsequent year up to 2024, with a total of 12 records across this period. It is likely to be in the process of colonising the area around the proposed wind farm site.

Chough is a scarce resident of coastal areas around the south and west of Ireland. There was one record from the proposed wind farm site in the winter of 2022/23.

7.3.5 Evaluation

7.3.5.1 Potential Important Avian Features (Annex I species)

Hen Harrier

Hen Harrier is an Annex I species. It is a rare breeding species in Ireland with an estimated population in 2022 of 85-106 pairs (Ruddock *et al.*, 2024). It is amber-listed in Ireland due to declines in its breeding population (Gilbert *et al.*, 2021).

In the five national Hen Harrier surveys, the Knockmealdowns, Kilworth, and Comeraghs Region supported 1-2 to 5-7 Hen Harrier breeding pairs. Therefore, the Knockmealdowns, Kilworth, and Comeraghs Region Hen Harrier breeding population comprises over 1% of the national population and is of national importance.

In 2023, confirmed breeding occurred at one nest site on the edge of the proposed wind farm site. In 2024, no confirmed breeding occurred within / adjacent to the site but there was territorial activity at another location on the edge of the site. In both years, confirmed breeding occurred at separate locations at least 2 km from the site, while territorial activity occurred at another location over 1.5 km from the site.

In previous years, confirmed breeding occurred within / adjacent to the proposed wind farm site in three years (2018-2020). There was no recorded breeding activity in 2021. In 2022, the only breeding activity was a confirmed nest over 2 km from the site. However, birds from this nest site appeared to make use of Knockanask Hill for foraging.

During winter, many Hen Harriers move to coastal areas. This was reflected in the much lower Hen Harrier activity recorded in the non-breeding season during the bird surveys for the proposed project.

Golden Plover (wintering population)

Golden Plover is an Annex I species. It is a widespread winter visitor to Ireland with an estimated all-Ireland population in 2011/12-2015/16 of over 90,000 birds, of which over 80,000 occur in the Republic of Ireland (Burke *et al.*, 2018). However, it has shown a marked decline, with a decrease of over 40% since 1994/95-1998/99. It remains very widespread in winter and was recorded in 62% of hectads in Ireland during the Bird Atlas 2007-11 winter surveys (Balmer *et al.*, 2013).

Golden Plover is red-listed in Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) (Balmer *et al.*, 2021) but this listing only refers to its breeding population. The Golden Plover wintering population only qualifies for amber-listing.

A wintering Golden Plover population occurs in the vicinity of the proposed wind farm site. The Golden Plovers that occur around the proposed wind farm site may be associated with the Lower Blackwater River wintering population.

The mean peak flock size per winter recorded in the vantage point surveys was 256 birds and even the maximum flock size of 649 birds was below the threshold for national importance.

The available Irish Wetland Bird Survey data gives a total population of 4,352 Golden Plovers for Co. Waterford. Based on this data, the threshold for county importance is 44 birds. The Irish Wetland Bird Survey data is likely to significantly underestimate the Co. Waterford population because the survey only covers wetland sites, while wintering Golden Plovers are not restricted to such sites. However, given a mean peak count per winter of 256 birds, Co. Waterford population would have to be implausibly high (over 25,600 birds) for the Golden Plover population associated with the wind farm site to not be of county importance.

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 (NPWS, undated). It is amber-listed in Ireland due to declines in its breeding range (Gilbert *et al.*, 2021).

There was a very low incidence of Merlin sightings in the breeding season during vantage point surveys and other surveys carried out around the proposed wind farm site. While Merlin is a notoriously difficult species to survey (Lusby *et al.*, 2011) and there is the potential that some activity may have been overlooked, given the survey effort it is considered that no breeding Merlin are present within or adjacent to the site.

In 2023, a probable nest site was found around 2 km from the proposed wind farm site. In 2024, a pair was observed displaying at a different location around 1 km from the site. All of the

potential Merlin foraging habitat on Knockanask Hill is within the potential core foraging range of 5 km, as defined by SNH (2016), from the 2023 probable nest site.

A single breeding pair would represent well under 1% of the national Merlin population. While there are no figures available for the County Waterford population, it will clearly be a lot less than 100 pairs. Therefore, a single pair would represent a lot more than 1% of the Waterford population. Therefore, a breeding pair would be of county importance.

The SNH foraging range of 5 km represents a theoretical area of nearly 80 km^2, while the Merlin foraging habitat within the proposed wind farm site is around 2 km^2. While not all of the theoretical foraging area will be suitable Merlin foraging habitat, it is clear that the proposed wind farm site only represents a small fraction of the likely foraging range of any Merlin pair breeding in the vicinity. There was a very low incidence of Merlin records from the site, so it does not appear to provide an important foraging resource.

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.*, 2021). 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 within the 2 km buffer zone around the proposed wind farm site. There was a nest site recorded at Mount Melleray in 2023. However, the proposed wind farm site is outside the likely core foraging range of 2 km (SNH, 2016) from this nest site.

Therefore, as the proposed wind farm site does not 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. However, the collision risk modelling predicted a non-negligible collision risk to Peregrine. Therefore, Peregrine has been included as an Important Avian Feature for the purposes of assessing collision risk, but assessments of other potential impacts are not required.

7.3.5.2 Potential Important Avian Features (red-listed species)

Red Grouse

Red Grouse is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2021) due to a greater than 50% long-term decline in its breeding population.

The results of the breeding distribution surveys in 2023 and 2024 indicated that the proposed wind farm site supported one Red Grouse territory on Knockanask Hill. Numbers of Red Grouse territories were not assessed in previous years, but all the Red Grouse records within the proposed wind farm site came from the same area as the 2023 records (apart from one record within forestry that was presumably a mapping error). Red Grouse were also recorded on the south-western slopes of Knockscullogue, outside the site.

The most recent population estimates are of 4,218 adult birds in the Republic of Ireland in 2008 Cummins *et al.*, 2010) and 202 breeding pairs in Northern Ireland in 2004 (NRGSC, 2013). While the population may have declined since then, the breeding Red Grouse population in the local

area around the proposed wind farm site is clearly well below the 1% threshold for national importance.

Cummins *et al.* (2010) estimated the Red Grouse populations in the Knockmealdown Mountains and the Comeragh Mountains as 63 and 21 adult birds, respectively. The Knockmealdown Mountains population will include birds in Co. Tipperary. Therefore, the Red Grouse population in the local area around the proposed wind farm site is likely to be substantially more than 1% of the Co. Waterford population and is assessed as being of county importance.

Woodcock (breeding population)

Roding Woodcock were widespread in the proposed wind farm site. They were recorded throughout most of the lengths of the transect routes within the proposed wind farm site.

The standard method for surveying breeding Woodcock involves counting registrations of roding birds (Hoodless *et al.*, 2009). In a large-scale British survey of breeding Woodcock, the mean of the maximum number of registrations recorded per site was 7.45 (with a standard error of 1.03) (Hoodless *et al.*, 2009).

The transect survey method used in the Scart Mountain Wind Farm surveys differed from the stationary method used in the British surveys. However, both survey methods should produce similar results in sites where roding Woodcock are widespread across the survey areas.

The figures from the British survey were based on three survey visits per site, compared to 5-6 survey visits per transect in the Woodcock surveys carried out in 2024. This means that there was a higher chance of recording higher maximum numbers of registrations recorded per transect in the latter surveys. Despite this fact, the maximum number were lower than the mean from the British surveys. Therefore, the numbers of Woodcock registrations recorded would suggest that the proposed wind farm site holds a relatively low density of breeding Woodcock compared to typical British Woodcock sites.

Comparable data for Ireland is lacking. However, the incidence of surveys with zero registrations of roding birds was notable. At sites with large populations, roding Woodcock are usually recorded on every survey within the recommended survey period (T. Gittings, unpublished data).

Woodcock is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2021) for its breeding populations. Its recorded distribution indicates that it is now very rare as a breeding species over most of the country with concentrations of breeding records in a few areas. However, due to its secretive nature, the recorded breeding distribution in the Bird Atlas surveys (Balmer *et al.*, 2013) is likely to underestimate the actual breeding distribution of this species. O'Neill *et al.* (2023) considered that "breeding Woodcock occupy a greater range in Ireland than previously reported".

There were possible, probable, or confirmed breeding records of Woodcock from 132 hectads in Ireland during the Bird Atlas surveys. The Scart Mountain Wind Farm site only occupies part of one hectad. The breeding population in the proposed wind farm site is not likely to be at the higher end of the range of Irish breeding densities. Also, as discussed above, the Bird Atlas surveys are likely to have significantly underestimated Woodcock breeding distribution in Ireland. Therefore, it is unlikely that the Scart Mountain Wind Farm site holds 1% of the Irish breeding population.

During the Bird Atlas surveys, there were possible, probable, or confirmed breeding records of Woodcock from 11 of the 17 hectads in Co. Waterford. The forestry habitat in the proposed wind farm site comprises around 3.5% of the forestry habitat in Co. Waterford[7] and not all of the latter will hold breeding Woodcock. Therefore, it is likely that the proposed wind farm site supports well over 1% of the Co. Waterford Woodcock population, so the Scart Mountain Wind Farm site is evaluated as being of county importance for breeding Woodcock.

Snipe (breeding population)

Snipe is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2021) 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).

Breeding Snipe activity was recorded in five areas around the proposed wind farm site, with one area possibly supporting 2-3 territories. However, in 2023 and 2024 (the only years with comprehensive survey coverage) only 1-2 Snipe territories were recorded.

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 proposed wind farm site is clearly well below the 1% threshold for national importance.

Possible, probable, or confirmed breeding records of Snipe were recorded in 12 hectads in Co. Waterford during the Bird Atlas surveys (including edge hectads with at least 50% of their land area in Waterford). This is around 2% of the Republic of Ireland hectads with Snipe breeding evidence. This would imply, on a pro rata basis, a Co. Waterford breeding population of around 120 pairs of Snipe in 2008. Given the likely continued decline since 2008, the breeding Snipe population within local area around the proposed wind farm site is likely to be substantially more than 1% of the Co. Waterford population. Therefore, the breeding Snipe population of the proposed wind farm site is assessed as being of county importance.

Kestrel

Kestrel is red-listed in Birds of Conservation Concern Ireland 2020-2026 (Gilbert *et al.*, 2021) 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).

A high level of Kestrel activity was recorded in the vantage point surveys carried out for the proposed project. A minimum of three Kestrel territories were estimated to be present in the 2 km buffer around the proposed wind farm site in 2023 and 2024. However, given the level of Kestrel flight activity recorded in the vantage point surveys, it seems likely that the actual breeding population was higher.

[7] Forestry habitat in proposed wind farm site was estimated as the total area of the WD1, WD3, WD4 and WS5 habitats mapped in Chapter 6. Forestry habitat in Co. Waterford was estimated as the total areas of the CORINE landcover types 312, 313 and 324 (2018 dataset).

While the precise size of the Kestrel breeding population is not known, it is clearly below the threshold for national importance (around 600-1,000 pairs). Based on the Bird Atlas 2007-11 data (Balmer *et al.*, 2013), the Waterford population is probably around 175 pairs (See Appendix 7.7). Therefore, the Kestrel breeding population is likely to be of county importance.

7.3.5.3 Other species

Most of the other waterbird, raptor and owl species recorded during the bird surveys for the Scart Mountain Wind Farm project were recorded infrequently or rarely. Therefore, as they do not have established populations in the Scart Mountain Wind Farm study area, they do not qualify as Important Avian Features.

Grey Heron, Sparrowhawk, Buzzard and Long-eared Owl were recorded more frequently, and Sparrowhawk, Buzzard and Long-eared Owl were considered to have breeding populations in the study area. These species were not included as Important Avian Features because they are not nationally rare / scarce or rare / scarce in Co. Waterford, they are green-listed in Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) (Gilbert *et al.*, 2021), and the local populations are not Qualifying Interests of Special Protection Areas or are important features of Natural Heritage Areas or proposed Natural Heritage Areas.

The only other rare/scarce species recorded in the 500 m buffer around the proposed wind farm site were Great Spotted Woodpecker and Chough.

Great Spotted Woodpecker is a recent colonist to Ireland (Coombes and Wilson, 2015) and is green-listed in Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021) (Gilbert *et al.*, 2021). While it may currently be scarce in Co. Waterford, it has a rapidly expanding population and over the lifespan of the wind farm project is likely to become common and widespread throughout Ireland.

There was only a single record of Chough during the bird surveys for the Scart Mountain Wind Farm project. Chough is a scarce species of coastal areas in south and west Ireland. While small inland populations occur in the coastal hinterland in a few areas, there are no known Chough populations in the Knockmealdown Mountains. Therefore, the record from the Scart Mountain Wind Farm project almost certainly refers to a wandering bird and is not of conservation significance.

The non-waterbird, raptor, owl and grouse species recorded also included five red-listed species: Stock Dove, Swift, Meadow Pipit, Grey Wagtail and Yellowhammer. These are all common and widespread species with estimated all-Ireland populations of 37510, 116090, 1719240, 83470 and 230,450 individuals, respectively (Crowe *et al.*, 2014).

7.3.5.4 Summary

Table 7.11 summarises the evaluation of the conservation significance of the potential Important Avian Features species populations in the Scart Mountain Wind Farm study area.

Table 7.11 Evaluation of the conservation significance of the potential Important Avian Features.

Species	International status	National status	Population	Occurrence	Important Avian Feature	Evaluation	
						NRA	Percival
Hen Harrier	Annex I	Amber	Breeding / partial resident	2 territories with nest sites within / adjacent to proposed wind farm site and 1 other territory adjacent to the site; at least 1 further territory partially within study area. Some birds remain in winter.	Yes	National	High
Golden Plover	Annex I	Amber	Wintering	Regularly recorded around the site with a mean peak count per winter of 256 birds; possibly connected to Lower Blackwater River wintering population.	Yes	County	Medium
Merlin	Annex I	Amber	Breeding	Probably within foraging range of one breeding pair; no evidence of nesting.	Yes	County	High
Peregrine	Annex I	Amber	-	Nest site at Mount Melleray Abbey but proposed wind farm site is outside the likely core foraging range of this nest site; included as an Important Avian Feature due to the predicted collision risk.	Yes	-	Medium
Red Grouse	-	Red	Resident	One territory within proposed wind farm site on Knockanask Hill; other territories adjacent to proposed wind farm site at Knockscullloge.	Yes	County	Medium
Woodcock	-	Red	Breeding	Moderate / large breeding population.	Yes	County	Medium
Snipe	-	Red	Breeding	One territory within proposed wind farm site on Knockanask Hill; several other territories on the edge of / adjacent to the proposed wind farm site.	Yes	County	Medium
Kestrel	-	Red	Resident	At least three territories, probably more, within study area.	Yes	County	Medium

7.4 POTENTIAL EFFECTS

7.4.1 Impacts on Hen Harrier

7.4.1.1 Do-nothing impact

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

7.4.1.2 Construction disturbance

Goodship and Furness (2022) recommended a buffer zone of 300-750 m to protect Hen Harriers from pedestrian and aircraft disturbance but stated that "for activities with a high potential for visual and audial disturbance (e.g. forestry operations), a larger buffer zone between 500-1000m may be necessary during the breeding period".

The distances of the Hen Harrier nest sites / territories recorded within / adjacent to the proposed wind farm site from the proposed wind farm infrastructure are shown in Table 7.12. All four nest sites / territories are located within 300 m of the proposed wind farm infrastructure and within 650 m of the proposed turbines. Therefore, these nest sites are all close enough to be potentially disturbed by wind farm construction work. The other recorded Hen Harrier nest sites / territories are all over 2 km from the nearest wind farm infrastructure and are, therefore, well outside any potential disturbance zone. However, there may also be other suitable nest sites within the potential disturbance zone that could be occupied in future years.

Table 7.12. Distances of Hen Harrier nest sites / territory centres from proposed wind farm infrastructure.

Territory	Year(s)	Distance (m) from	
		all infrastructure	turbines
A	2018-2019	180	540
B	2019-2020	70	640
A	2023	50	520
G	2024	260	460

Values are rounded to the nearest 10 m. For A and B, the distances refer to nest sites; the nest site in territory A was in different locations in 2018 and 2023. For G, the distances refer to the territory centre.

Across the seven years with information on breeding Hen Harriers, there was one year with two nest sites within 1 km of proposed wind farm infrastructure (2019), four years with one nest site / territory centre within 1 km of proposed wind farm infrastructure (2018, 2020, 2023 and 2024), and two years with no nest sites / territory centres within 1 km of proposed wind farm infrastructure (2021 and 2022). Therefore, based on this record, in any one year construction work could potentially affect 0-2 nest sites.

Construction disturbance could have different types of impacts on nesting Hen Harriers, depending on the timing of the construction work in relation to the Hen Harrier nesting activity.

If construction work begins while Hen Harriers are nesting at a nest site within the potential disturbance zone, then construction disturbance may cause the Hen Harriers to abandon the nest site. Hen Harriers can make second nesting attempts in the same season: in a Scottish study, 15 instances of likely second nesting attempts were identified within 0.03-1.4 km of a nest that had failed at the egg stage (Hardey *et al.*, 2013). However, the likelihood of a second nesting attempt presumably depends on how late in the breeding season the nest failure occurs.

If construction work is ongoing before the Hen Harriers 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.

If construction work causes abandonment of a nest site, without successful nesting elsewhere, the impact would be a very significant short-term negative impact at the national scale. However, construction disturbance to Hen Harrier nest sites from the Scart Mountain Wind Farm will be avoided by implementation of the mitigation measures in Section 7.5.1. Also, Hen Harriers may not be vulnerable to construction disturbance every year: breeding activity did not occur within / adjacent to the proposed wind farm site in two of the seven years covered by the surveys for the proposed project.

7.4.1.3 Habitat loss

The total permanent habitat loss will be around 31 ha. This will include around 3 ha of heath. Most of the remainder will be forestry habitat. Therefore, as forestry habitat is suitable for Hen Harriers for around one-third of the forest rotation, the effective loss of Hen Harrier habitat will be around 9 ha.

Table 7.13 shows the potential effect of permanent habitat loss on the availability of foraging habitat within the core foraging range around each of the four Hen Harrier nest sites / territory centres that have been identified within / adjacent to the proposed wind farm site. These calculations assume that the core foraging range around each nest site / territory centre is a circle of radius 2 km, based on the guidance in SNH (2016). This assumption is not likely to be correct, particularly in years when both territories were occupied, but the calculations provide an indication of the likely habitat loss effects.

Table 7.13. Potential effect of permanent habitat loss on the availability of Hen Harrier foraging habitats.

Territory	Site	Total core foraging habitat (ha)	Habitat loss (ha)	Reduction in core foraging habitat
A	1	467	3.1	0.7%
A	2	507	3.0	0.6%
B	1	682	6.0	0.9%
G	1	491	3.7	0.8%

Foraging habitats were identified from the habitat map in Chapter 6 for the proposed wind farm site. The following habitats in the proposed wind farm site were considered potential foraging habitats: dry-humid acid grassland (GS3), wet grassland (G4), dry siliceous heath (HH1), dry calcareous heath (HH2), wet heath (HH3), broad-leaved woodland (WD1), upland blanket bog (PB2), cutover bog (PB4), conifer woodland (WD3), conifer plantation (WD4), scrub (WS1) and recently-felled woodland (WS5). The areas of the forestry habitat (WD1, WD3, WD4 and WS5) were given a weighting of 0.33, as they are suitable for Hen Harrier foraging for approximately one-third of the forestry rotation.

Table 7.13 indicates that the potential effects of permanent habitat loss on the availability of Hen Harrier foraging habitats within the core foraging ranges of Hen Harrier breeding territories will be imperceptible.

To create space for the turbine delivery on roads and operation on hardstands an additional 49 ha of conifer plantation will be felled. These areas will be maintained as open habitats. Therefore, there will be a net gain in open habitat within the proposed wind farm site. However, the quality of the new open areas as potential Hen Harrier habitat will depend on their management.

7.4.1.4 Displacement (foraging habitat)

Literature review

There is mixed evidence about the sensitivity of Hen Harrier to disturbance and displacement impacts from wind farms. A large-scale study by Pearce-Higgins *et al.* (2009) compared Hen Harrier flight activity at 12 wind farms with matched control sites. They found a 52.5% reduction in flight activity within 500 m of turbines, but this had wide confidence intervals (-1.2 - +74.2%). In North America, Garvin *et al.* (2011), reported a greater than 50% reduction in Northern Harrier[8] flight activity after construction of a wind farm, while overall raptor abundance was 61% higher in a control site compared to the wind farm (there was no pre-construction data for the control site).

However, a review of a number of studies (Whitfield and Madders, 2006) found no evidence of displacement in seven of the nine studies examined, with a displacement effect reported in one study and possible limited small-scale displacement in another study. Based on this review Madders and Whitfield (2006) classified the sensitivity of Hen Harrier to displacement as "Low-Medium?", indicating uncertainty about the exact level of sensitivity. Haworth and Fielding (2012) reported that "detailed monitoring at five Scottish wind farms does not support … [the level of avoidance reported by Pearce-Higgins *et al.* (2009)] but does suggest some small scale avoidance". Another study that found no evidence of displacement impacts to Hen Harrier flight activity was a monitoring study at the Derrybrien Wind Farm (Madden and Porter, 2007), although the statistical power of this study was probably not sufficient to detect anything below a very large displacement impact. Thelander *et al.* (2003) reported increased flight activity within 50 m of turbines, but this study only included flight activity within 300 m of the turbines. Other studies have found little evidence of displacement impacts to Hen Harrier nest sites and breeding productivity (Haworth and Fielding, 2012; Fernández-Bellon *et al.*, 2015; Wilson *et al.*, 2016; various studies cited by Wilson *et al.*, 2015). However, O'Donoghue *et al.* (2011) reported increased distance to nest sites and a decline in productivity following construction of a wind farm in Kerry.

Assessment

The data shown in Fig. 1 of Pearce-Higgins *et al.* (2009) indicates that reductions in Hen Harrier densities mainly occur within 250 m of the turbine and they state that Hen Harrier avoidance of turbines extended to "at least … 250 m from the turbines". The quantitative displacement effect

[8] The Northern Harrier is the equivalent of the Hen Harrier in North America. It was formerly considered to be a subspecies of the Hen Harrier, but recent genetic research indicates that is a closely related, but separate, species (Etherington and Mobley, 2016).

quoted above is from Table 3 of their paper, which shows predicted reductions in densities for a range of species in 500 m buffers around turbines. These predicted reductions were based on statistical models that assumed linear relationships between bird densities and distances from turbines. This means that, where the avoidance effect extends for less than 500 m, the models will tend to over-predict the displacement effect at the 500 m scale. Therefore, in this assessment the displacement effect has been assessed using 250 m buffers around the turbines and makes a precautionary assumption of a 100% displacement effect within those buffers.

The above approach is precautionary as in reality any displacement effect will be less than 100%. Furthermore, there is some uncertainty about the displacement effect reported by Pearce-Higgins *et al.* (2009) as other studies (summarised above) have reported much weaker displacement effects (although most of these other studies are grey literature and have not been peer reviewed).

The potential displacement effects were assessed for the likely core foraging range around each nest site / territory centre recorded over the period 2018-2024. The likely core foraging ranges were assumed to be circles of radius 2 km, based on the guidance in SNH (2016). This assumption is not likely to be correct, particularly in years when both territories A and B were occupied, but the assessment provides an indication of the likely displacement effects.

The overall distribution of Hen Harrier habitat potentially affected by displacement effects is shown in Figure 7.16. This shows the habitat composition of the 250 m buffers around each turbine within the likely core foraging range of at least one nest site / territory centre. The displacement habitat can be divided into northern and southern groups.

The northern group of seven turbines overlapped with the distribution of Hen Harrier breeding season flight activity. These include five turbines with buffers largely occupied by bog/heath habitat on Knockanask Hill and two turbines buffers largely occupied by forestry habitat.

There were very low levels of breeding season Hen Harrier flight activity recorded around the southern group of six turbines. The buffers around these turbines were largely occupied by forestry habitat. As forestry is only suitable as Hen Harrier foraging habitat for around one-third of its lifecycle, it is possible that the low level of flight activity could have been affected by the age-classes of the forestry during the period covered by this assessment. Alternatively, it may be that the distribution of bog/heath habitat in relation to the nest sites / territory centres meant that the core foraging ranges were asymmetrically distributed around the nest sites / territory centres, and the southern group of turbines were outside these ranges.

Table 7.14 shows the amounts of Hen Harrier foraging habitat potentially affected by displacement effects divided between the northern and southern groups of turbines. In calculating these figures, the areas were weighted to reflect the likely availability of the habitat over the lifespan of the wind farm. The forestry habitats were given a weighting of 0.33 as they are suitable for Hen Harrier foraging for approximately one-third of the forestry rotation, while the bog/heath habitats were given a weighting of 1. For three of the nest sites / territory centres, the southern group of turbines contributes around 25-50% of the displacement area. If the southern group is outside the core foraging ranges the total displacement area would be reduced by a corresponding amount. The fourth nest site has the largest displacement area, and this is almost entirely contained within the northern group of turbines.

Table 7.14 also shows the total amount of Hen Harrier foraging habitat within the likely core foraging ranges and percentage reductions due to the displacement effects. The reduction is

based on the combined displacement areas across the northern and southern groups of turbines. It would not be valid to calculate percentage reductions using only the displacement areas from the northern group as the habitat figures for the likely core foraging ranges assume that the southern group are within these ranges. Because the percentage reductions include the displacement areas from the southern group of turbines, and due to the precautionary nature of the assessment (see above), the percentage reductions are likely to overestimate the true displacement effects.

Table 7.14. Potential displacement effects on the availability of Hen Harrier foraging habitats.

Territory	Site	Displacement area (ha)		Total core foraging habitat (ha)	Reduction in core foraging habitat
		north	south		
A	1	15	25	467	9%
A	2	25	15	507	8%
B	1	99	7	682	16%
G	1	20	35	491	11%
all		99	34	870	15%

Foraging habitats were identified from the habitat map in Chapter 6 for the proposed wind farm site and from CORINE landcover mapping (2018 dataset) for the areas outside the proposed wind farm site. The following habitats in the proposed wind farm site were considered potential foraging habitats: dry-humid acid grassland (GS2), dry siliceous heath (HH1), wet heath (HH3), broad-leaved woodland (WD1), conifer woodland (WD3), conifer plantation (WD4), scrub (WS1) and recently-felled woodland (WS5). The following CORINE landcover types were considered potential foraging habitats: coniferous forest (312), mixed forest (313), transitional woodland-shrub (324) and peat bogs (412). Note that the areas mapped as transitional woodland-shrub were mainly young forestry plantations. The areas of the forestry habitat (WD1, WD3, WD4, WS5, 312, 313 and 324) were given a weighting of 0.33, as they are suitable for Hen Harrier foraging for approximately one-third of the forestry rotation.

The nest sites / territory centres in territories C-F were more than 2 km from the proposed wind farm site. Therefore, avoidance of turbines will not have any effect on availability of foraging habitat within the core foraging ranges of these territories, using the 2 km definition of the core foraging range. However, given the small amount of Hen Harrier foraging habitat within the 2 km core foraging range of territory C, it is possible that the core foraging range of this territory extends further than 2 km and may include part of the proposed wind farm site.

The potential displacement effects to territories A, B and G are permanent moderate negative impacts at the national scale. This is a precautionary assessment (see above).

7.4.1.5 Displacement and operational disturbance (nest sites)

Operational wind farms could cause displacement impacts to Hen Harrier 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 detailed information available about the effects of turbine presence on Hen Harrier nest sites. In general, birds habituate over time to new structures in the landscape, and there are some documented examples of Hen Harrier nesting within a few 100 metres of operational turbines (e.g., Haworth and Fielding, 2012). However, the degree to which such habituation is usual is not clear.

The increased human activity generated by wind farms may also cause nesting Hen Harriers to avoid areas close to operational wind farms. The activity generated by the wind farm will include

routine maintenance and occasional repair works to faulty turbines. The nature of these activity types mean that the generic breeding season buffer distance of 350-750 m recommended by Goodship and Furness (2022) is applicable, rather than the 500-1000 m buffer distance used for activities such as forestry operations.

The nearest turbines are all over 500 m from the nest sites, but the nearest wind farm infrastructure is much closer to each nest site (Table 7.12).

The nearest wind farm infrastructure to the nest sites in territory A will be an access track. This track largely follows the route of an existing forestry road. In the vicinity of nest site A1 the track will be around 30 m closer to the nest site than the forest road, while the track is on the line of the forest road in the vicinity of nest site A2.

The nearest wind farm infrastructure to the nest sites in territory B will also be an access track. This access track is a new route. However, there is an existing forest road at a similar distance from the nest site, although this forest road is a cul-de-sac and may not be used very often.

Overall, given the distance of the turbines from the nest sites, and the nature of operational activities in the proposed wind farm site compared to existing activities in the proposed wind farm site, it seems unlikely that displacement and/or operational disturbance will cause Hen Harriers to avoid occupying the nest sites, or to abandon nesting attempts at these nest sites.

7.4.1.6 Collision risk

The predicted collision risks to the Hen Harrier breeding and non-breeding populations are summarised in Table 7.15.

The predicted collision risks to the breeding population represent a mean of around 0.25 Hen Harrier collisions over the 35-year lifespan of the wind farm. However, with a mean annual collision risk to the breeding population of 0.0075, there is an approximately 23% chance of at least one collision, and a 3% chance of at least two collisions, occurring within the wind farm lifespan (see Appendix 7.7).

The predicted collision risks to the non-breeding population are much smaller and represent around one Hen Harrier collision every 400-500 years.

The turbine models with the highest Hen Harrier collision risks are those with the lowest ground clearances (N163 and V162).

Table 7.15. Predicted collision risk (collisions/year) to the Hen Harrier breeding and non-breeding populations from the operation of the proposed project.

Population	Model	N149	N163	SG 155	V150	V162
breeding	1 height band	0.0075	0.0075	0.0075	0.0075	0.0074
	2 height bands	0.0038	0.0050	0.0044	0.0039	0.0049
non-breeding	1 height band	0.0022	0.0022	0.0021	0.0022	0.0021
	2 height bands	0.0011	0.0014	0.0013	0.0011	0.0014

See Appendix 7.7 for the full results of the collision risk modelling.

The significance of the collision risk was assessed by population modelling using the maximum predicted collision risk from the one height band model. This may overestimate the collision risk for turbine models with higher ground clearances, as most Hen Harrier flight activity is likely to be below their ground clearance heights.

The Hen Harrier population model (Appendix 7.7) indicated that with typical productivity rates (numbers of birds fledged per breeding pair) recorded for the Irish population, the Knockmealdowns, Kilworth, and Comeraghs population would show moderate growth rates. The predicted collision risk, or a precautionary doubling of the predicted collision risk, would not affect the growth rates or have significant effects on the potential for the population of the population to reach a favourable conservation status.

If the Knockmealdowns, Kilworth, and Comeraghs population has very low productivity rates, the model predicted that it would decline to extinction within the lifespan of the wind farm. The predicted collision risk scenarios would cause a slight increase in the decline, but, at most, would result in extinction one year earlier.

7.4.1.7 Cumulative impacts

This assessment considers the cumulative impacts of the development of the Scart Mountain Wind Farm in-combination with other relevant projects and plans on the Hen Harrier breeding population of the Knockmealdowns, Kilworth, and Comeraghs Region.

Construction disturbance

It is possible that, if both projects get planning permission, construction work on the proposed Dyrick Hill Wind Farm and the Scart Mountain Wind Farm will overlap. This could potentially cause increased disturbance to Hen Harrier nests, as the potential construction disturbance zone from the proposed Dyrick Hill Wind Farm overlaps the Hen Harrier nest sites identified within territory A. However, construction disturbance to Hen Harrier nest sites from the Scart Mountain Wind Farm will be avoided by implementation of the mitigation measures in Section 7.5.1.

Displacement

The potential cumulative impacts of displacement from the proposed project in-combination with the proposed Dyrick Hill Wind Farm on the availability of Hen Harrier foraging habitats within the core foraging ranges of the four Hen Harrier nest sites / territories assessed in Section 7.4.1.4 are shown in Table 7.16.

As with the assessment in Section 7.4.1.4, the turbines that could potentially cause displacement were divided into two groups. The northern group comprises seven turbines in the Scart Mountain Wind Farm site and two turbines in the Dyrick Hill Wind Farm site that are in areas with high levels of recorded breeding season flight activity. The southern group comprises six turbines in the Scart Mountain Wind Farm site and three turbines in the Dyrick Hill Wind Farm site with low levels of recorded breeding season flight activity, and another three turbines in the Dyrick Hill Wind Farm site that were not covered by the Scart Mountain vantage point surveys but are outlying areas of forestry. See Section 7.4.1.4 for further discussion.

Depending on the extent to which the habitats in the southern group are important for Hen Harriers, the cumulative impacts would be long-term moderate – significant negative impacts

at the national scale. As discussed in Section 7.4.1.4, the assessment of potential displacement effects was precautionary.

Table 7.16. Potential cumulative displacement effects from the proposed project in-combination with the proposed Dyrick Hill Wind Farm on the availability of Hen Harrier foraging habitats.

Territory	Site	Displacement area (ha)		Total core foraging habitat (ha)	Reduction in core foraging habitat
		north	south		
A	1	49	90	467	30%
A	2	58	79	507	27%
B	1	132	27	682	23%
G	1	53	97	491	31%
all		132	100	870	27%

See footnote to Table 7.14 for habitat definitions and weightings used in these calculations.

In the wider Knockmealdowns, Kilworth, and Comeraghs Region there are two other wind farm projects (the Barranafaddock Wind Farm and the proposed Coumnagappul Wind Farm). The potential cumulative impacts of displacement from the proposed project in-combination with the Barranafaddock Wind Farm, the proposed Coumnagappul Wind Farm and the proposed Dyrick Hill Wind Farm would reduce the overall availability of Hen Harrier foraging habitats by around 2%. However, this figure does not take account of Hen Harrier nest site locations and territories and the landscape configuration of the foraging habitat.

Collision risk

The cumulative collision risk of the proposed project in combination with the other wind farm projects in the Knockmealdowns, Kilworth, and Comeraghs Region is around 0.03 collisions / year (Appendix 7.7).

The Hen Harrier population model indicated that with typical productivity rates (numbers of birds fledged per breeding pair) recorded for Irish population, the Knockmealdowns, Kilworth, and Comeraghs population would show moderate growth rates. The predicted cumulative collision risk, or a precautionary doubling of that risk, would not affect the growth rates or have significant effects on the potential for the population of the population to reach a favourable conservation status.

If the Knockmealdowns, Kilworth, and Comeraghs population has very low productivity rates, the model predicted that it would decline to extinction within the lifespan of the wind farm. The predicted collision risk scenarios would cause a slight increase in the decline, but, at most, would result in extinction one year earlier.

Other impacts

Forestry operations will take place throughout the construction and operational periods of the wind farm. Felling licences for forestry management operations are administered by the Forest Service. All activities associated with a felling licence have to comply with the *Forest Biodiversity Guidelines* (Forest Service, 2000). These guidelines require that that all forest operations should be planned "with due regard to the breeding nesting seasons of important species". To comply with the *Forest Biodiversity Guidelines*, forestry operations within the Scart

Mountain Wind Farm site will have to be planned and implemented so that they do not cause disturbance to occupied Hen Harrier nest sites.

Afforestation or agricultural improvement of bog or heath habitats or areas of unimproved grassland in the Knockmealdowns, Kilworth, and Comeraghs Region may result in loss of Hen Harrier foraging habitat. Any significant habitat loss of this kind would have a cumulative impact on the availability of foraging habitat for the Knockmealdowns, Kilworth, and Comeraghs Region Hen Harrier population in-combination with the displacement impacts from the proposed project, the Barranafaddock Wind Farm and the proposed Dyrick Hill Wind Farm.

7.4.2 Impacts on Golden Plover (wintering population)

7.4.2.1 Do-nothing impact

Golden Plover activity in the area around the proposed wind farm site probably depends on the availability of suitable foraging habitat. This is likely to vary from year to year with changes in management of individual fields, while weather conditions (e.g., flooding of fields) may also affect this.

7.4.2.2 Construction disturbance, habitat loss and displacement

Golden Plovers were not recorded using habitats within the wind farms. The presumed roosting area used by Golden Plovers in the bog / heath on Broe Mountain is over 500 m from the nearest proposed turbine, while the grassland foraging area used by Golden Plovers on the western side of the proposed wind farm site is over 700 m from the nearest turbine. Golden Plovers may use other grassland areas around the proposed wind farm site for foraging, but the nearest potential grassland foraging habitat is over 300 m from the nearest turbine. Therefore, the development of the wind farm is not likely to cause any construction disturbance, habitat loss or displacement impacts to the wintering Golden Plover population that uses the area around the proposed wind farm site.

7.4.2.3 Barrier effects

Golden Plover flight activity across the proposed wind farm site involved birds commuting between areas of open ground either side of the site. Therefore, there is potential for barrier effects to interfere with their commuting routes.

Percival *et al.* (2018) reported reduced flight activity by Golden Plovers within 200 m of operational turbines at an English wind farm, with increased flight activity at distances of 200-700 m. However, this work has not been peer-reviewed.

Knockanask Hill

The main concentration of Golden Plover flight activity within the proposed wind farm site involved birds commuting across Knockanask Hill. However, there were no records of birds on the ground in the vicinity of Knockanask Hill, so the locations that the birds were commuting between are not known. Applying a barrier effect of 200 m around the proposed turbine locations on Knockanask Hill would not result in significant lengthening of potential commuting routes. However, if the barrier effect was slightly larger, the barrier-free gaps between turbines 1 and 2 and turbines 3 and 4 would disappear.

The worst-case scenario of birds completely avoiding Knockanask Hill due to the presence of turbines would increase the length of potential commuting routes between open ground immediately adjacent to the site on either side of Knockanask Hill by around 1 km. However, there were no records of birds on the ground immediately adjacent to the site on either side of Knockanask Hill. Therefore, the flightlines are likely to have involved birds commuting between more distant locations. As the length of the commuting route increases, the length of the diversion that would be required to avoid Knockanask Hill decreases and the additional energy expenditure due to increases in commuting distances would also decrease.

Other areas

There were ground records of Golden Plovers in adjacent to the proposed wind farm site, although there were no records from these areas in the winters of 2022/23 and 2023/24. The flight activity associated with these areas does not indicate regular commuting routes across the interior of the site. There is also a large gap between turbines 7 and 8, which means that any commuting routes between these areas are unlikely to be significantly affected by barrier effects.

Conclusions

Overall, given the evidence about the spatial extent of barrier effects to Golden Plovers, and the lack of ground records of Golden Plovers in the vicinity of Knockanask Hill, and their flight activity patterns around the proposed wind farm site, any barrier effects are unlikely to be significant.

7.4.2.4 Collision risk

The predicted collision risk to the wintering Golden Plover population is around 4 collisions/year. There was not much variation between the turbine models in the collision risk (Table 7.17).

Table 7.17. Predicted collision risk (collisions/year) to the Golden Plover wintering population from the operation of the Scart Mountain Wind Farm .

Population	Model	N149	N163	SG155	V150	V162
wintering	1 height band	1.7	1.7	1.8	1.7	1.7
	2 height bands	1.6	1.7	1.7	1.6	1.7

See Appendix 7.7 for the full results of the collision risk modelling.

The predicted collision risks would not have significant impacts on the all-Ireland or County Waterford Golden Plover populations (Appendix 7.7).

If the Golden Plovers that occur at the proposed wind farm site are part of the Lower Blackwater River Population, the predicted collision risk would result in a 6% increase in mortality rates to this population, based on the five-year mean Irish Wetland Bird Survey peak count for this site (Appendix 7.7). This would be a potentially significant impact. However, there are three important caveats.

Firstly, the collision risk model used 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.

Secondly, the Irish Wetland Bird Survey data for the Lower Blackwater River Population is limited and it is not clear how well it represents the actual Golden Plover population of the site (Appendix 7.7).

Thirdly, some of the flight activity data included in the collision risk model may have involved birds of passage migration in April and October, which were not part of the local wintering population.

7.4.2.5 Cumulative impacts

The only potential impact that requires cumulative assessment is the collision risk.

The cumulative collision risk of the proposed project in combination with other wind farm projects in County Waterford would not cause a significant impact to the all-Ireland Golden Plover population (Appendix 7.7).

The calculated increase to the mortality rate of the County Waterford Golden Plover population from the cumulative collision risk of the proposed project in combination with other wind farm projects in County Waterford is around 2% (Appendix 7.7). While this is above the 1% threshold, the actual increase to the mortality rate of the County Waterford Golden Plover population is not likely to be significant. Firstly, Irish Wetland Bird Survey counts are likely to substantially underestimate the County Waterford population as many wintering Golden Plover populations in Ireland occur away from the wetland sites covered by Irish Wetland Bird Survey. Secondly, the default 98% avoidance rate used in all the collision risk models included in the cumulative assessment is likely to overestimate the true collision risk by an order of magnitude (see Section 7.4.2.4). Thirdly, the 1% threshold is very conservative (see Section 7.2.8.10).

The only other proposed wind farm site within the likely home range of the local Golden Plover wintering population is the proposed Dyrick Hill Wind Farm. The predicted collision risk from the proposed Dyrick Hill Wind Farm is 6.21 collisions/year (JOD, 2023). This relatively high collision risk reflects the fact that the proposed Dyrick Hill Wind Farm site is largely open and contains suitable Golden Plover foraging and roosting habitat.

The calculated increase to the mortality rate of the Lower Blackwater River Population Golden Plover population from the cumulative collision risk of the proposed project in combination with the proposed Dyrick Hill Wind Farm is around 28% (Appendix 7.7).

Based on the above, it seems likely that the cumulative collision risk of the proposed project in combination with the proposed Dyrick Hill Wind Farm would be more than double the collision risk of the proposed project alone. Therefore, the likelihood of a significant impact on the local wintering Golden Plover population will increase.

7.4.3 Impacts on Merlin

7.4.3.1 Do-nothing impact

In the absence of any development, the usage by Merlin of the area around the proposed 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.

7.4.3.2 Construction disturbance

No nesting Merlin were recorded in the proposed 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 proposed wind farm site.

7.4.3.3 Habitat loss

The wind farm will remove around 3 ha of 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 7.3.5.1) and the very low recorded usage of the site.

7.4.3.4 Displacement

Very little is known about the impact of wind farms on Merlin populations (Humphreys *et al.*, 2015). However, it is generally assumed that they are likely to be sensitive to displacement impacts.

Displacement impacts result in reduced use of the affected areas, not complete exclusion. Given the low level of Merlin activity recorded around the proposed wind farm site, and theoretical foraging range for a breeding pair of nearly 80 km^2 (see Section 7.3.5.1), any displacement impacts are unlikely to significantly affect the availability of a Merlin foraging habitat for a local breeding pair.

7.4.3.5 Collision risk

The predicted collision risk is negligible (less than one collision every 2,000 years).

7.4.3.6 Cumulative impacts

No potential impacts to Merlin require cumulative assessment.

7.4.4 Impacts on Peregrine

7.4.4.1 Do-nothing impact

The relatively low-level of Peregrine usage of the area around the proposed wind farm site reflects the fact the site is outside the core foraging range of any Peregrine nest sites. There is currently no suitable Peregrine nesting habitat within the 2 km buffer around the proposed wind farm site. It is unlikely that any future landscape changes would result in development of suitable nesting habitat.

7.4.4.2 Construction disturbance, habitat loss and displacement

The proposed wind farm site does not form part of the core range of a resident or regularly occurring Peregrine population. Therefore, construction disturbance, habitat loss and displacement impacts are not relevant.

7.4.4.3 Collision risk

The predicted collision risk was around 0.1 collisions / year (Table 7.18).

Table 7.18. Predicted collision risk (collisions/year) to Peregrines from the operation of the Scart Mountain Wind Farm .

Population	Model	N149	N163	SG 155	V150	V162
resident	1 height band	0.060	0.061	0.061	0.061	0.061
	2 height bands	0.038	0.046	0.043	0.039	0.046

See Appendix 7.7 for the full results of the collision risk modelling.

The predicted collision risk could potentially cause a 0.1% increase in the annual mortality of the Republic of Ireland population (Appendix 7.7), which would not be a significant impact.

There is no specific data available on the size of the County Waterford Peregrine population. However, in the Bird Atlas 2007-11 surveys (Balmer *et al.*, 2013), breeding Peregrine were recorded from ten hectads in Co. Waterford and 330 hectads in the Republic of Ireland. This implies that the Co. Waterford population is well over an order of magnitude lower than the Republic of Ireland population. Therefore, the impact on the mortality rate of the County Waterford population is likely to exceed the 1% threshold and may be of marginal significance.

7.4.4.4 Cumulative impacts

The only potential impact that requires cumulative assessment is the collision risk.

The cumulative collision risk of the proposed project in combination with other wind farm projects in County Waterford would increase the calculated increase in the mortality rate of the Republic of Ireland population by 0.04% compared to the impact of the proposed project alone (Appendix 7.7).

There are no collision risk predictions for around one-third of the turbines included in the cumulative assessment.

The cumulative impact of the collision risk from the proposed project in combination with the collision risk from other wind energy projects in Co. Waterford is likely to be slightly higher than the impact from the proposed project alone.

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 proposed 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 food resources.

7.4.5.2 Construction disturbance

Pearce-Higgins *et al.* (2012) found a significant reduction in Red Grouse densities at proposed wind farm sites during construction periods. They do not present any estimates of the effect size but the data in their Fig. 2 suggests a decline in density of approximately 40%. They also found that Red Grouse densities had recovered by the first year post-construction.

Pearce-Higgins *et al.* (2012) do not indicate the distance over which reductions in Red Grouse densities takes place. Goodship and Furness (2022) do not include Red Grouse in their review of disturbance distances, but they do provide information for the related Black Grouse. They recommend buffer zones of 100-150 m from pedestrian disturbance for nesting females and 500-750 m for lekking males[9], but state that "for forestry activities, buffer zones up to 1000 m may be necessary during the breeding season". However, the 1000 m presumably applies to lekking males. Red Grouse do not display lekking males. Therefore, from the ratio between forestry and pedestrian disturbance distances for lekking Black Grouse males, 300 m appears to be a suitable precautionary disturbance distance for nesting Red Grouse females.

The Red Grouse territory in the proposed wind farm site is located in the middle of Knockanask Hill, where it is surrounded by five proposed turbines. Most of the Red Grouse records associated with this territory were within 300 m of the proposed wind farm infrastructure (Figure 7.13). Therefore, this territory is likely to be subject to disturbance impacts for the duration of construction work in this part of the proposed wind farm site. The 300 m buffer covers most of the potential Red Grouse habitat on Knockanask Hill, so there is unlikely to be sufficient alternative suitable habitat for displaced birds. As there is only a single territory, calculation of the displacement impact using the effect size from Pearce-Higgins *et al.* (2012) is not meaningful: either the birds will be displaced, or they won't be.

The Co. Waterford population of Red Grouse is estimated to be less than 84 birds (see Section 7.5.3.2). If the Red Grouse territory is displaced, this would be a very significant short-term negative impact at the county scale. This is a potentially reversible impact. However, the re-occupation of the territory, following the end of the construction period, would depend on the availability of surplus birds in the local population.

[9] Lekking refers to aggregations of displaying males.

7.4.5.3 Habitat loss

The wind farm will remove around 4 ha of bog and heath habitat on Knockanask Hill. This is around 2% of the total area of these habitats on Knockanask Hill. This will be a permanent slight negative impact at the county scale.

7.4.5.4 Displacement

Red Grouse do not appear to be sensitive to displacement impacts from operational 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 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. In a study on the Norwegian island of Smøla, Stokke *et al.* (2020) reported mean annual collision rates per turbine of 0.005-0.030 collisions/year[10]. However, the population density of Red Grouse at the wind farm they studied appears to have been significantly higher than typical Irish population densities. Bevanger *et al.* (2009) reported densities of around 3-9 birds/km^2 in the wind farm area, compared to mean densities of less than 2.5 birds/km^2 in the East and South Region of Ireland[11]. The density of Red Grouse in the proposed project site is even lower: the total area of bog/heath habitat on Knockanask Hill is around 2 km^2 so a single Red Grouse pair on the hill equates to a density of around 1 adult bird/km^2.

Red Grouse collision rates with turbine bases are likely to be strongly related to population density. Therefore, the collision rates with the turbines in the proposed project are likely to be much lower than those reported by Stokke *et al.* (2020). Nevertheless, using the maximum collision rate from Stokke *et al.* (0.03 collisions/turbine/year), the potential increase in mortality rates to the Irish population would be negligible, while the potential increase to the County Waterford population would be below the 1% threshold (see Appendix 7.7).

[10] This study refers to Willow Ptarmigan, but Willow Ptarmigan is the same species as Red Grouse.

[11] Cummins *et al.* reported densities of 1.22 males/km^2 and state that 55% of their population estimate were males.

7.4.5.6 Cumulative impacts

This assessment considers the cumulative impacts of the development of the proposed project in-combination with other relevant projects and plans on the Co. Waterford Red Grouse population.

Red Grouse occurrence in other proposed wind farm sites in County Waterford

The only wind energy projects in Co. Waterford with potential Red Grouse habitat are the Barranafaddock Wind Farm, the proposed Coumnagappul Wind Farm, and the proposed Dyrick Hill Wind Farm.

No Red Grouse were recorded in bird surveys carried out for the Barranafaddock Wind Farm (FTC, 2019).

There were two Red Grouse records in vantage point surveys for the proposed Coumnagappul Wind Farm, but they were not recorded in breeding and winter transect surveys, and the habitat was considered degraded (FTC, 2023).

No Red Grouse were recorded in bird surveys for the proposed Dyrick Hill Wind Farm (JOD, 2023). There were two records of Red Grouse in the proposed Dyrick Hill Wind Farm site from the bird surveys carried out for the Scart Mountain Wind Farm. Both these records were in 2024 and there were no records of Red Grouse in the proposed Dyrick Hill Wind Farm site from any of the other eight years of bird surveys carried out for the Scart Mountain Wind Farm.

Construction disturbance

It is possible that, if the projects get planning permission, construction work on the proposed Dyrick Hill Wind Farm and/or, the proposed Coumnagappul Wind Farm may overlap with construction work on the proposed project. Therefore, it is possible that there will be cumulative construction disturbance impacts from the proposed project in-combination with the proposed Coumnagappul Wind Farm and or the proposed Dyrick Hill Wind Farm. However, as no Red Grouse territories were identified in either the proposed Coumnagappul Wind Farm site or the proposed Dyrick Hill Wind Farm site, any such cumulative impacts are unlikely to be significantly greater than the impact of the proposed project by itself.

Collision risk

It is possible that there will be cumulative collision risk impacts from the proposed project in-combination with the proposed Coumnagappul Wind Farm and/or the proposed Dyrick Hill Wind Farm. However, as no Red Grouse territories were identified in either the proposed Coumnagappul Wind Farm site and the proposed Dyrick Hill Wind Farm site, any such cumulative impacts are unlikely to be significantly greater than the impact of the proposed project by itself.

7.4.6 Impacts on Woodcock (breeding population)

7.4.6.1 Do-nothing impact

There is little information in the literature about the preferences of Woodcock for different age-classes of forestry. It has been suggested that they prefer young forestry (Gibbons *et al.*, 1993),

but the evidence base for this assertion is unclear. While it is likely that they do have preferences for particular configurations of forestry habitat, it is not possible to predict how the suitability of the forestry habitat within the proposed wind farm site will change over the duration of wind farm lifespan.

7.4.6.2 Construction disturbance

Construction work may cause temporary disturbance impacts to Woodcock if there are any nest sites located close to areas where work is taking place[12]. However, as the proposed wind farm site is in an actively managed commercial forest, where extensive felling operations have been taking place over recent years, the local Woodcock 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.

7.4.6.3 Habitat loss

The total permanent habitat loss will include around 21.8 ha of forestry habitat. There is a total of around 760 ha of forestry habitat within the proposed wind farm site. Therefore, the permanent habitat loss will remove around 4% of the potential Woodcock habitat within the proposed wind farm site. This will be a long-term slight negative impact at the county scale.

Additional clearance of forestry for bat mitigation and to widen the open space corridors along forest roads will remove additional areas of potential Woodcock habitat. However, open spaces form part of the habitat matrix used by Woodcock within large areas of forestry. Therefore, the net habitat loss effect of the additional forestry clearance is not likely to affect the significance assessed above.

7.4.6.4 Displacement

Literature review

The only published study of Woodcock interactions with wind farms appears to be a study by Dorka *et al.* (2014). They reported a decrease in abundance from about 10 males/100 ha to about 1.2 males/100 ha after construction of a wind farm (a displacement impact of 88%), which may have been due to the barrier effect of the turbines and acoustic effects interfering with display flights and mating. A review of this, and other information, recommended buffer distances of at least 500 m around the flight paths of roding birds to avoid impacts (LAG VSW, 2014).

The Dorka *et al.* study was criticised by Schmal (2015) on a number of grounds. In particular, she suggested that habitat changes (closure of the forest canopy) could have occurred at the same time as the wind farm construction, reducing the habitat suitability for Woodcock, while the presumed lack of Woodcock females in the vegetation free areas around the turbines may have affected the roding flights as these are presumed to be influenced by the presence of females. She also notes that one of the two post-impact years surveyed was during the wind farm construction period, so the low numbers of roding Woodcock could be due to construction

[12] Woodcock nests are very difficult to find, so it would not be practicable to attempt to detect nest locations.

disturbance rather than permanent displacement. These, and other criticisms, were vigorously rebutted by Straub *et al.* (2015). They dispute the evidence presented by Schmal (2015) indicating habitat changes concurrent with the wind farm development, note the small size of the vegetation-free areas around each turbine (2000 m^2; Dorka *et al.*, 2015) and note that there was not any significant difference in the Woodcock numbers in the two post-impact year surveys.

Overall, the response by Straub *et al.* (2015) appears to successfully rebut the main criticisms made by Schmal (2015). However, there are some weaknesses in their study design. In particular, all their survey locations in the proposed wind farm site were located immediately adjacent to the turbine locations. This means that the results of their study cannot be used to estimate the distance over which any displacement effect occurs. They report that, at one of the survey locations, which was in a clearfell area, the roding Woodcock in the post-impact surveys were all estimated to be at distances of over 300 m from the turbines, but this is an anecdotal observation.

As part of the Castlebanny Wind Farm project, a Woodcock survey was carried out in an area of forestry at adjacent to the Ballymartin Wind Farm (Gittings, 2019). This survey mapped the distribution of roding Woodcock along two transects, which sampled forestry habitat at various distance from existing turbines. Significantly fewer than expected Woodcock were recorded within 250 m of the turbines with the results suggesting a displacement impact of around 69%. However, due to the configuration of the forestry habitat in relation to the wind farm, and the availability of suitable transect routes, the apparent avoidance of the 0-250 m distance band could have been due to avoidance of forest edge habitat rather than avoidance of the turbines.

Assessment

Both the Dorka *et al.* study and the Ballymartin Wind Farm study provide evidence of large reductions in Woodcock roding activity within 250 m of wind turbines. However, there does not seem to be any published evidence to support a 500 m displacement effect as suggested by LAG VSW (2014). There are also specific factors that may affect the applicability of Dorka *et al.*'s results to assessment of the Scart Mountain Wind Farm. The forestry in their study area had a canopy height of 30-40 m, and roding Woodcock were regularly observed flying at a height of 60-100 m (Straub *et al.*, 2015). The mature forestry in both the Scart Mountain Wind Farm site has a height of around 20 m. Roding Woodcock in Irish forestry habitats generally fly at, or just above, the canopy height (but see Section 7.3.3.2). Therefore, the potential for displacement of roding Woodcock by wind turbines may be reduced due to the vertical separation between the operational part of the wind turbine and the Woodcock flight paths. This applies particularly to the turbine models with higher ground clearances.

A 250 m buffer around the current turbine layout would include around 28% of the potential Woodcock breeding habitat within the Scart Mountain Wind Farm site[13]. Based on the reductions in roding activity reported by Dorka *et al.* and derived from the Ballymartin Wind Farm study, this could cause an 20-25% decrease in the Woodcock population. However, as discussed above, there are potential confounding factors that could affect the reliability of the displacement effect estimated from the Ballymartin Wind Farm study.

[13] Woodcock breeding habitat defined as habitat types WD1, WD3, WD4 and WS5 from the habitat map in Chapter 6.

Under the Percival criteria, an 20-25% decrease in the Woodcock population would be a high magnitude impact. This would be a long-term significant negative impact at the county scale.

7.4.6.5 Collision risk

There were seven breeding season records of Woodcock during the vantage point surveys in 2023 and 2024, although only one of these records related to a roding male. However, Woodcock was not included in the standard collision risk model as vantage point surveys are not considered to provide representative data on Woodcock flight activity.

Most of the collision risk to Woodcock is likely to be generated by roding activity, as the durations of roding flights will be much longer than other flight activity such as commuting flights.

A custom collision risk model was developed to assess the collision risk to roding Woodcock (Appendix 7.7). This was based on the observed number of roding Woodcock recorded, the typical flight height distribution of roding Woodcock, and typical durations of roding Woodcock activity.

This model produced collision risks of around 1.1-1.4 collisions / year of roding Woodcock for the N163 and V162 turbines (Appendix 7.7). There were no predicted collisions for the other turbine models as those had ground clearances of more than 30 m.

Additional collision risk will be generated by non-roding Woodcock flight, such as birds commuting between nesting sites and foraging habitats. Such flights will be of much shorter duration than roding flights. Therefore, the collision risk generated is likely to be much smaller than the collision risk generated by roding flights.

Using a precautionary doubling of the collision risk to allow for uncertainty in the collision risk modelling, the collision risk to roding Woodcock would result in an increase in the mortality rate to the local population of around 40% (Appendix 7.7).

The forestry habitat in the proposed wind farm site comprises around 3.5% of the forestry habitat in Co. Waterford. If breeding Woodcock are uniformly distributed across this habitat, the 41% increase in mortality rates to the local population at the proposed wind farm site would be equivalent to a 1% increase in mortality rates to the County Waterford population. However, not all of the forestry habitat in County Waterford will be suitable for breeding Woodcock, so the actual increase in mortality rates to the County Waterford population is likely to be significantly higher than 1%.

7.4.6.6 Cumulative impacts

Woodcock occurrence in proposed wind farm sites in County Waterford

The wind energy projects in Co. Waterford with potential Woodcock breeding habitat are the Barranafaddock Wind Farm, the proposed Coumnagappul Wind Farm, the proposed Dyrick Hill Wind Farm, the Knocknamona Wind Farm, and the Woodhouse Wind Farm.

Dedicated Woodcock surveys were carried out for the Lyrenacarriga Wind Farm project (MKO, 2021). The maximum number of roding birds recorded was five on 9th May 2018, with one-three recorded on the other four survey dates.

No dedicated Woodcock surveys were carried out for any of the other projects. There were no breeding season records of Woodcock in the surveys carried out for the Barranafaddock Wind Farm and the proposed Dyrick Hill Wind Farm (FTC, 2019; JOD, 2023). There were two incidental breeding season records of Woodcock in bird surveys carried out around the Knocknamona Wind Farm site (Ecopower, 2020).

Displacement

The Lyrenacarriga Wind Farm Environmental Impact Assessment Report assessed the displacement impact to the breeding Woodcock population as a slight negative effect on the basis that "the proposed development site does not contain habitats that are unique to the local area nor are commercial forestry plantation of particularly high-quality breeding habitat for this species".

There is also potential for displacement impacts to occur to breeding Woodcock at some, or all, of the other proposed wind farm sites listed above.

There will be an increased displacement effect on the Co. Waterford Woodcock population from the cumulative impact of the Scart Mountain Wind Farm in-combination with other wind farm projects, compared to the displacement effect of the Scart Mountain Wind Farm alone. However, it is not possible to assess the scale of this increase due to lack of information about Woodcock populations in the other proposed wind farm sites.

Collision risk

The Lyrenacarriga Wind Farm Environmental Impact Assessment Report assessed the collision risk impact to the breeding Woodcock population as no effect on the basis that "no flights were recorded at the potential collision height during vantage point surveys". However, vantage point surveys do not provide reliable data for modelling Woodcock collision risk (see Section 7.4.6.5). The ground clearance of the turbine models that are being constructed in the Lyrenacarriga Wind Farm site is 17 m. Therefore, some degree of collision risk impact will occur to the breeding Woodcock population at this site.

There is also potential for collision risk impacts to occur to breeding Woodcock at some, or all, of the other proposed wind farm sites listed above.

There will be an increased collision risk impact effect on the Co. Waterford Woodcock population from the cumulative impact of the Scart Mountain Wind Farm in-combination with other wind farm projects, compared to the collision risk impact of the Scart Mountain Wind Farm alone. However, it is not possible to assess the scale of this increase due to lack of information about Woodcock populations and collision risk impacts in the other proposed wind farm sites. However, the Scart Mountain Wind Farm is only likely to generate collision risk to roding Woodcock if a turbine model with a ground clearance of lower than 30 m is selected.

7.4.7 Impacts on Snipe (breeding population)

7.4.7.1 Do-nothing impact

The Snipe territories at Knockanask and Knockscullogе are located in bog/heath habitat. The continued suitability of these areas will depend on the grazing and burning regime.

7.4.7.2 Construction disturbance

Goodship and Furness (2022) do not provide any information about disturbance distances to breeding Snipe. The potential construction disturbance impacts were assessed using the avoidance distance of 400 m from turbines reported by Pearce-Higgins *et al.* (2009). There may also be some additional disturbance from construction of other wind farm infrastructure extending outside the 400 m turbine buffer, although the disturbance distances are likely to be smaller.

There are proposed turbines and other wind farm infrastructure located within the Snipe territory on Knockanask Hill. The 400 m around the proposed turbines includes almost all of the potential Snipe breeding habitat on Knockanask Hill (Figure 7.14). Therefore, construction work in this area is likely to cause disturbance to any Snipe occupying this territory if the construction work occurs in the Snipe breeding season.

There is also potential for construction disturbance to breeding Snipe on the south-western slopes of Knocksculloge (Area 2; Figure 7.14), at the southern end of Broe Mountain (Area 4; Figure 7.14), and at the southern end of the proposed wind farm site (Area 5; Figure 7.14). However, in these areas, the recorded Snipe activity was mainly over 300 m from the nearest turbine and most, or all, of the suitable Snipe breeding habitat is outside the 400 m buffer.

If the disturbance causes abandonment of the territory or failure of a breeding attempt, this would be a short-term moderate negative impact at the county scale.

7.4.7.3 Habitat loss

The wind farm will remove around 3 ha of wet and dry heath habitat on Knockanask Hill. This is around 2% of the total area of these habitats on Knockanask Hill. Therefore, the impact on Snipe breeding habitat is likely to be small. However, the impact may be higher if the habitats affected include localised areas of wet flushes, etc.

7.4.7.4 Displacement

There is limited information available on displacement impacts to Snipe. However, the Pearce-Higgins *et al.* (2009) study found significant displacement impacts. They reported avoidance effects extending to 400 m from turbines, 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 around the turbines includes all of the likely extent of the Knockanask Hill Snipe territory. It also includes parts of three other areas where Snipe breeding activity was recorded. However, in these areas the recorded Snipe activity was mainly over 300 m from the nearest turbine and most, or all, of the suitable Snipe breeding habitat is outside the 400 m buffer.

The potential displacement impact is a long-term moderate negative impact at the county scale.

7.4.7.5 Collision risk

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 location where there is most likely to be collision risk for breeding Snipe is Knockanask Hill. However, this collision risk will only occur if the breeding Snipe are not displaced by the turbines.

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.

7.4.7.6 Cumulative impacts

This assessment considers the cumulative impacts of the development of the proposed project in-combination with other relevant projects and plans on the Co. Waterford breeding Snipe population.

Snipe occurrence in proposed wind farm sites in County Waterford

The wind energy projects in Co. Waterford with potential Snipe breeding habitat are the Barranafaddock Wind Farm, the proposed Coumnagappul Wind Farm, and the proposed Dyrick Hill Wind Farm.

There were no breeding season records of Snipe in the bird surveys carried out for the Barranafaddock Wind Farm (FTC, 2019). However, dedicated breeding wader surveys were not carried out for this project.

Displaying Snipe were recorded during nocturnal bird surveys at the proposed Coumnagappul Wind Farm site (FT, 2023). However, dedicated breeding wader surveys were not carried out for this project. The Environmental Impact Assessment Report noted that "as display behaviour was observed on several occasions, it is likely that the species breeds in low densities in wetter parts of the site".

No Snipe were recorded in breeding wader surveys carried out for the proposed Dyrick Hill Wind Farm (JOD, 2023). However, there was at least one Snipe territory identified from the Scart Mountain Wind Farm surveys along the boundary between the Dyrick Hill Wind Farm and Scart Mountain Wind Farm sites.

Construction disturbance

The proposed Coumnagappul Wind Farm Environmental Impact Assessment Report (FT, 2023) assessed the significance of construction disturbance before mitigation as a short-term significant effect. The Environmental Impact Assessment Report assessed the residual impact

to all bird populations after mitigation as a "slight-imperceptible reversible residual effect and in the local context".

There are three proposed turbine locations in the proposed Dyrick Hill Wind Farm site within 200-400 m of the Snipe records associated with the territory along the boundary between the proposed Dyrick Hill Wind Farm and Scart Mountain Wind Farm sites. However, these records were made from the Scart Mountain Wind Farm site, and the potential breeding habitat associated with this territory is likely to extend closer to the proposed Dyrick Hill Wind Farm turbine locations. This territory did not appear to be occupied in 2023 and 2024.

It is possible that, if the projects get planning permission, construction work on the proposed Dyrick Hill Wind Farm and/or, the proposed Coumnagappul Wind Farm may overlap with construction work on the proposed project. Therefore, it is possible that there will be cumulative construction disturbance impacts from the proposed project in-combination with the proposed Coumnagappul Wind Farm and or the proposed Dyrick Hill Wind Farm.

Displacement

The proposed Coumnagappul Wind Farm Environmental Impact Assessment Report (FT, 2023) did not quantify the displacement effects to breeding Snipe, but it assessed the significance as a local long-term moderate effect[14]. It also assessed the significance of habitat loss as a long-term moderate effect, and the significance of construction disturbance as a short-term significant effect. These impacts were all assessed before mitigation. The Environmental Impact Assessment Report assessed the residual impact to all bird populations after mitigation as a "slight-imperceptible reversible residual effect and in the local context" but does not present any clear justification for this reduction in impact significance after mitigation.

There are three proposed turbine locations in the Dyrick Hill Wind Farm site within 200-400 m of the Snipe records associated with the territory along the boundary between the Dyrick Hill Wind Farm and Scart Mountain Wind Farm sites. However, these records were made from the Scart Mountain Wind Farm site, and the potential breeding habitat associated with this territory is likely to extend closer to the proposed Dyrick Hill Wind Farm turbine locations. This territory did not appear to be occupied in 2023 and 2024.

There is likely to be an increased displacement effect on the Snipe breeding population in Co. Waterford from the cumulative impact of the proposed project in-combination with the proposed Coumnagappul Wind Farm and the proposed Dyrick Hill Wind Farm, compared to the displacement effect of the proposed project alone. The cumulative impact of the proposed project in-combination with the proposed Dyrick Hill Wind Farm may increase the number of Snipe territories affected from one to two. There may also be displacement effects at the Barranafaddock Wind Farm site.

[14] This was under the heading of disturbance during the operational phase, but the reference to Pearce-Higgins *et al.* (2012) indicates that the assessment referred to displacement effects.

7.4.8 Impacts on Kestrel

7.4.8.1 Do-nothing impact

Kestrels 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 Kestrel foraging habitat within the proposed 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.

7.4.8.2 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 proposed wind farm site is in an actively managed commercial forest, where extensive felling operations have been taking place over recent years, 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.

7.4.8.3 Habitat loss

Kestrels generally use forestry habitats for foraging in a similar way to Hen Harrier, foraging in pre-thicket habitats and being excluded from closed-canopy habitats. However, they will also use more agriculturally improved habitats for foraging, and it is difficult to define their habitat preferences with the same degree of precision as for Hen Harrier. However, the overall scale of the habitat loss impact will be of a similar magnitude as that for Hen Harrier and is not considered to be significant.

7.4.8.4 Displacement

Kestrels generally appear 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, Barrio 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 proposed project is unlikely to cause displacement impacts to the local Kestrel population.

7.4.8.5 Collision risk

The predicted collision risk to the Kestrel population is less than 1 collision / year. The turbine models with the highest Kestrel collision risks are those with the lowest ground clearances (N163 and V162; Table 7.19).

Table 7.19. Predicted collision risk (collisions/year) to the Kestrel summer and winter populations from the operation of the proposed project.

Population	Model	Turbine model				
		N149	N163	SG 155	V150	V162
Resident	1 height band	0.55	0.55	0.56	0.55	0.55
	2 height bands	0.34	0.41	0.38	0.34	0.41

See Appendix 7.7 for the full results of the collision risk modelling.

Standard collision risk modelling techniques will tend to overestimate Kestrel collision risk due to the high incidence of hovering flight activity. The collision risk model assumes that all flight activity involves birds moving around the proposed wind farm site, so that longer duration flights will have higher incidences of turbine transits. However, hovering Kestrel are essentially stationary, so the flight duration of the hovering bird does not affect the incidence of turbine transits. The collision risk model for the Castlebanny Wind Farm (Gittings, 2021) included a bespoke model to calculate the transits generated by the hovering component of Kestrel flight activity separately. This resulted in a large reduction in the collision risk, compared to the standard collision risk model. While site-specific data for the Scart Mountain Wind Farm site is not available, it is likely that modelling the hovering component of Kestrel flight activity separately here would result in a comparable reduction in the predicted collision risk.

The predicted collision risk would result in a negligible increase in annual mortality to the Republic of Ireland population (Appendix 7.7).

The calculated increase to the mortality rate of the County Waterford Kestrel population from the collision risk of the Scart Mountain Wind Farm is around 0.6% (Appendix 7.7). Therefore, the predicted collision risk is not likely to have a significant impact on the County Waterford population.

7.4.8.6 Cumulative impacts

The only cumulative impact that needs to be assessed is the collision risk.

The cumulative collision risk of the proposed project in-combination with the Barranafaddock Wind Farm, the proposed Coumnagappul Wind Farm, the proposed Dyrick Hill Wind Farm and the Lyrenacarriga Wind Farm is around four collisions / year (Appendix 7.7). Around two-thirds of the cumulative collision risk was generated by the Dyrick Hill Wind Farm.

The calculated increase to the mortality rate of the Republic of Ireland Kestrel population from the collision risk of the proposed project in-combination with the Barranafaddock Wind Farm, the proposed Coumnagappul Wind Farm, the proposed Dyrick Hill Wind Farm and the Lyrenacarriga Wind Farm is around 0.1% (Appendix 7.7).

The calculated increase to the mortality rate of the County Waterford Kestrel population from the collision risk of the proposed project in-combination with the Barranafaddock Wind Farm,

the proposed Coumnagappul Wind Farm, the proposed Dyrick Hill Wind Farm and the Lyrenacarriga Wind Farm is around 5% (Appendix 7.7).

There are no collision risk predictions for around one-third of the turbines included in the cumulative assessment. Therefore, the cumulative impact of the collision risk from the proposed project in combination with the collision risks from other wind farm projects may have a significant effect on the County Waterford Kestrel population.

7.4.9 Impacts on nocturnally migrating passerines

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 include nocturnally migrating passerines (songbirds).

Some level of passerine migration occurs throughout Ireland. However, concentrations of passerine migration are generally associated with particular landscape features such as coastlines and large river valleys. Monitoring of nocturnal passerine migration requires specialist survey methods (such as radar surveys). It is not generally carried out for wind farm projects and is not specified in the relevant guidance (SNH, 2017). However, the location and landscape position of the proposed project is such that high levels of passerine migration across the site would not be expected. Given the size of migrant passerine populations, high fatality rates would be required to have population level effects. High fatality rates may occur at offshore wind farms, but there is no evidence of high fatality rates to migrant passerine populations at onshore wind farms in either Europe or North America (NatureScot, 2020). If high fatality rates to migrant passerines were occurring at onshore wind farms, these would be detected by the collision fatality monitoring, which is probably carried out at most consented wind farms in Ireland.

7.4.10 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 proposed 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 proposed wind farm site, they are not potentially sensitive to disturbance or displacement impacts from the wind farm.

Three additional target species were included in the collision risk model: Curlew, Hobby and Chough. The predicted collision risks for these species were negligible (Appendix 7.7).

Other target species recorded during the bird surveys for this project were: Whooper Swan, Black-throated Diver, Red Kite, White-tailed Eagle, Goshawk, Whimbrel and Short-eared Owl. These species were not included in the collision risk model because they were not recorded flying at potential collision height during the surveys used for the model. This means that their collision risks were effectively zero within the limits of accuracy of the model.

7.4.11 Other impacts

7.4.11.1 Turbine blade replacement

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 be similar in nature to the construction phase impacts but much smaller in magnitude.

7.4.11.2 Turbine delivery route (Proposed TDR)

Road widening along the proposed TDR 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.

7.4.11.3 Grid connection route (Proposed GCR)

The proposed GCR largely follows existing public roads and forest roads. There is one section of around 700 m that crosses agricultural land in the Colligan River valley, including a crossing of the river itself.

The agricultural land crossed by the proposed GCR is improved grassland and does not contain habitats that are likely to support bird population of high conservation significance.

The section of the Colligan River crossed by the proposed GCR may contain potential breeding habitat for Kingfisher and Grey Wagtail. Probable breeding by Grey Wagtail was recorded in the tetrad (2 x 2 km grid square) covering this area during the Bird atlas 2007-11 surveys (Balmer *et al.*, 2013).

Construction of the proposed GCR could cause disturbance to breeding Kingfishers or Grey Wagtails if there are nest sites close to the crossing point, and if construction work takes place during the breeding season. However, most Grey Wagtail nest sites in Ireland are associated with bridges or other artificial structures (Smiddy and O'Halloran, 1998), so there are unlikely to be any Grey Wagtail nest sites close to the proposed GCR.

The Irish population of Kingfisher is estimated to be a maximum of around 1000 pairs. Therefore, the Co. Waterford population is clearly less than 100 pairs, so one breeding pair will be more than 1% of the county population. Therefore, disturbance to breeding Kingfishers that causes avoidance of a nest site or failure of a breeding attempt would be a temporary significant negative impact at the county scale.

Based on the availability of habitat in the local area (i.e., within around 5 km of the grid connection crossing), the local population of Grey Wagtails will be a lot less than 100 pairs, so one breeding pair will be more than 1% of the local population. Therefore, disturbance to breeding Grey Wagtails that causes avoidance of a nest site or failure of a breeding attempt would be a temporary significant negative impact at the local scale.

7.4.11.4 Decommissioning

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.

7.4.12 Impact assessment summary

The significance of the predicted impacts, including cumulative impacts where relevant, to the Important Avian Features is summarised in Table 7.20.

Table 7.20 Summary of the assessment of the predicted impacts (before mitigation) to the Important Avian Features.

Key Avian Receptor	Evaluation	Impact significance			
		Construction disturbance	Habitat loss	Displacement	Collision risk
Hen Harrier	national	very significant	imperceptible	moderate – significant (foraging habitat) slight (nest sites)	not significant
Golden Plover wintering population	county	neutral	neutral	neutral	not significant
Merlin	county	imperceptible	imperceptible	slight	not significant
Peregrine	county	-	-	-	not significant / significant
Red Grouse	county	very significant (reversible)	slight	neutral	not significant
Woodcock	county	slight	slight	significant	significant
Snipe	county	moderate	slight	moderate	not significant
Kestrel	county	slight	slight	neutral	not significant / significant

All impact significances are negative and refer to the cumulative impacts, where relevant. Construction disturbance impacts are short-term. The impacts of habitat loss, displacement, and collision risk are long-term. Collision risk significance was assessed at the Knockmealdowns, Kilworth, and Comeraghs Region scale for Hen Harrier.

7.5 MITIGATION MEASURES

7.5.1 General

An Ecological Clerk of Works will be appointed by the contractor carrying out the construction of the wind farm and will be responsible for monitoring compliance with the mitigation measures and construction phase monitoring requirements relating to ecology / biodiversity.

This will include toolbox talks, supervision of vegetation clearance, protection of nesting birds and minimising disturbance from site vehicles. See Section 6.9.2 of Chapter 6 for further details.

A Bird Protection Plan will be implemented as part of the construction programme. This will incorporate all the measures discussed below that are designed to mitigate impacts to bird populations during the construction phase.

A Hen Harrier Protection Plan will be implemented throughout the construction, operational and decommissioning phases of the wind farm. This will incorporate all the measures that discussed below that are designed to mitigate impacts to Hen Harriers.

7.5.2 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 Hen Harrier surveys and Snipe surveys. The survey methods will follow those used for the breeding raptor and breeding distribution surveys in 2023 and 2024 (see Appendices 7.4 and 7.5).

If nesting Hen Harriers are found, an assessment will be carried out by a suitably experienced ornithologist to determine the restrictions to construction work that will be required. This will start from the basis a potential 1 km disturbance distance (Goodship and Furness, 2022). However, depending on the location of the nest site, some lower magnitude construction work may be possible within 1 km without causing any disturbance.

If breeding Snipe are found, no construction work will take place within 500 m of the nest site, or the centre of the territory if the nest site is not found.

If other sensitive breeding species are found, appropriate mitigation will be implemented based on evidence about their disturbance distances.

7.5.3 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 Hen Harrier breeding season (April-August), the proposed works will be reviewed by a competent ecologist to assess whether there is potential for disturbance impacts to occupied Hen Harrier nest sites. If the available information is inconclusive, Hen Harrier surveys will be carried out.
(2) If the work will take place during the Snipe breeding season (April-July), surveys will be carried out of the 500 m buffer around the turbine location to locate any Snipe breeding territories.
(3) If active Hen Harrier nest sites, or occupied Snipe breeding territories are present within the relevant buffer distances (1 km for Hen Harrier and 500 m for Snipe), no work will take place until the birds have completed breeding.

7.5.4 Mitigation of disturbance impacts to Kingfisher and Grey Wagtail

Construction work on the proposed GCR crossing of the Colligan River will only take place during the Kingfisher and Grey Wagtail breeding seasons if appropriate surveys have shown that there are no Kingfishers or Grey Wagtails breeding in the vicinity of the crossing.

7.5.5 Monitoring

7.5.5.1 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 surveys to assess displacement impacts to breeding Hen Harrier, Red Grouse, Woodcock and Snipe. 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 be carried out using detection dogs and will include trials of searcher efficiency and scavenger removal. The frequency of the searches, and the duration of the monitoring, will be designed to collect sufficient data to generate a robust assessment of the collision mortality impacts to Kestrel. The vantage point surveys will take place in tandem with the carcass searches.

The other surveys will take place at suitable intervals to cover the construction and operational periods (e.g., Years 1, 2, 3, 5, 10 and 15).

The Hen Harrier surveys will be designed to assess occupancy by breeding Hen Harriers of the 2 km buffer around the proposed wind farm site. A suitable survey method would be the methods of Hardey *et al.* (2013).

The Red Grouse surveys will be designed to assess occupancy by breeding Red Grouse of the bog/heath habitats on Knockanask Hill. A suitable survey method would be the methods used in the 2023 and 2024 breeding distribution surveys (see Appendices 7.4 and 7.6).

The Woodcock surveys will be designed to sample representative habitat at various distances from the turbines (e.g., 0-250 m, 250-500 m and > 500 m from turbines). A suitable survey method would be that of Heward *et al.* (2015), which involve surveys from point locations. Repeat of the transect surveys carried out for this report would also help assess changes in Woodcock activity patterns.

The Snipe surveys will be designed to assess occupancy by breeding Snipe of potential breeding Snipe habitat within 500 m of the turbines. A suitable survey method would be the methods used in the 2023 and 2024 breeding distribution surveys (see Appendices 7.4 and 7.6).

7.5.6 Other mitigation measures

Construction-phase mitigation measures to protect retained habitats within the proposed wind farm site, and to protect wetlands and watercourses, are described in Chapter 6 (Biodiversity) and Chapter 9 (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 Hen Harrier

7.6.1.1 Construction and operational disturbance

Successful implementation of the mitigation measures outline in Section 7.5 will prevent disturbance to active Hen Harrier nests. Therefore, the potential for residual impacts (after mitigation) will be eliminated. However, if Hen Harriers avoid using nest sites in, or adjacent to, the wind farm site due to the presence of turbines, the mitigation measures will not reduce this impact.

7.6.2 Snipe

7.6.2.1 Construction disturbance

Successful implementation of the mitigation measures will prevent disturbance to breeding Snipe. Therefore, the potential for residual impacts (after mitigation) will be eliminated.

7.6.3 Kingfisher and Grey Wagtail

Successful implementation of the mitigation measures will prevent disturbance to active Kingfisher or Grey Wagtail nests. Therefore, the potential for residual impacts (after mitigation) will be eliminated.

7.6.4 Other impacts

The other potentially significant impacts are the construction disturbance impact to Red Grouse, the displacement impact to Hen Harrier, and the collision risk impacts to Peregrine, Woodcock, and Kestrel.

The construction disturbance impact to Red Grouse cannot be mitigated because the territory contains turbine locations and Red Grouse are resident. Therefore, the impact cannot be avoided by the timing of the work. However, this is a short-term impact (see Section 7.4.5.2).

The displacement impact to Hen Harrier is addressed in Section 7.7.

The Woodcock collision risk impact could be mitigated by selecting a turbine model with a ground clearance of at least 30 m.

There are turbine curtailment systems available that can be used to mitigate collision risk (e.g., McClure *et al.*, 2021). However, these are designed for large birds (eagles, swans, geese, etc.) and reduce, rather than eliminate, collision risk. For the Key Avian Receptors with potentially significant collision risks identified in this assessment, turbine curtailment systems are unlikely to be effective, due to the bird species involved and/or the low absolute numbers of collisions that are predicted to occur.

7.6.5 Residual impact assessment summary

The residual impacts are compared to the impacts assessed before mitigation in Table 7.21. This table only shows impacts where the mitigation measures will cause, or may cause, a material change in the predicted impact.

Table 7.21 Summary of the assessment of the predicted residual impacts (after mitigation) to the Important Avian Features.

Important Avian Feature	Impact type	Impact before mitigation	Residual impact (after mitigation)
Hen Harrier	Construction disturbance to active nests	short-term very significant negative	neutral
	Operational disturbance to active nests	short-term very significant negative	neutral
Snipe breeding population	Construction disturbance	moderate negative	neutral
Kingfisher	Construction disturbance	temporary significant negative	neutral
Grey Wagtail	Construction disturbance	temporary significant negative	neutral

This table only shows impacts where the mitigation measures will cause, or may cause, a material change in the predicted impact.

7.7 COMPENSATION

The mitigation hierarchy was applied throughout the design of the proposed project to avoid significant effects on biodiversity, and where such effects could not be avoided, they have been minimised where possible, to reduce residual effects. The residual significant effects of the proposed project that require compensation is displacement of foraging Hen Harrier and snipe.

FuturEnergy Ireland in-house ecologist prepared the Biodiversity Management Plan (BMP) that sets out the extent of the compensation measures and the governance of same. The FuturEnergy Ireland in-house land team, with input from the ecologist, sourced the lands for compensation, carried out all negotiations with landowners and provided landowners with details of land management measures to be implemented to benefit Hen Harrier. The land management measures will also benefit any snipe displaced by the proposed project.

The total area of BMP lands within the control of the Applicant is 326.87 ha and of this 234.77 ha are considered to be suitably located for management for foraging Hen Harrier i.e. outside the 250 m turbine displacement zone. This equates to ca. 1.8 ha to each 1 ha of land potentially lost to hen harrier through displacement.

The BMP lands comprise 118.1 ha of open moorland on Knocknanask, 79.43 ha of agricultural land and 37.24 ha of forestry distributed around the northern margins of the proposed wind farm site (Figure 7.17). These lands are all located in areas where high levels of Hen Harrier flight activity were recorded during the surveys for the proposed project.

The landowners of the BMP lands within the control of the Developer have agreed to management of their lands for biodiversity is for the lifetime of the wind farm once operational plus an additional 3-5 years before operation commences. This is likely to be a term of 35 – 40 years for the proposed project. This means that 234.77 ha of land will be managed for Hen Harrier for 35 years at a minimum if the proposed project is permitted.

The suite of management measures (provided as Appendix I of the BMP) to be implemented have been tried and tested by the Hen Harrier Project, Farming for Nature and other agri-environment schemes in Ireland. The efficacy of the proposed management measures has been demonstrated by agri-environment schemes such as the hen harrier project. The proposed management measures are management prescriptions that are standardly used by a variety of community, conservation and development projects across Ireland and the UK to improve biodiversity in habitats in a variety of settings.

Full details of the compensation measures and proposed monitoring of the success of these measures are provided in the Biodiversity Management Plan appended to Chapter 6 (Biodiversity).

7.8 CONCLUSION

The proposed project is predicted to result in residual significant effects for Hen Harrier and snipe as a result of displacement during the operational phase. There are no other significant residual effects predicted for any of the Important Avian Features discussed identified in this chapter.

In line with the mitigation hierarchy, as significant displacement effects on Hen Harrier and snipe cannot be avoided, prevented or reduced, compensation measures are provided to offset

the residual effects of the proposed project. The compensation measures proposed are provided as a Biodiversity Management Plan (Appended to Chapter 6). The BMP sets out 3 broad aims as follows:

- Aim 1: Management of lands to improve suitability for foraging hen harrier.
- Aim 2: Restoration of moorland habitats.
- Aim 3: Restoration of conifer plantation to dry heath.

The first aim is specific to the residual effects identified in this chapter as it will focus on offsetting the predicted displacement of Hen Harrier and snipe. The suite of management measures that will be implemented to improve or create suitable habitat for Hen Harrier and snipe has been tried and tested by the Hen Harrier Project[15], farming organisations[16] and other agri-environment schemes in Ireland. The efficacy of the proposed management measures has been demonstrated by agri-environment schemes such as the Hen Harrier Project but the efficacy is also supported by Conservation Evidence [17].

The measures will be implemented between 3 and 5 years before wind farm operation commences. Therefore, some of the improvement in habitat will have occurred before operation commences thereby reducing the significance of the predicted residual effects.

[15] Hen Harrier Project website http://www.henharrierproject.ie/ (last accessed 8 December 2024)

[16] Farming for Nature https://www.farmingfornature.ie/ (last accessed 8 December 2024)

[17] Conservation Evidence summarises the documented evidence for the effectiveness of conservation actions. See https://www.conservationevidence.com/actions/700 (last accessed 15 December 2024)

7.9 REFERENCES

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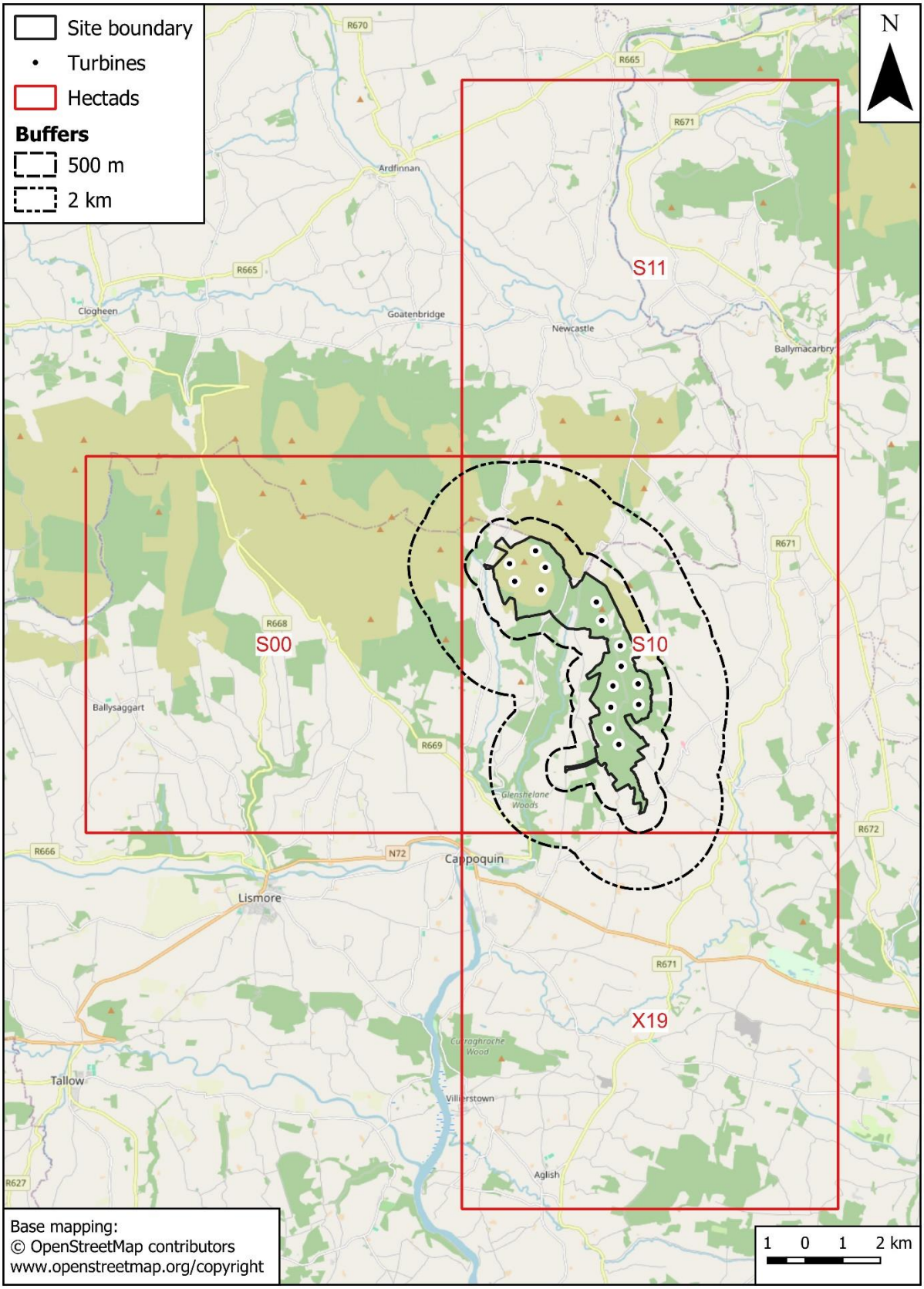

Figure 7.1. Study area.

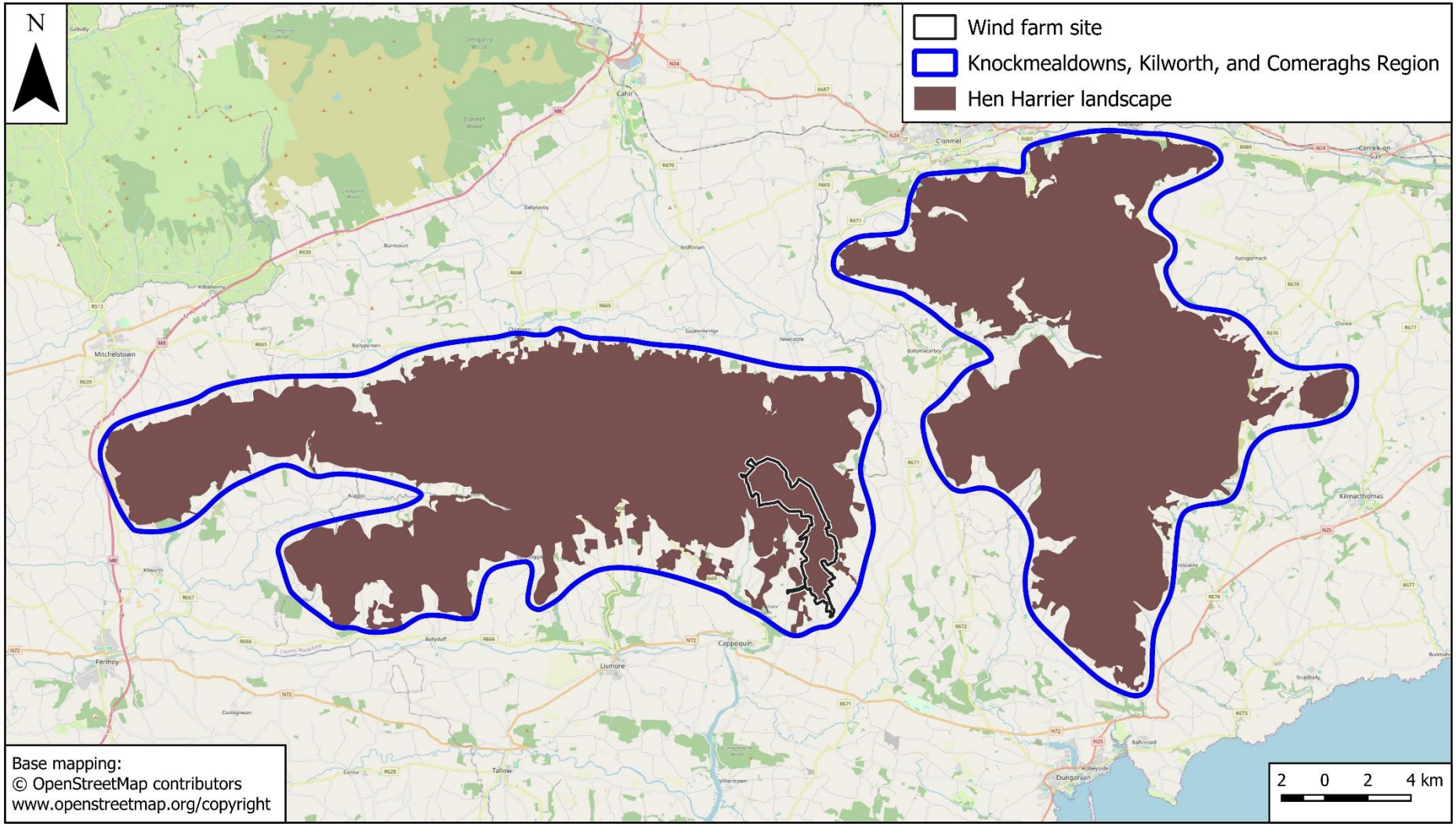

Figure 7.2. Knockmealdowns, Kilworth and Comeraghs Hen Harrier Region .

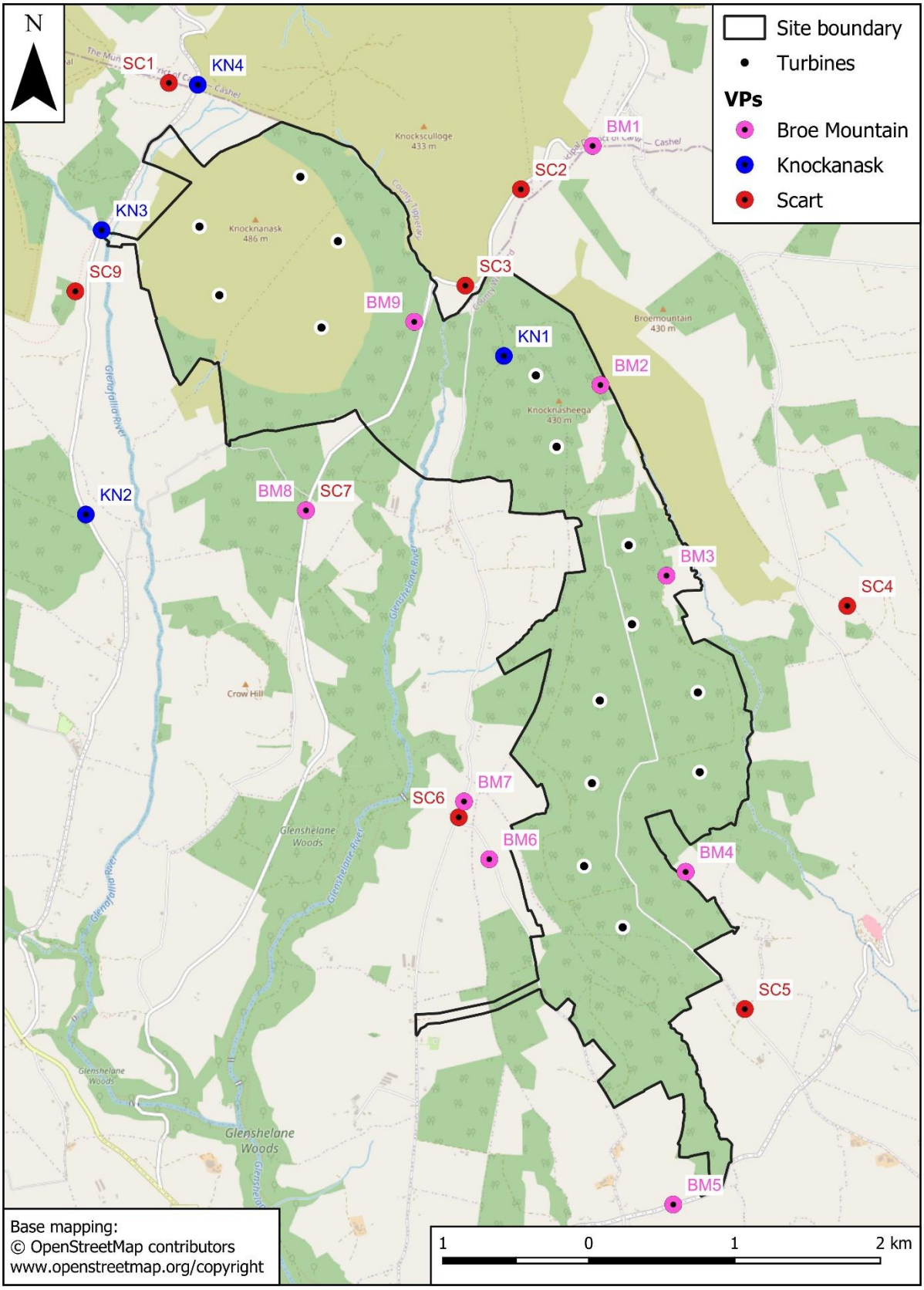

Figure 7.3. Vantage point locations.

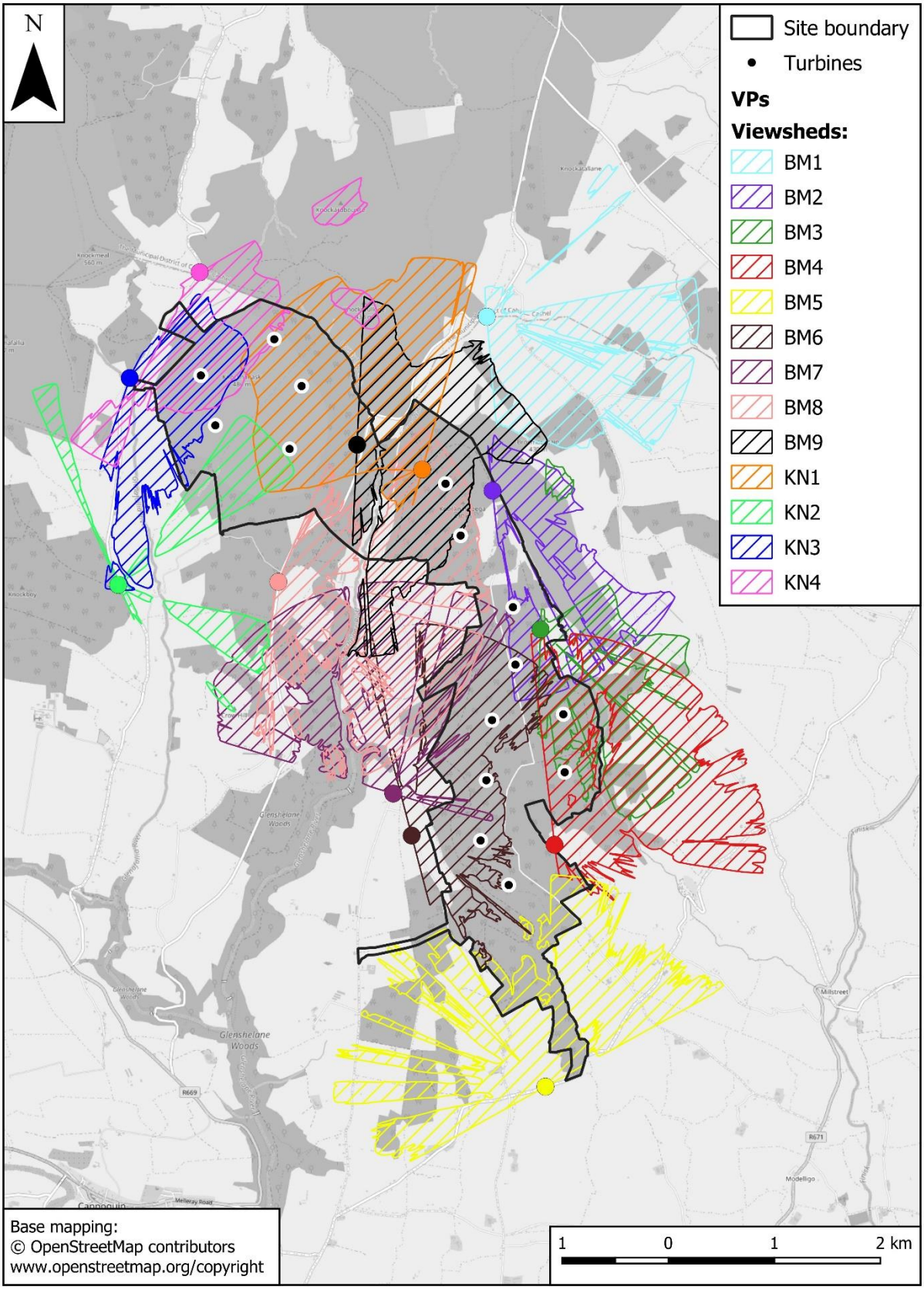

Figure 7.4. Viewshed coverage of the MWP vantage points.

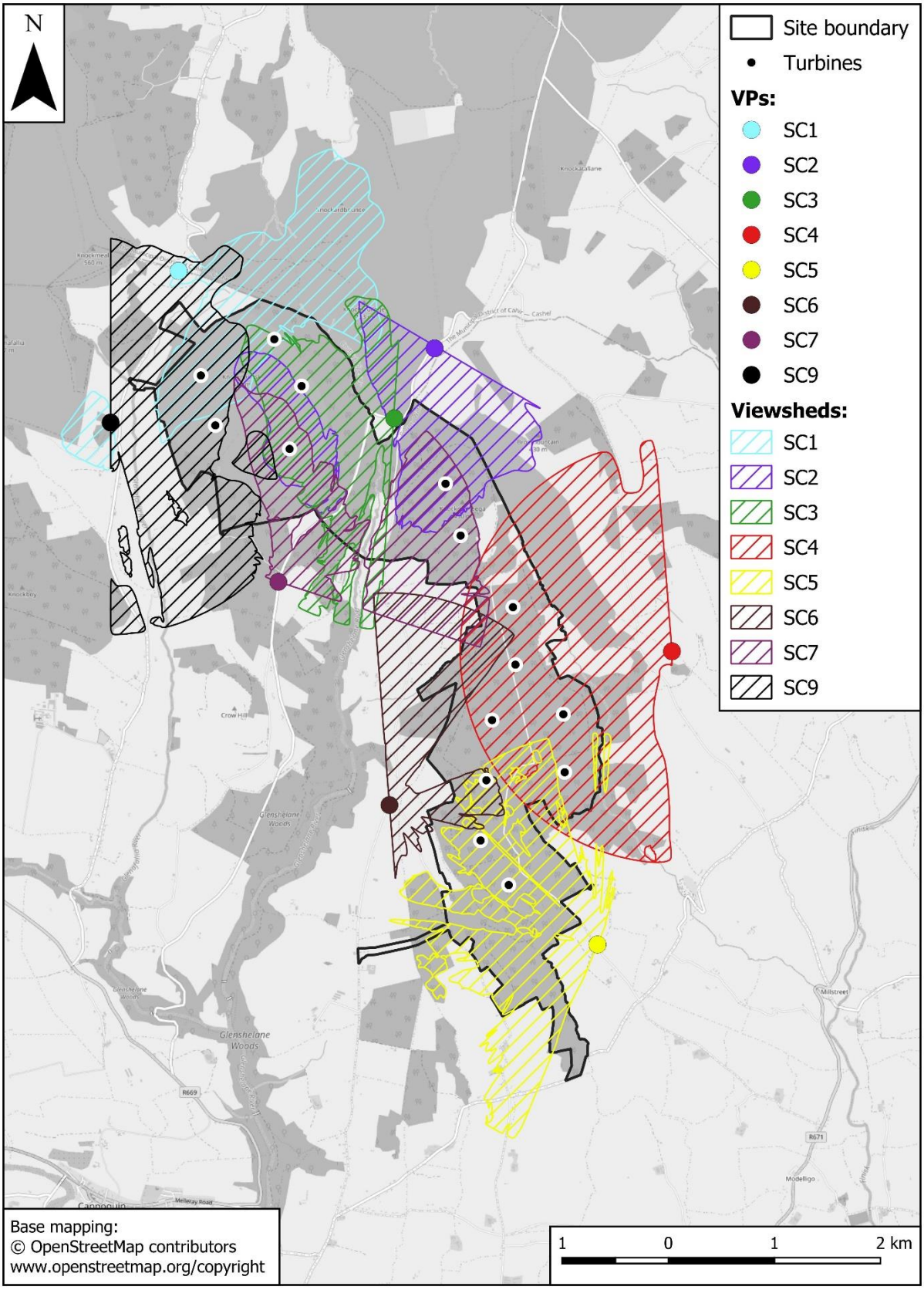

Figure 7.5. Viewshed coverage of the APEM vantage points.

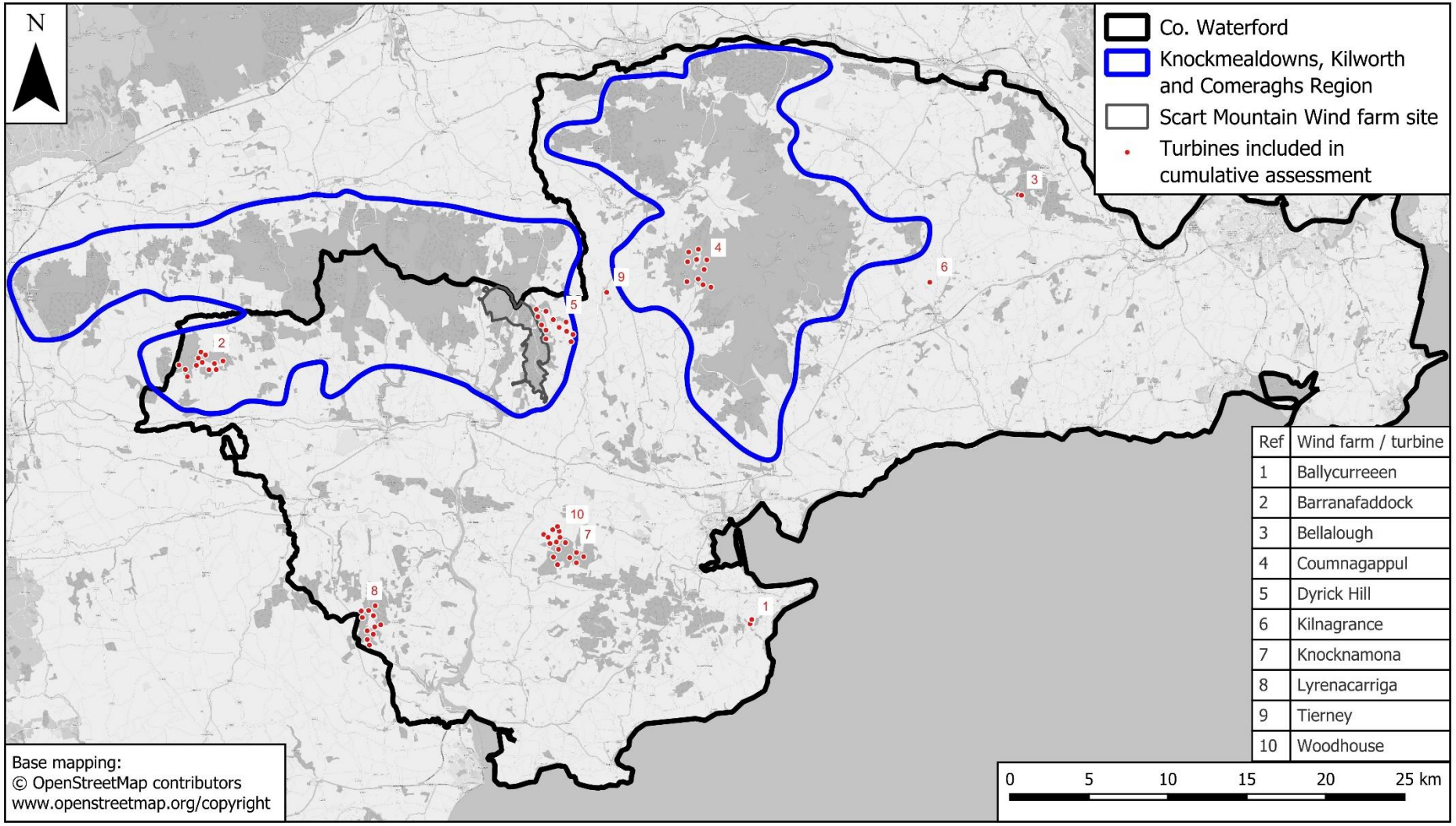

Figure 7.6. Scope of cumulative assessment.

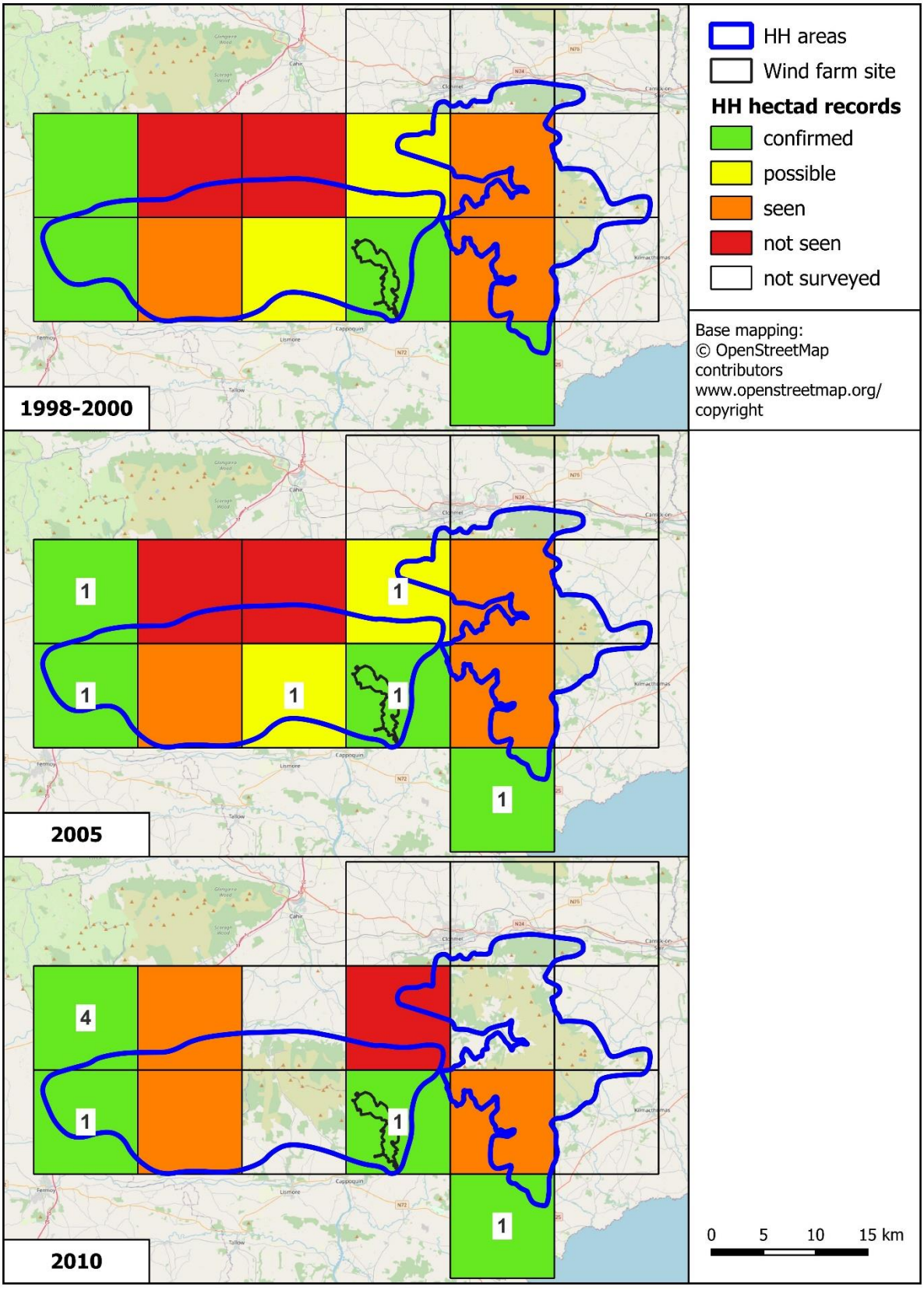

Figure 7.7. Hen Harrier hectad records in the Knockmealdowns, Kilworth and Comeraghs Region from national Hen Harrier surveys, 1998-2000, 2005 and 2010.

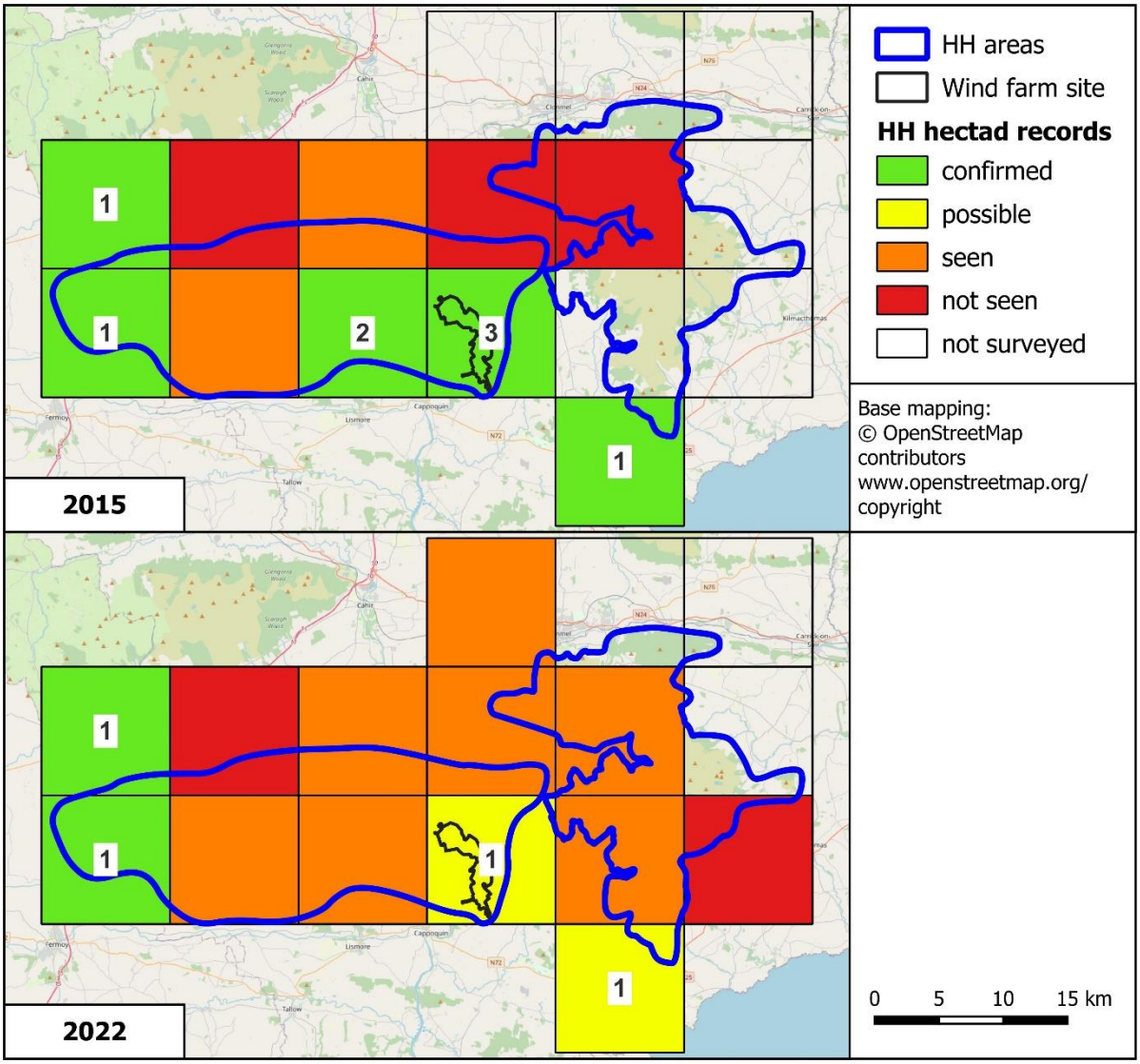

Figure 7.8. Hen Harrier hectad records in the the Knockmealdowns, Kilworth and Comeraghs Region from national Hen Harrier surveys, 2015 and 2022.

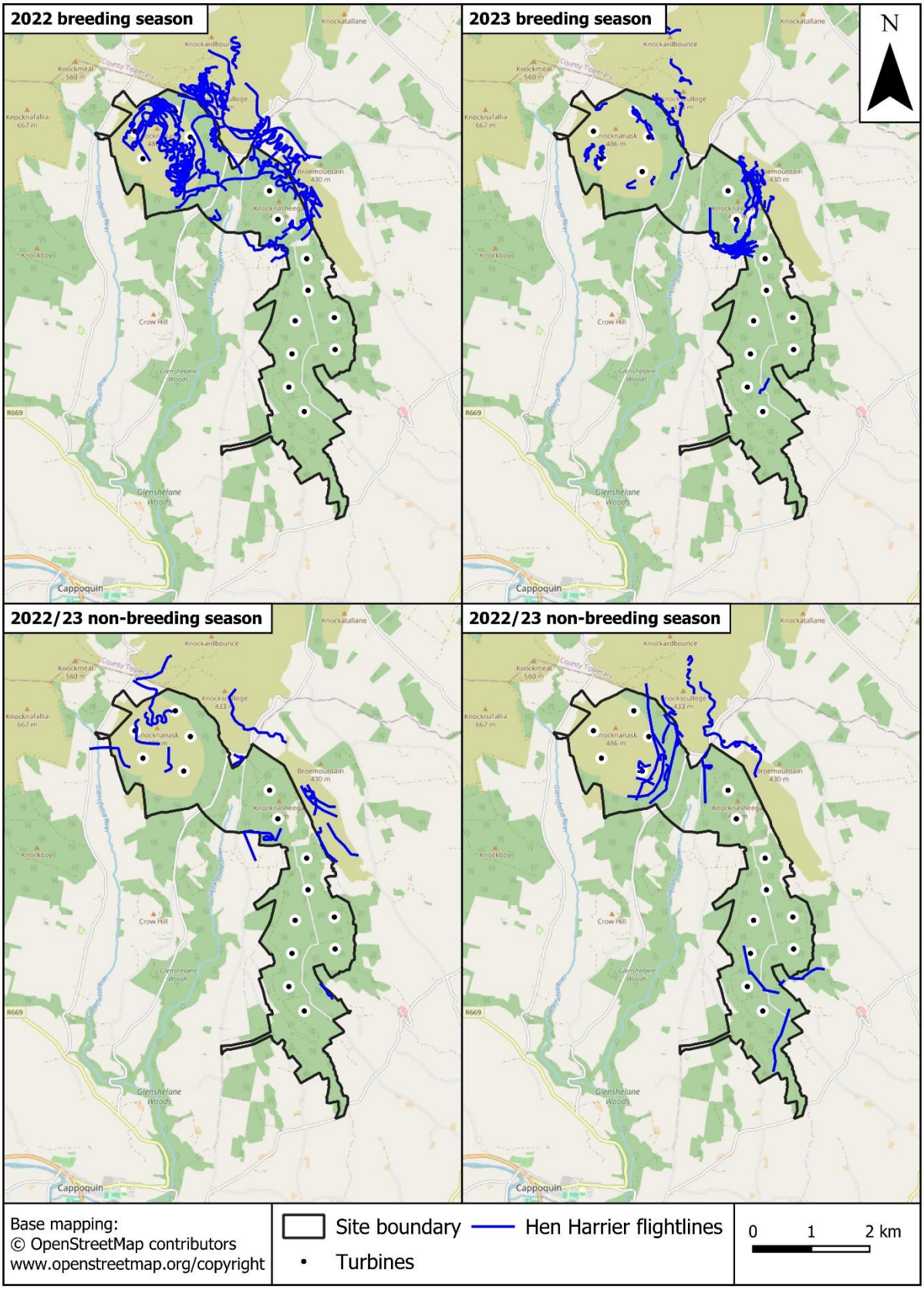

Figure 7.9. Hen Harrier flightlines, vantage point surveys, 2023-2024 breeding seasons and 2022/23-2023/24 non-breeding seasons.

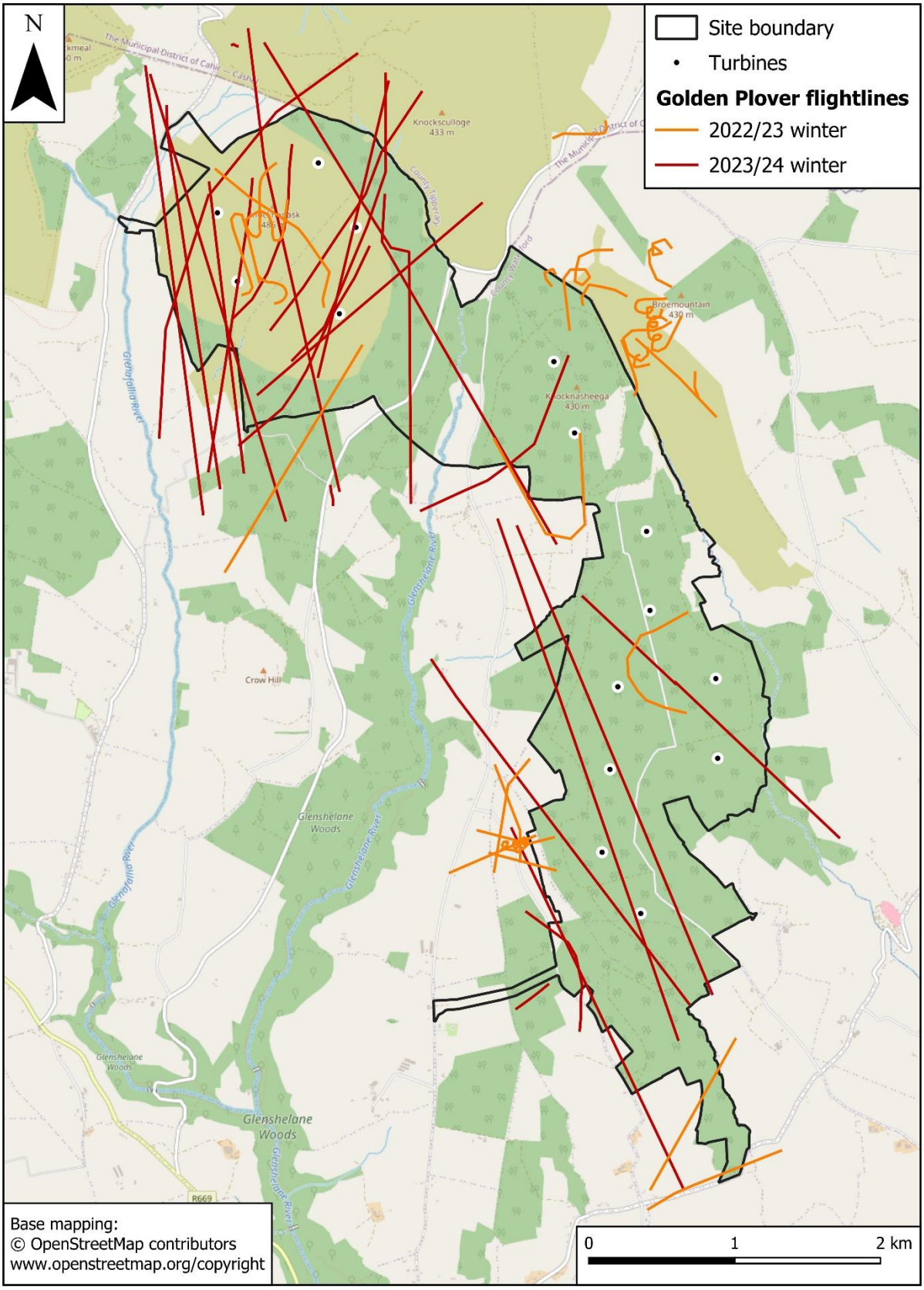

Figure 7.10. Golden Plover flightlines, vantage point surveys, winter 2022/23 and 2023/24.

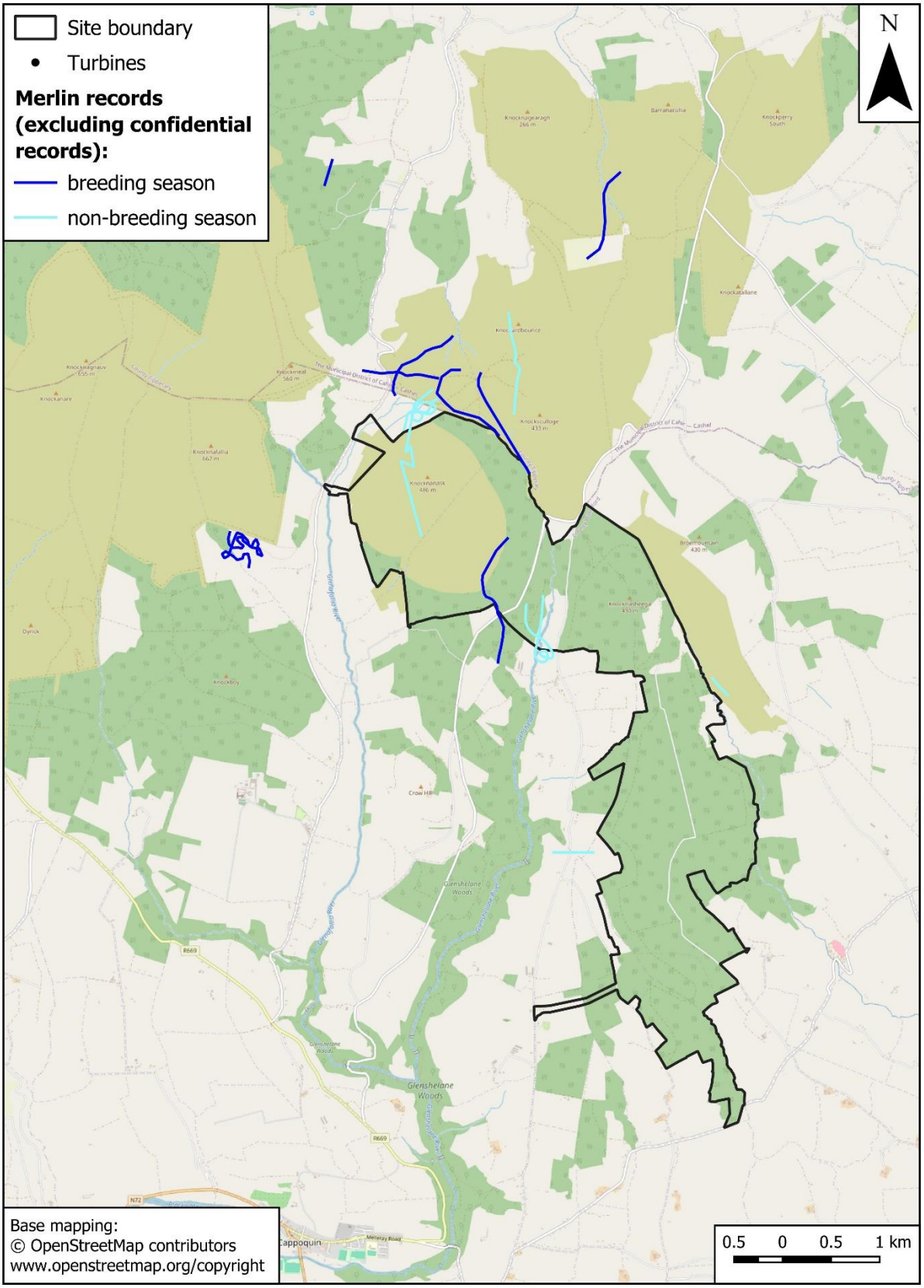

Figure 7.11. Merlin records from the bird surveys carried out for the Scart Mountain Wind Farm project.

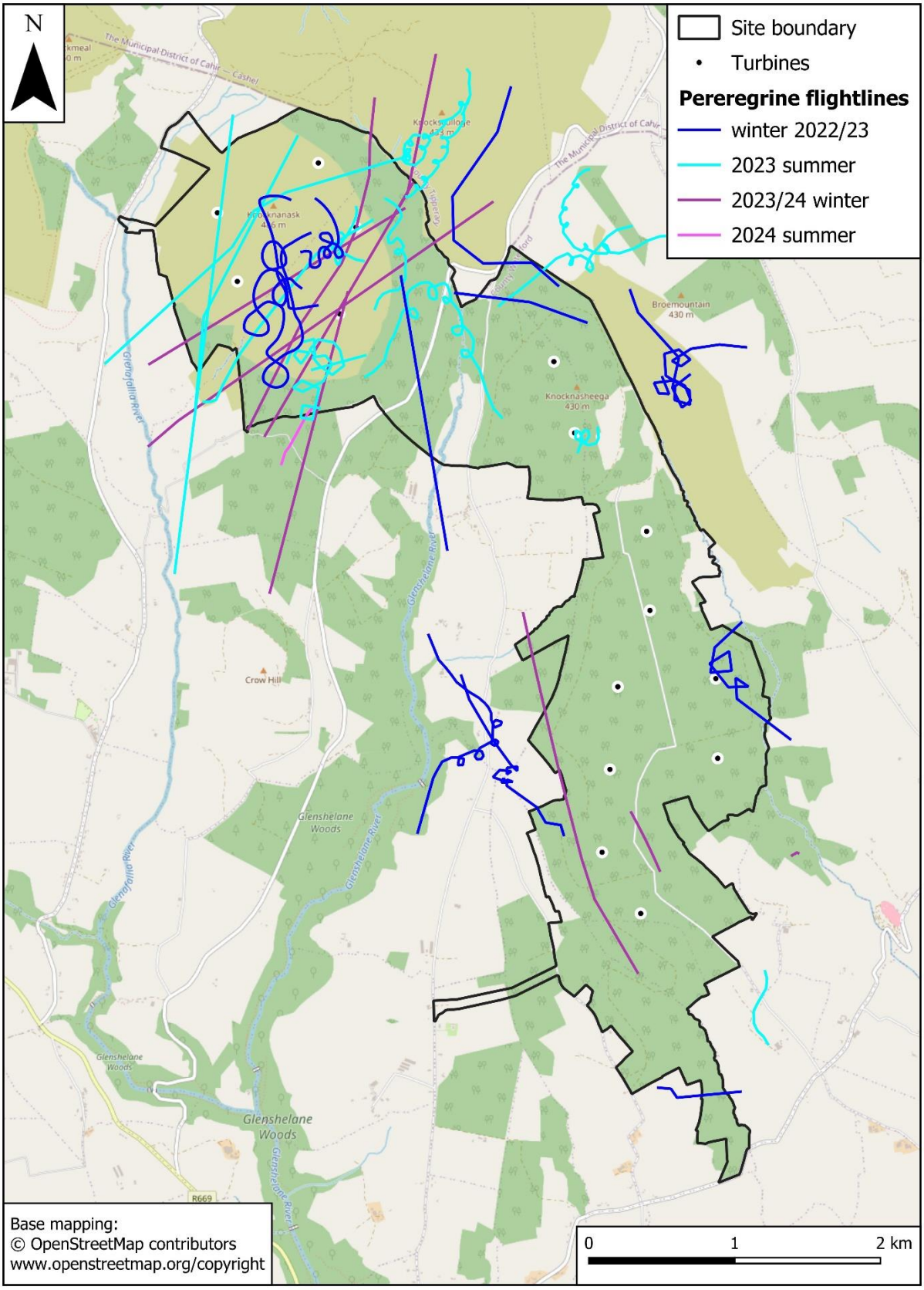

Figure 7.12. Peregrine flightlines, vantage point surveys, winter 2022/23 – summer 2024.

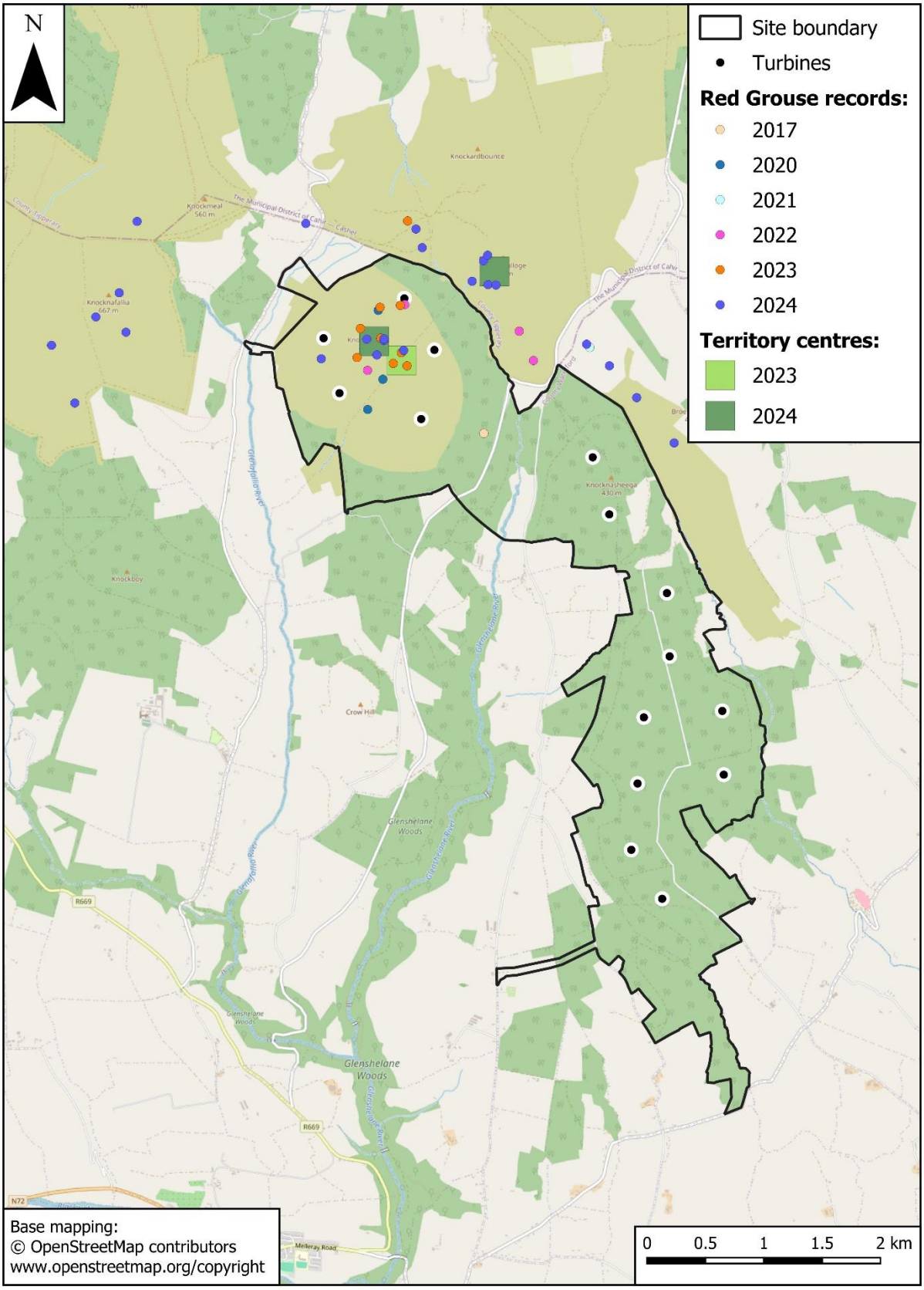

Figure 7.13. Red Grouse records from the bird surveys carried out for the Scart Mountain Wind Farm project.

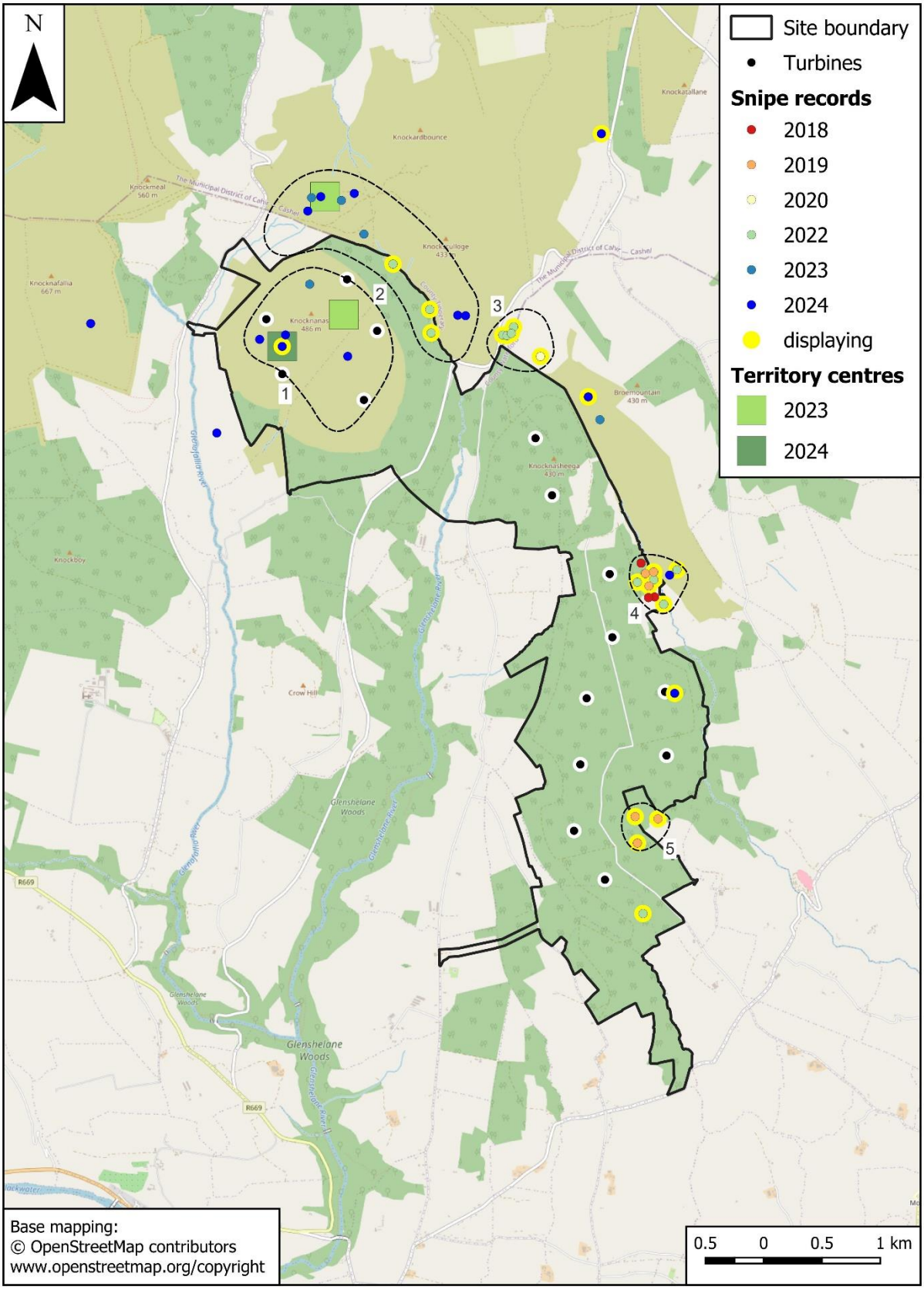

Figure 7.14. Breeding season Snipe records from the bird surveys carried out for the Scart Mountain Wind Farm project.

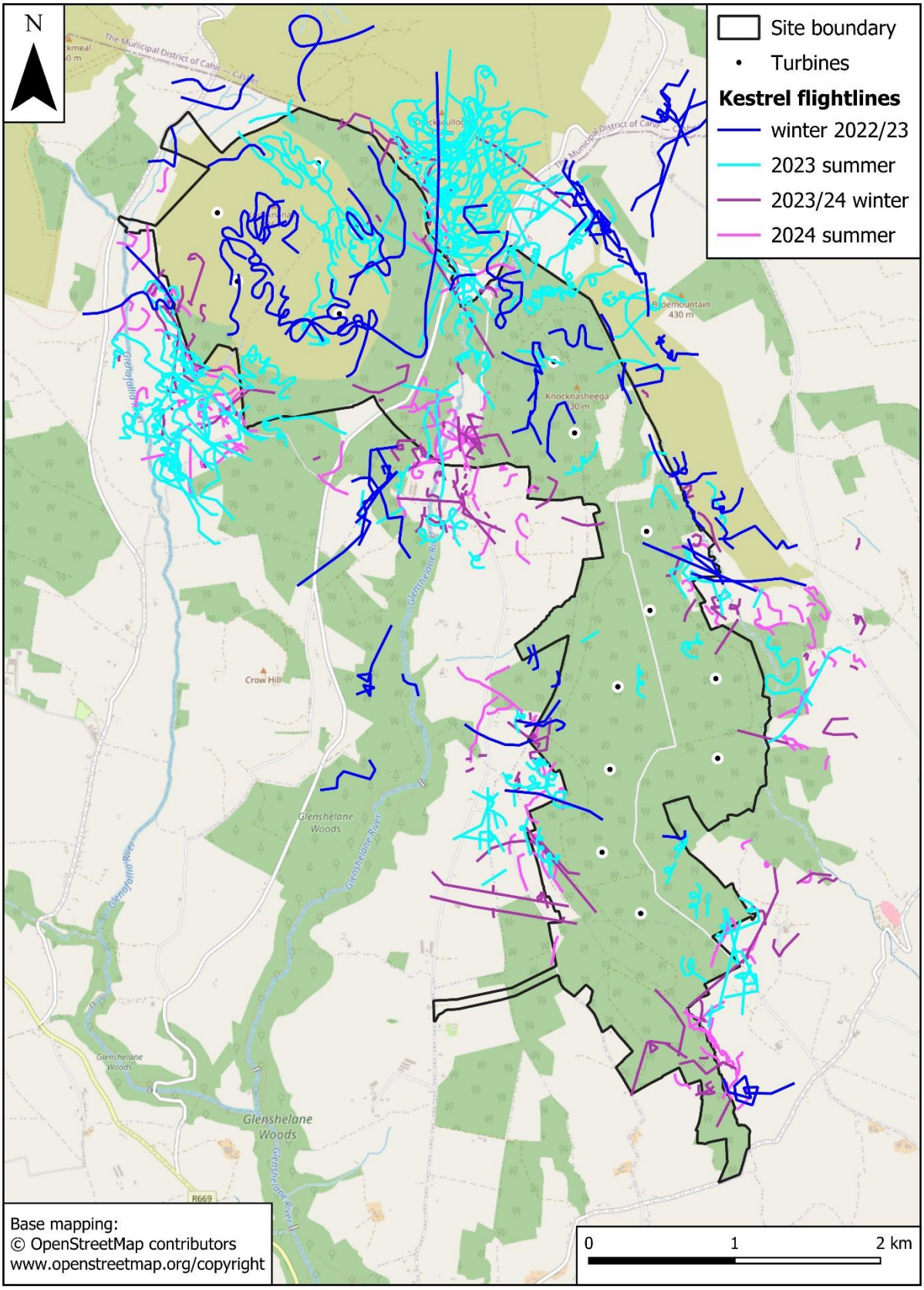

Figure 7.15. Kestrel flightlines, vantage point surveys, winter 2022/23 – summer 2024.

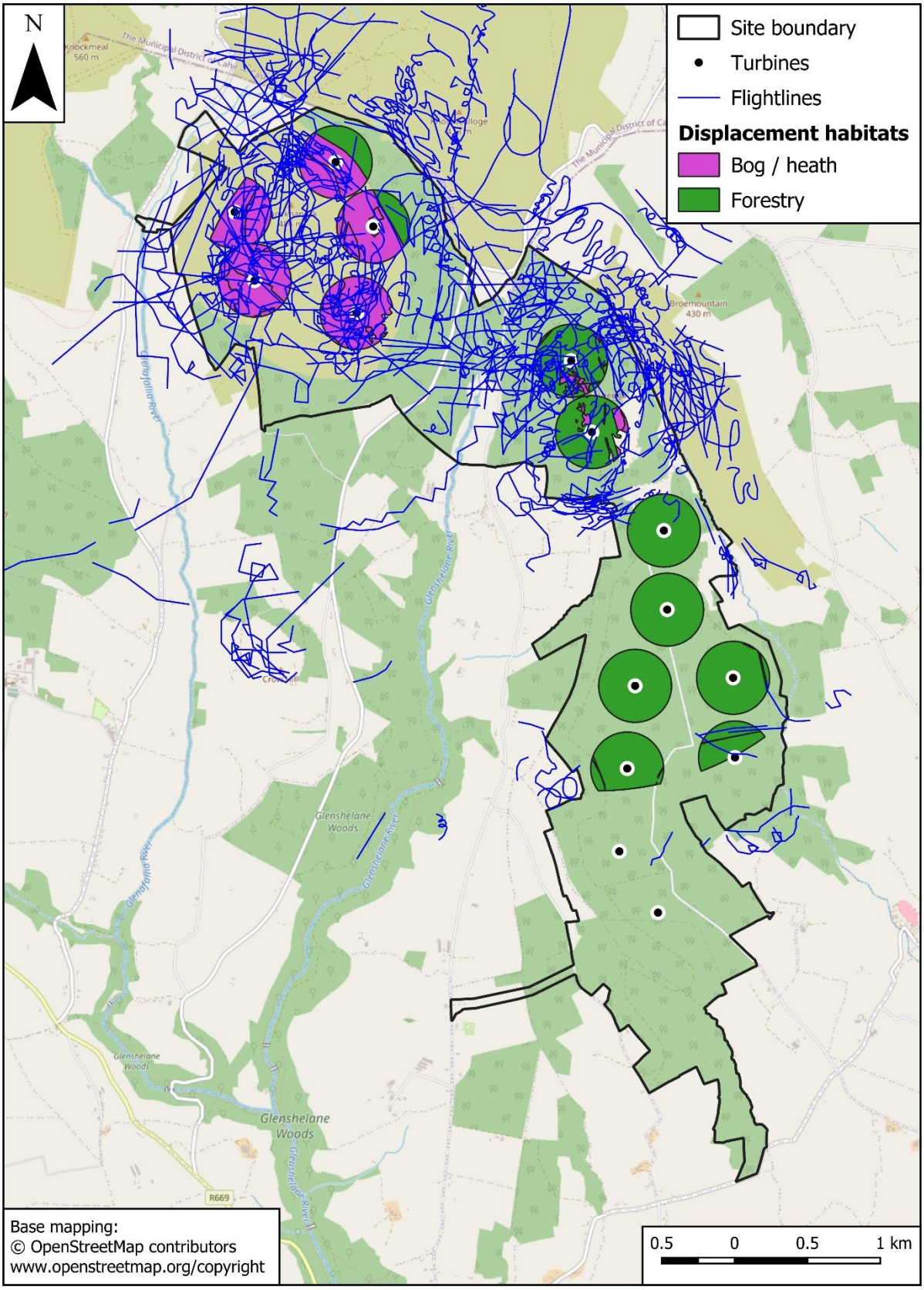

Figure 7.16. Potential Hen Harrier foraging habitats within core foraging ranges of nest sites / territory centres potentially affected by displacement impacts.

7°50'0"W
7°48'0"W
52°13'0"N
52°12'0"N
607600
605000
611000
613200

Legend

- Proposed Wind Farm Site
- Proposed turbine layout
- 250m buffer from proposed turbine layout
- Proposed infrastructure footprint within the proposed wind farm site
- Biodiversity enhancement lands

Habitats

- Wet / dry heath (4010/4030)
- Aced grassland (GS3)
- Conifer plantation (WD4/WD5)

Corine Land Cover

- Pastures (2310)
- Coniferous forest (312)
- Transitional woodland-shrub (324)
- Peat bogs (412)

0 250 500
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING\
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE\
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY \ WORK COMMENCES\
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd
A	17/12/2024	First issue	S.P	J.S

Client: Ireland FuturEnergy

Project: Scart Mountain Wind Farm

Title: Figure 7-17 Biodiversity management plan lands

Scale @ A3: 1:15,000

Prepared by:	Checked by:	Date:
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Draft: A